VAGINAL CELIOTOMY

BY

S. WYLLIS BANDLER, M. D.

FELLOW OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS AND GYNECOLOGISTS; ADJUNCT PROFESSOR OF DISEASES OF WOMEN, NEW YORK POSTGRADUATE MEDICAL SCHOOL AND HOSPITAL; ASSOCIATE ATTENDING GYNECOLOGIST TO THE BETH ISRAEL HOSPITAL, NEW YORK CITY

WITH 148 ORIGINAL ILLUSTRATIONS

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

1911

PRINTED IN AMERICA

Dedicated
to
PROFESSOR DR. ALFRED DÜHRSSEN (BERLIN)
who, by his original work in vaginal
surgery, has raised the specialty of
gynecology and obstetrics to the
dignity of a science

PREFACE

My interest in vaginal celiotomy dates back to 1895. In the intervening years I have given this method the test of time and experience.

I have never given it the extreme praise voiced by its most faithful and enthusiastic admirers. I have often wondered at its almost complete neglect by a very large share of the surgical and gynecological world.

In the thorough correction of cystocele, descensus uteri, prolapse of the uterus; for the performance of simple hysterectomy, vaginal celiotomy has a value so great that the abdominal route should scarcely enter into consideration.

I know of no book which treats in detail of these and allied topics. For this reason I offer this work in the hope that it may suggest the value of the vaginal path in the correction of many pelvic gynecological diseases.

The drawings by K. K. Bosse have been made after repeated observation of the various operative procedures on the living.

My sincere thanks are due the firm of W. B. Saunders Company, for its excellent work in the production of this book.

S. W. B.

NEW YORK CITY, *January*, 1911

CONTENTS

VAGINAL CELIOTOMY.

POSTERIOR VAGINAL CELIOTOMY.

Vaginal celiotomy, which includes the anterior and the posterior method, has naturally been practised for many years in the performance of vaginal hysterectomy. Anterior vaginal celiotomy first gained its real dignity when Mackenrodt and Dührssen began to perform vaginal suspension and vaginal fixation for the correction of retroflexions and retroversions. From that time on this route found an increasing number of indications until it was used, and can be used today, as a path for the performance of almost any operation included under the phrase "operation for pelvic gynecological disease."

Posterior vaginal celiotomy is an essential step in hysterectomy, but, in addition, it has great value as a celiotomy done for the purpose of diagnosis and for the surgical treatment of many pelvic diseases. The posterior method, because of its simplicity and lack of danger, is of the greatest value in diagnosis and differential diagnosis, even though it does not permit of that clear view of the various organs granted by the anterior route. It has the disadvantage that no correction of a retroflexion or retroversion can be done by this method.

TECHNIC.

The cul de sac of Douglas may be entered by a transverse or longitudinal incision or by a combination of the two. The longitudinal incision is carried down through the posterior covering of the cervix,

through the mucosa of the posterior fornix, passing thus into the connective tissue lying under the cul de sac of Douglas and then penetrating the peritoneum. If not made too long, if the cervix is pulled well down and if the posterior fornix is put on the stretch by a long posterior speculum, there is very little danger of injuring the rectum, provided the incision closely hugs the posterior wall of the actual cervix tissue. The longitudinal incision may be amplified by incisions made transversely (Fig. 1).

The cul de sac of Douglas may be entered by a transverse incision. The loose vaginal tissue in the posterior fornix with its transverse corrugations may be picked up 1 1/2 to 2 inches away from the external os after the cervix is drawn well up toward the urethra, and one snip with the scissors close to the forceps gives direct entrance into the cul de sac of Douglas (Fig. 2). The advantages of this method are: the peritoneum and the vaginal edge are readily brought into contact; there is remarkably little oozing. The risk in this method is: the possibility of cutting into the rectum or of injuring intestine if the latter be present in the cul de sac of Douglas. These risks, while not great, are nevertheless worthy of consideration. If the scissors do not enter the cul de sac, a slight dissection with the gauze-covered finger exposes the peritoneal fold of Douglas which is picked up with forceps (Fig. 3), and cut to any desired width. The peritoneum is then united to the vaginal edge by forceps or by sutures, either of which remain in place until the desired operation is completed (Fig. 4).

The safest method consists of a transverse incision made nearer to the external os, but is, unfortunately, the bloodiest, for the loose connective tissue under the cul de sac of Douglas and between the cervix and the rectum oozes considerably, especially at the lateral margins of the transverse incision. With the cervix pulled well up toward the urethra a transverse incision is made across the cervix throughout its entire width and passing well down to the structure of the cervix. The lower margin of the incision is grasped with

FIG. 1.—POSTERIOR VAGINAL CELIOTOMY.

A longitudinal incision in the posterior fornix amplified by two transverse cuts. The cervix is pulled up toward the urethra, the knife makes a long longitudinal incision beginning at the point where the mucosa begins to be loosely attached to the posterior wall of the cervix. The point of the knife should stick closely to the structure of the cervix itself. After the incision in Douglas has been carried to the desired length, two transverse cuts are made at the lowest area of the peritoneal incision. If a transverse incision is made first the added longitudinal cut may be made subsequently. The peritoneum may be united to the vaginal mucosa by several interrupted sutures as shown above.

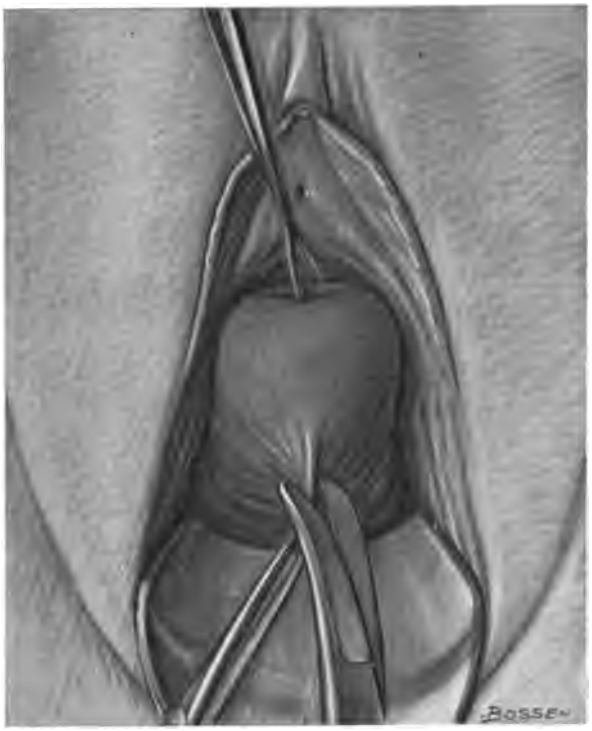

FIG. 2.—POSTERIOR VAGINAL CELIOTOMY.

If the loose vaginal mucosa in the posterior fornix is picked up firmly 1 1/2 to 2 inches away from the external os and if scissors be held in a horizontal direction, it is generally possible to incise the vaginal mucosa and the peritoneal fold of Douglas at the same time. The length of this transverse incision may be increased toward either side. There is very little oozing and the peritoneum may be united to the vaginal mucosa by forceps or sutures.

FIG. 3.—POSTERIOR VAGINAL CELIOTOMY.

If the transverse cut with the scissors is made a little nearer to the external os than in Fig. 2 the peritoneumis not incised, but is brought directly into view. A little dissection is made with gauze-covered index finger, and then the peritoneum is picked up and incised.

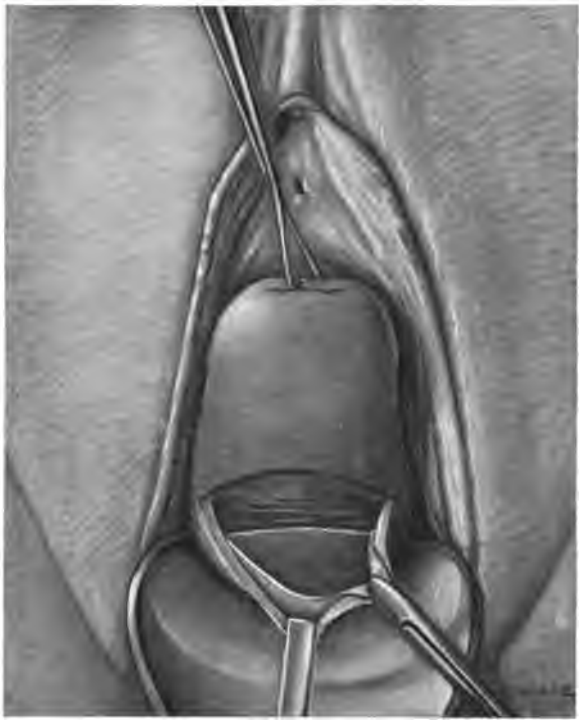

FIG. 4.—POSTERIOR VAGINAL CELIOTOMY.

The lower edge of the peritoneal apron on the posterior wall of the cul de sac of Douglas may be picked up with the forceps or hooked with the index finger and brought into ready contact with the vaginal edge and united by sutures or by long artery forceps or clamps. This gives roomy, unhindered entrance into the peritoneal cavity for any examination or manipulation and retains the peritoneum where it may be sewed or made use of in any desired fashion subsequently.

one or two forceps which brings the connective tissue bands uniting it to the posterior wall of the cervix into view. These bands may be cut through with short snips of a blunt-pointed scissors (Fig. 5), the tip of the scissors being held very close to the structure of the cervix itself. The index finger covered with gauze then further separates these bands and soon the peritoneum of the cul de sac of Douglas is reached. This may be grasped with forceps and cut with the scissors; or it may be perforated with the finger or, by further separation of its connection to the posterior wall of the cervix, this peritoneal pouch may, with the aid of the index finger be peeled off from the posterior wall of the cervix and uterus for a further distance of one or more inches. (This added upward dissection of the peritoneum from the posterior wall of the uterus, when extended laterally by the introduced finger, enables us to reach and perforate pus sacs situated lateral to the sac of Douglas without entering the free peritoneal cavity (see page 154).) The peritoneum may then be grasped with the scissors and cut through, or it may be perforated with the index finger. Peritoneum is united to vaginal edge by forceps (Fig. 4) or by sutures (Fig. 6). The longitudinal incision mentioned above may be amplified by a transverse one, giving in that event a large opening (Fig. 1).

The peritoneum may be entered by a longitudinal incision made by the scissors in the act of splitting up the entire posterior wall of the vaginal portion of the cervix through the cervical canal (Fig. 7). This splitting, when continued, results in entrance into the peritoneal cavity (Fig. 8), after which the uterus is grasped with volsellum forceps and the splitting of the posterior uterine wall may then be continued as far as desired. This method is used in gaining access to fibroids in the posterior wall of the uterus, and above the peritoneal fold of Douglas. This procedure is also the one followed in doing vaginal hysterectomy through the posterior incision according to the method of Döderlein.

By whichever method the cul de sac is entered, the width of the incision in the peritoneum may be increased by cutting with scissors or by stretching the gap with aid of two introduced index fingers exerting tension toward either side. It is then always advisable to bring the posterior apron of the peritoneum which is over the rectum into contact with the adjacent edge of the vaginal incision. This is done by applying one or more long artery forceps or clamps or by uniting the peritoneum and vaginal edge by interrupted single sutures or by several mattress sutures. The long ends of these sutures, when pulled on, serve to bring this incision into the cul de sac into relief and to markedly check the oozing from the connective tissue posterior to the peritoneum and anterior to the rectum; in other words, the posterior parametrium. When clamps are used instead of sutures they are in the way and interfere with ready entrance into the peritoneal cavity.

USES OF POSTERIOR VAGINAL CELIOTOMY.

For differential diagnosis.—A high place must be accorded to posterior celiotomy as a diagnostic aid, more especially appreciated in differentiating intra uterine from extra uterine gestation. The operation is extremely simple, taking only one minute to enter the peritoneal cavity by a longitudinal or, preferably, transverse incision. Small spurting vessels should be controlled by forceps or sutures, otherwise oozing continues during the entire examination. It is advisable in the course of the examination to introduce a speculum into the peritoneum. If no free blood or clots are found in the cul de sac of Douglas, and if the tubes are normal, the exclusion of ectopic gestation is absolutely certain. If ectopic gestation is disclosed, the choice of continuing the operation per vaginam by the posterior or anterior route or per abdominem rests with the surgeon.

I have used the posterior incision in very many cases for verifying or excluding the existence of an early ectopic gestation in cases where the differential diagnosis between this condition and early abortion

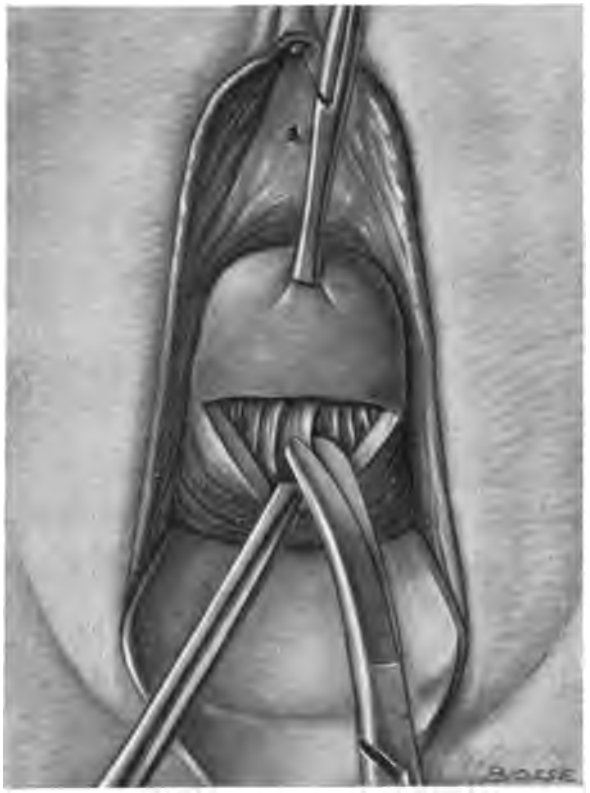

FIG. 5.—POSTERIOR VAGINAL CELIOTOMY.

If a transverse incision is made in the posterior wall of the cervix nearer to the external os than in figures in 2 and 3, it is necessary to loosen the connective tissue bands connected with the posterior wall of the cervix by snips of scissors followed by rubbings with the gauze-covered index finger. The peritoneum when reached may be pushed up or dissected up from its connections by the index finger. The peritoneum is then perforated by the finger or by forceps and scissors.

FIG. 6.—POSTERIOR VAGINAL CELIOTOMY.

The peritoneum is not so easily grasped by forceps with the incision made in figure 5 as with the incision in figures 2 and 3. It is easy, however, to perforate it with the index finger, to catch the posterior apron of the peritoneum with the finger, to bring it down into contact with the vaginal edge, and then unite the two by interrupted sutures. The sutures pass through the vaginal mucosa and the peritoneum. In the above drawing they are attached more particularly to the peritoneum to show how readily it can be drawn down.

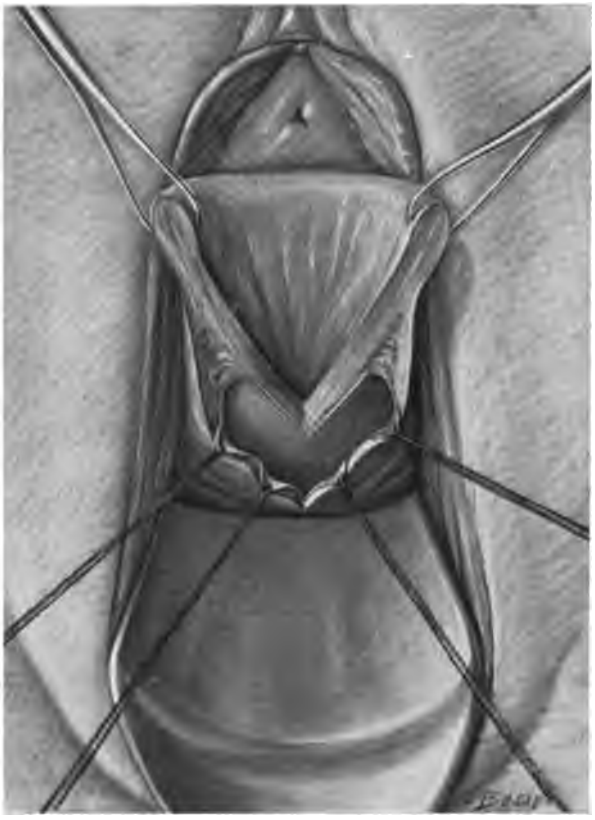

FIG. 8.—POSTERIOR VAGINAL CELIOTOMY.

The incision begun in figure 7 has been continued through the cervix and into the cul de sac of Douglas and the posterior apron of peritoneum has been united to the vaginal edge. This method allows of approach to the subperitoneal, interstitial and submucous fibroids of the posterior uterine wall situated above the cul de sac of Douglas, and constitutes the first stage of Döderlein's method of hysterectomy.

was in question. The procedure itself is so simple that its use need not be considered a performance of any great moment.

For Examination.—A thorough examination of the adnexa may be carried out through the posterior vaginal incision. The external hand is applied over the abdomen, two fingers of the other hand pass through the incision into the peritoneal cavity and in this manner, bimanual examination is thoroughly carried out. There are many cases where sterility is due to some involvement of the tubes which escapes diagnosis on ordinary bimanual examination. The outer end of the tube may be closed by adhesions or may be surrounded by cobweb adhesions; there may be a small, soft hydrosalpinx, etc. Many such cases are curetted for sterility. In many such cases the Alexander-Adams operation is done for the cure of sterility. These procedures could be avoided if the diagnosis of adhesions were made with certainty.

To Loosen Adhesions.—In cases of adherent retroflexed uterus or adherent prolapsed adnexa, whether operation be attempted entirely through the posterior route or whether the posterior incision is used as an aid to the anterior, the internal fingers may loosen adhesions and separate adherent tubes and ovaries. The internal fingers may grasp the tube and ovary and draw them into the vagina. When adhesions to intestine are extremely dense, the greatest care of course is required in manipulating the internal fingers to avoid injury to the intestine.

For Replacing Incarcerated Uterus.—Very few cases of retroflexion cause trouble when pregnancy takes place. In the vast majority of cases the uterus rises up out of the pelvis into the abdominal cavity. In a few instances, where the condition has not been diagnosed or where a pessary has not been used or where the patient has not been kept under observation, incarceration of the pregnant uterus is threatened or actually occurs. In the early stages reposition of the uterus by bimanual manipulation or in the knee-chest position may just fail to lift the uterus past the promontory of the sacrum. In

such cases posterior vaginal incision, by permitting of the deep introduction of the internal fingers, may be of service in replacing the uterus, thus avoiding abdominal operation or the occurrence of an abortion or injury to the bladder through pressure.

For Delivering Adnexa and Uterus.—For the purposes of examination and operation the posterior vaginal incision is indicated, when ovaries or ovarian tumors lie deep or can be pushed down and can be reached with the internal fingers, or if they lie directly on or close to the posterior fornix. The more loose the various ligaments of the uterus, the looser, especially, the round and broad ligaments, the more movable and retroflexed the uterus, the more expeditiously can the adnexa be delivered through the posterior vaginal incision, and this is more true of the uterus. It is hard to deliver the uterus unless it is freely movable and unless the ligaments are loose (Fig. 9). This is particularly so in the case of nulliparæ, in many of whom the anterior route is to be preferred. Those cases in which delivery of the uterus by the posterior route is easy are the very ones in whom retroflexion or retroversion is present and in whom the anterior method should be chosen, because it permits, in addition to the other procedures, the correction of the abnormal position by vagino-suspension or fixation or by shortening of the round ligaments.

For Removing Ovarian Cysts.—The posterior path has for years been used to great advantage for the removal of small movable ovarian tumors which are prolapsed into the cul de sac of Douglas. In fact, it was for the removal of ovarian cysts that this route was first used, and in America, too. Atlee, in 1857, was the first to do a posterior vaginal celiotomy, though to Gaillard Thomas, 1870, belongs the credit of the first deliberate use of this route. Dührssen, however, uses the posterior route for the opening and extraction of cystic tumors of the ovary, if they can be reached by this path, only in the case of pregnancy, a condition which contraindicates the use of the anterior vaginal route. Practically all movable ovarian cystic tumors which

FIG. 9.—DELIVERY OF THE UNCUT UTERUS THROUGH THE POSTERIOR VAGINAL INCISION.

A long posterior speculum and, if necessary, two side retractors, have been introduced into the peritoneal cavity, and volsella applied to successively higher points on the posterior wall of the uterus have brought the fundus into the vagina. The fundus when lifted up toward the urethra exposes the anterior wall of the uterus with delivered tubes and ovaries. This procedure is possible with freely movable or retrodeviated uterus with loose ligaments. It may be used to accomplish the delivery of adnexa or ovarian cysts for diagnosis or removal.

FIG. 10.—Through the posterior vaginal incision small movable ovarian cysts and dermoids may be delivered if situated in the cul de sac of Douglas or if pushed down into the cul de sac of Douglas from above. It is generally necessary to puncture the cyst, to grasp the edges of the incision in the cyst wall, and then the cyst itself with long forceps and thus extract the collapsed tumor, and ligate the meso-ovarium and meso-salpinx most carefully with several sutures. It is occasionally necessary to deliver the uterus itself through the posterior incision in order to bring the tumor within reach of puncture or to bring the pedicle or meso-ovarium within reach of the needle or ligature carrier.

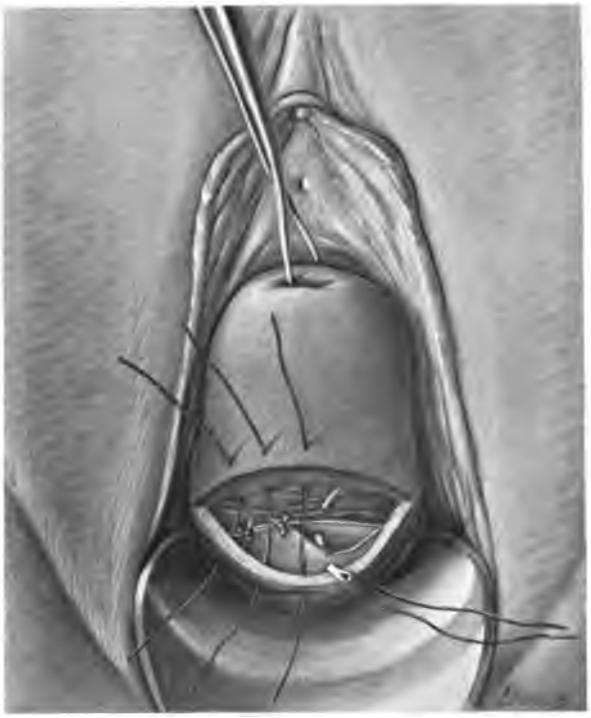

FIG. 11.—The transverse incision into the cul de sac of Douglas may be sewed in the direction of the incision by interrupted sutures, the needle being passed through the peritoneum from below upward, taking firm hold on the uterus at the peritoneal reflection. The incision in the posterior fornix is then closed in the same manner. If, in any case, drainage by a wick of gauze is desired, it may be placed between any two interrupted sutures.

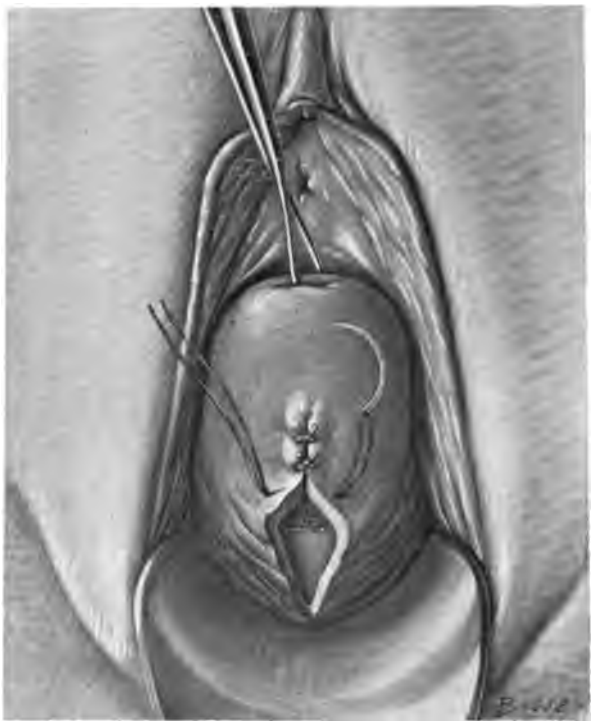

FIG. 12.—The transverse incision may be sewed in the longitudinal direction especially in the case of shallow, angular posterior fornix or of posterior parametritis. The transverse incision followed by thorough separation of the subperitoneal connective tissue before the cul de sac is opened plus the longitudinal sewing of the incisions, increases the mobility of the uterus in cases of retrodisplacement due to posterior parametritis or to sclerosis.

can be pushed down deep into the pelvis may be removed by the posterior route with or without delivery of the uterus. The cyst wall is pierced with a trocar or forceps, and after the fluid or dermoid contents have been discharged the edges of the incision in the cyst wall are grasped and the collapsed tumor is extracted. The same holds true of movable dermoid cysts not situated lateral or antero-lateral to the uterus. (Fig. 10.)

For Posterior Parametritis and Retrodisplacement.—The transverse incision into the Douglas cul de sac is also of great value where an old sclerosing posterior parametrium has pulled the uterus into retrodisplacement. Incisions into the posterior peritoneal sac are sewed as a rule in the direction in which they have been made (Fig. 11). In these cases, however, a wide transverse incision into the cul de sac of Douglas permits the peritoneal and vaginal incisions to be sewn in a longitudinal direction and this makes the uterus more mobile (Fig 12). This is an important adjunct to any operation designed to bring forward the fundus in such a retrodisplaced case.

For Drainage.—In many instances after abdominal laparotomy or after anterior celiotomy packing is desired because of raw, oozing surfaces, or drainage is needed because of infection of the peritoneum or injury to intestine, etc., and then this may be accomplished, and the gauze drawn out or introduced, through the posterior incision. The ascites of abdominal tuberculosis or that due to papilloma or carcinoma of the ovaries or in some cases to fibroma of the ovary may be readily drained by posterior vaginal incision.

For Pelvic Abscess.—The posterior route has been used for years in the opening of pelvic abscesses. Strictly speaking, this is not always celiotomy, for in a certain proportion of cases the pus is not in the peritoneal cavity, but in the pelvic connective tissue, posterior or lateral to the uterus. In the vast majority of cases of large pyosalpinges and tubo-ovarian abscesses opened per vaginam, adhesions in the cul de sac of Douglas practically wall off the pus foci and

pus sacs from the peritoneal cavity. The posterior route is of course of value in the treatment of pelvic peritonitis according to the method of Pryor.

Exudates or accumulations posterior or postero-lateral to the uterus consist of blood or inflammatory exudate. Blood, inflammatory exudate, pus, may be in the cul de sac of Douglas proper, or in the tubes or ovaries prolapsed into the cul de sac or lateral to it, or may be in the broad ligaments; exudate or pus may be in the connective tissue under the cul de sac of Douglas, *i. e.*, in the posterior parametrium.

In many instances one is not certain whether he is dealing with a posterior parametritis or an encapsulated purulent exudate in the peritoneal cavity, or with pyosalpinges or tubo-ovarian abscess, or an infected hematocele.

The method of posterior incision is of great value in the presence of retrouterine accumulations, not alone for the purpose of diagnosis but for the purpose of treatment. If doubt exists as to the diagnosis between hematocele and posterior parametritis, if the exudate lies directly behind the uterus and extends more or less to either side, this posterior incision is of great value in making a diagnosis as well as in carrying out the treatment. In these cases a transverse incision is made in the posterior fornix over the most bulging part of the mass (Fig. 13). It is always advisable to make this incision close to the cervix, and not to use too long a speculum. When the cervix is lifted up the mass remains visible if we are dealing with a posterior parametritis, whereas in the case of pus accumulations in the tubes and ovaries, the act of pulling on the cervix makes the mass less distinct. Hence the speculum should not be too long nor should the cervix be pulled down too firmly. A transverse incision is made with the scissors and then a long pair of curved scissors is pushed directly into the mass through this incision, the tip of scissors always pointing upward toward the uterus to avoid the rectum. The handles of

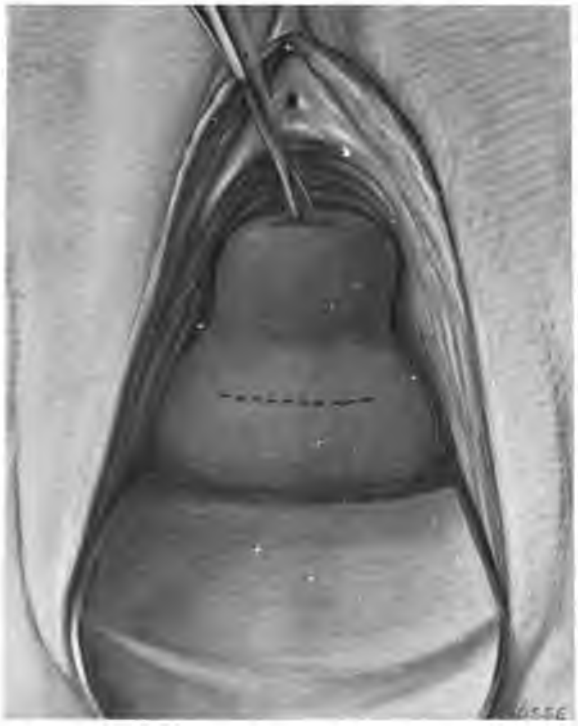

FIG. 13.—Shows to an exaggerated extent the bulging of the posterior fornix produced by a posterior parametric abscess. The same condition, but to a less pronounced degree, occurs with an intraperitoneal or intratubal collection of pus when situated in the cul de sac of Douglas. The dotted line shows the position and extent of the transverse incision through the mucosa which is to be made with scissors, before the pus accumulation is perforated and opened.

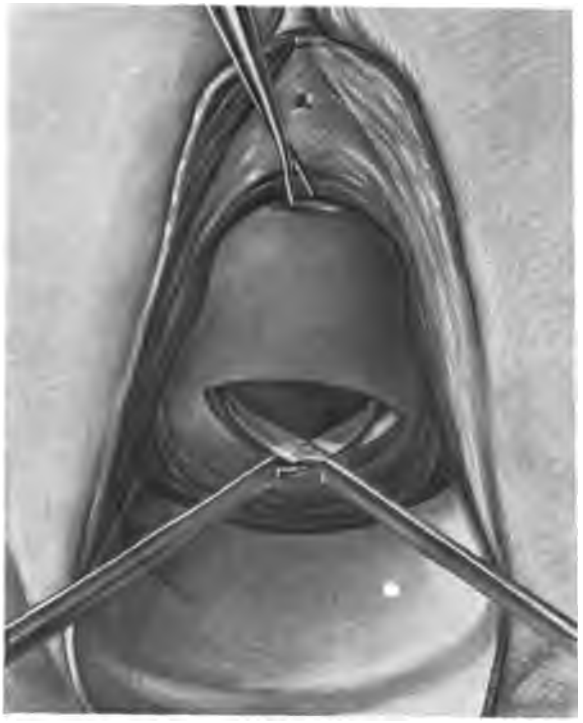

FIG. 14.—Shows the introduction of a long, narrow, not too sharp-pointed, slightly curved scissors through the transverse incision of figure 13 into the mass in the posterior fornix with opening of the scissors and stretching of the vaginal incision. This gives free outlet to the pus. Scissors or long dressing forceps are the only instruments used by the author in entering and opening pelvic abscesses.

the scissors are then separated and the resulting discharge of either pus or blood makes the diagnosis (Fig. 14). If blood appears, this may be drained and then the choice of route for attacking the ectopic gestation rests between the anterior vaginal incision or the abdominal one, unless the hematocele be an old infected one, when it may be advisable, temporarily or otherwise, to treat the condition only vaginally by drainage.

In many instances, even after a so-called pelvic abscess is opened, especially when situated in the median line, one is not sure as to whether he has been dealing with the posterior parametrium or a purulent encapsulated accumulation in the cul de sac of Douglas, or pus held within the tube or ovary, *i.e.*, pyosalpinx or tubo-ovarian abscess. Hence it is important after opening such abscesses to go in with the finger, to enlarge and open up the various foci, to push in an upward direction with great care. If we are dealing with a posterior parametritis, we should avoid piercing the cul de sac of Douglas; if dealing with any of the other inflammatory conditions mentioned, we should avoid perforating either the upper lymph wall of the peritoneal pus accumulations or the upper walls of the tubo-ovarian pus sacs themselves.

Irrigation of resulting cavities should be of the very mildest character, carried out without any pressure; often no irrigation is advisable. Subsequent drainage may be carried out by the use of large rubber tubes, which must then be sewn to the edge of the vaginal incision, or by thorough but gentle packings of gauze, or by a combination of the two. I must confess to a preference for gauze, for by this means one may thoroughly fill out the entire cavity. The use of gauze, however, necessitates frequent changes, each time a little less gauze being introduced, in order to prevent new foci from being formed by contact of the walls of this pus cavity. This demands frequent attention on the part of the surgeon, more so than if tubes are used, but I find the excellent results well worth this extra labor.

In pus accumulations postero-lateral to the uterus, or posterior

to the broad ligaments, the posterior fornix incision enables us to push the peritoneum of the cul de sac of Douglas upward and to dissect it off laterally and then with the introduced finger, aided by manipulation of the external hand held on abdomen, to perforate pus sacs without entering the free peritoneal cavity.

A Step in Vaginal Hysterectomy.—Posterior vaginal section is an essential preliminary to practically all the operations for the vaginal removal of the uterus. Whenever possible the posterior incision should enter into the peritoneum as the first step of the operation. There are cases where this is not possible, the cul de sac of Douglas coming into reach only after the cervix and lower part of the uterus have been freed from their connections, after which it may be possible to enter the posterior peritoneum. If the uterus is to be split through the posterior wall alone, or if both walls are to be split at the same time it is always advisable to first enter both the posterior and anterior cul de sacs when feasible.

Some surgeons practise direct entrance into the posterior cul de sac in splitting the posterior wall of the cervix and uterus from the external os to the fundus. They enter the peritoneal cavity in the process of splitting the cervix without the aid of a transverse incision into the posterior fornix. This procedure constitutes the preliminary to Döderlein's method of vaginal hysterectomy (Figs. 7 and 8).

In this method the portio vaginalis is lifted up toward the symphysis, a posterior longitudinal incision is made which splits the posterior lip of the cervix up to the fornix. The splitting is continued through the peritoneum of Douglas into the cul de sac of Douglas, and this peritoneum is grasped and sewed to the edge of the posterior vaginal incision (Fig. 8). Laterally two or three sutures are applied to unite the peritoneum over the entire wound edge under which lies the rectum. The posterior wall of the uterus is then drawn down by tenaculum forceps applied to both sides of the uterus and splitting is continued between these forceps (Fig. 15). If myoma nodules are encountered,

FIG. 15.—The uterus, after preliminary splitting of the posterior wall of the cervix has made entrance into the cul de sac of Douglas, is divided still further. A posterior speculum is introduced into the peritoneal cavity and the uterus is drawn out by successively applied volsella and the splitting is continued up toward the fundus. This process is continued so that when the uterus has been delivered beyond the vulva the anterior wall seen in figure 9 is also to be divided.

The splitting in figures 7 and 8 is continued with delivery of the uterus through the posterior incision. This represents the important step in vaginal hysterectomy as practised by Döderlein. After delivery of the completely divided uterus, with or without enucleation of any myomata which are present, the remainder of the operation is carried out by clamps and ligation or by ligation alone.

these are grasped independently by volsella, enucleated or made smaller by cutting out wedge-shaped pieces, until the remainder of the uterus may be extracted. The uterus is then split further up over the fundus. The bladder remains far behind, so that finally only a small bridge remains between the anterior fornix and the base of the vesicouterine plica. The anterior wall of the cervix is divided up to the antecervical connective tissue and the plica is united to the anterior fornix. The two divided halves of the uterus are then freed up to their lateral connections, and these may be divided after applying strong clamps to the ligaments. The blood vessels appearing in the stumps held in the clamps are tied, and then the clamps may be removed and the stumps may be covered with the peritoneum.

Döderlein, however, prefers to tie off the ligamentum suspensorium ovarii and the pars cardinalis of the ligamentum latum in sections before cutting them. The wound surface is then covered with the peritoneum.

ANTERIOR VAGINAL CELIOTOMY.

Anterior colpoceliotomy was first recommended theoretically by Sänger in 1888.

Sänger said, "we may obtain a direct action on the previously anteverted corpus uteri through transverse separation of the anterior vaginal roof, by opening of the plica anteriorly and fixation of the corpus uteri with silver thread to the vagina; the wound then being united longitudinally, whereby the collum at the same time is forced backward into its normal position."

For a long time the operation of vaginal fixation was performed for the correction of retroflexio through a transverse fornix incision and without opening the peritoneum. In 1890, vaginal laparotomy was done occasionally by Dührssen. It was first accidently performed by him; the peritoneal fold being torn on grasping the anterior wall of the uterus in the course of a vaginal fixation which at that time was done without opening the vesicouterine fold. The same accident occurred to Zweifel and Fritsch.

In November, 1890, in a case of anteversion, Dührssen made a transverse opening in the anterior fornix, grasped the uterus with volsellum which tore through the plica, and the peritoneum was opened. The uterus was pushed forward by a double running catheter introduced into the uterus, grasped by a volsellum, and then fixed to the vaginal wall.

In a second case, one of retroflexio, the peritoneum was opened and the soft uterus had an intrauterine catheter in it to push the fundus forward. It perforated the uterus; the perforation was closed and the uterus was fixed to the anterior vaginal wall by a suture passed through the uterus above the tear.

In 1892, Dührssen began to open the peritoneum purposely.

Küstner was among the first to purposely make a wide incision in the peritoneal fold.

In 1893, Dührssen removed a fibroma from the anterior uterine wall by a vaginal celiotomy. About the same time he removed the adnexa by this route. After adopting this method, he added to the transverse vaginal incision a longitudinal incision of 2–4 cm., such an incision having been recommended by Zwiefel. He said in 1894, that he did this because the vagina was narrow and the tumors were large.

Dührssen's earliest cases of vaginal fixation without opening the plica were done through the transverse incision. After he began to open the plica he practised extraction of the corpus and adnexa. A transverse incision was made and the uterus was drawn down by two ligatures until the plica could be opened. Then, after removing the volsella and the speculæ and pushing the portio back, the corpus was drawn into the fornix by the aid of the uppermost provisional suture and then with the aid of volsella put on still higher the entire uterine body was drawn into the vagina and out to the vulva.

Then he found it necessary to make the vaginal wound larger, as it also aided in replacing the uterus. He therefore added a 2–4 cm. longitudinal incision.

In 1893, Dührssen began the regular use of vaginal celiotomy, although up to the end of 1894 anterior colpoceliotomy was mainly practised for the purpose of vaginal fixation, and even then the opening of the vesicouterine peritoneal fold in the hands of most operators was generally accidental.

Küstner opened the plica widely, using a simple longitudinal incision and fastening the corpus with two or three silkworm sutures to the anterior vaginal wall.

Martin did the same.

In 1894, Martin recommended the method of anterior celiotomy for

the enucleation of myomata. In 1895, he advised this method for the removal of adnexa. Among others, Kossmann wrote considerably in favor of anterior celiotomy.

In 1895, Dührssen reported two ectopic gestations removed through the vagina, and later recorded the removal of large ovarian cysts and pus tubes. About this time he improved the technic of the operation in order to avoid disturbances in labor which followed the operation of vaginal fixation. This consisted in sewing the vesicouterine fold before tying the sutures which fixed the uterus to the vagina. The resulting "sero-seröse" peritoneal union prevents dystocia in labor. In 1895, Wertheim reported the enucleation of fibromata by the vaginal route. Fehling and Peter Müller recommended anterior and posterior colporrhaphy plus vaginal fixation for the treatment of prolapse of the uterus.

In 1896, Wertheim and others devised vaginal fixation of the round ligaments and shortening of the round ligaments through vaginal celiotomy to avoid the disturbances in labor which had followed some cases of vaginal fixation.

Schauta early adopted the method of vaginal celiotomy for the performance of ovariotomy. He was the first to use the vaginal route for the removal of large cystic tumors of the adnexa, cysts containing from ten to fifteen quarts of fluid. He said that ovariotomy is easily done through the vagina if the cyst is movable and pedunculated. Even if only a small part of the cyst surface can be reached, it can readily be punctured by a trocar. The cyst wall thus opened is pulled through the vaginal incision, the pedicle is tied, and the cyst removed. There is room enough for this procedure even with large cysts in which the lower pole of the tumor does not dip down into the pelvis. In that event, the lower pole can be reached through the peritoneal incision by introducing two fingers into the peritoneal cavity, on which the trocar can be pushed into the cyst, which can then be drawn down after being emptied. Schauta, in his operations, removes dermoid and also multilocular cysts; one compartment after another is emptied by

the trocar so that unilocular cysts are not the only ones adapted to this method.

In 1896, Wertheim reported the vaginal extirpation of intraligamentous cysts. Theoretically speaking, it is not necessary to enter the peritoneal cavity. The lower pole of the cyst is exposed through the vagina and emptied by puncture. The cyst wall is then shelled out from its subperitoneal situation.. In his first case the cyst extended to the ensiform cartilage and contained ten quarts of fluid. It was remarkable with what ease the cyst was shelled out *in toto* without any bleeding. In this instance the uterus was also removed because, as is often the case with large intraligamentous cysts, it was pressed flat and misshaped through pressure. His second case was a cystic intraligamentous tumor of the ovary the size of a child's head. It was peeled out, as was the first case. but tore in several places where it was firmly adherent to the peritoneal covering. Its removal was not entirely extraperitoneal.

Chrobak has also removed intraligamentous cysts in this manner, and found that it might be advisable to leave *in situ* those parts of the cyst wall which could not be loosened from the peritoneum, and to sew them into the vagina. He remarked also that in abdominal operations it was sometimes necessary to leave behind areas of cyst wall too closely connected to intestine.

Before this period vaginal hysterectomy for double pyosalpinx, especially with the aid of clamps, was being practised in France and Germany, and was brought to a high state of perfection by Landau of Berlin.

Chrobak began vaginal extirpation of myomata in 1892, and by 1894 had done seventy vaginal myomotomies. "It is not always possible" he says, "to say whether the operation can be finished through the vagina. In all cases, preparation for a laparotomy must be made."

Boldt's use of the vaginal route for hysterectomy dates back to 1887.

In 1891 he began vaginal operations on a larger scale with a view to studying the merits of that route. He employed the method of vaginal hysterectomy for fibroids and advised the use of the vaginal route wherever possible. He was first in this country to try vaginal fixation for the correction of retroversion. In 1895 he reported a tubal gestation removed per vaginam.

Goffe early adopted the use of the vaginal route. He practises it now in the following conditions: (1) Retroflexion and descent of the uterus. (2) Retroversion with adhesions, which he treats by shortening the round ligaments; if the adhesions are deep down in the cul de sac of Douglas, he separates these through a posterior vaginal incision. (3) Conservative operations on the adnexa. (4) Pyosalpinx, ectopic gestation, dermoid cysts of the ovary. (5) Myomectomy for small fibroids. (6) Hysterectomy for many cases of fibroids. (7) For the correction of certain cases of sterility (which really comes under class three).

In a publication which appeared in 1899, Dührssen reported 500 operations by anterior vaginal celiotomy and indicated the class of cases in which this method could be used. The indications, exclusive of those for hysterectomy, were (1) Movable retroflexion and retroversion. (2) Fixed retroflexion. (3) Inflammations and perforations of the uterus. (4) For benign tumors of the uterus. (5) For diseases of the adnexa. (6) For solid tumors of the ovary, if they are no larger than a fist. (7) For ectopic gestation. (8) For small or even large cystic tumors. (9) For the purpose of producing artificial sterility by ligating or exsecting parts of the Fallopian tubes. (10) For cystocele. (11) For ligamentous parovarian cysts, if they are free of the pelvic wall.

The advantages according to Dührssen are, (1) the absence of an abdominal scar; freedom from the danger of hernia or fistula; freedom from the possibility of painful adhesions of the omentum or intestine to the line of incision; freedom from the use of an abdominal binder; (2) few subjective annoyances immediately after

the operation; (3) rapid convalescence and quick restoration to health and ability to work; (4) low mortality.

The great claim made for the vaginal method is, that it is less dangerous and that the statistics as regards mortality are better. It is a question whether this claim can be substantiated to the degree claimed by its adherents. By 1906, Dührssen had performed 1600 cases of vaginal celiotomy with a mortality of but 2 per cent. He states that only in 20 per cent. of all cases is it necessary to open the abdominal cavity and emphasizes his claim that 80 per cent. of all gynecological diseases in which opening of the peritoneum is necessary can be healed without ventral incision. He states, among other things, that the mortality is less, restoration to health quicker after vaginal celiotomy and that postoperative exudates, if they do form after the removal of pus adnexal tumors, generally break through of their own accord into the vagina after vaginal celiotomy.

When we take into consideration that reported vaginal operations include very many cases of retroflexion, that many of the inflammatory involvements of the adnexa are not of severe grade, that the severe cases of pyosalpinx give much better prognosis because the uterus is also removed, we see how unfair the comparison is.

If we exclude the cases of vaginal fixation, the vast majority of which are done primarily for the retroflexion alone, we have a mortality of 5 to 8 per cent. It can, therefore, be seen that the severity of the cases and the manner in which the statistics are compiled have a decided bearing on the reported mortality.

It is fairly claimed, however, that such operations as may, with relative freedom from marked adhesions, be done through the vagina show a mortality in all probability somewhat lower than cases operated upon by the abdominal route.

Dührssen stated in 1899 that the *conditions essential to the ready performance of vaginal celiotomy* were: (1) the uterus must be one that can be well pulled down; (2) tumors must not be larger than a

fist; (3) extensive internal adhesions, especially with intraligamentous or pseudo-intraligamentous tumors, must be absent.

Dührssen further stated that in diseases of the adnexa *vaginal celiotomy was contraindicated:* (1) With severe perimetritic adhesions high up or when the tube and ovaries are not palpable in inflammatory conditions, this meaning that they are probably deeply or laterally fixed or covered by adhesions of intestine, omentum or sigmoid. (2) In chronic oophoritis or perioophoritis, where the ovary is adherent close to the lateral pelvic wall. (3) In large tumors of the adnexa closely adherent to the lateral pelvic wall; these are frequently the so-called tubo-ovarian tumors. (4) If tumors of the adnexa are situated high up toward the abdominal cavity or situated anteriorly and united to the bladder, or if there is tuberculosis of the tubes. In the latter cases there are many adhesions to the intestine and bladder, and there is a very thick, brittle mesosalpinx, there is a short ligamentum suspensorium ovarii.

Continued practice and experience have led Dührssen to extend the limitations of the vaginal method, so that he finds vaginal celiotomy indicated even in many cases included under the four headings above. Personally, I believe the contraindications quoted above are legitimately founded. However, the following views of Abel and Schauta show to what extent the vaginal method is practised and the statement of Chrobak shows how thoughtfully the problem of choice should be considered.

Abel acknowledges that abdominal operations are easier than vaginal, and states that his early objection to the vaginal route was due to the fact that he did not understand the method. The conditions in which there is a choice between the vaginal and abdominal route in his opinion come under the headings of (1) displacements of the uterus; (2) tumors of the ovary; (3) inflammatory tubal conditions; (4) tubo-ovarian inflammations; (5) tubal gestations; (6) myomata. He believes that all ovarian tumors should be removed through the vagina, except very large cystic tumors, large solid tumors,

FIG. 16.—Original simple transverse incision of Dührssen, with bladder dissected back from cervix and uterus by gauze-covered index finger. The finger palpates the vesico-uterine plica and can draw it down into view if a narrow anterior retractor is introduced as above.

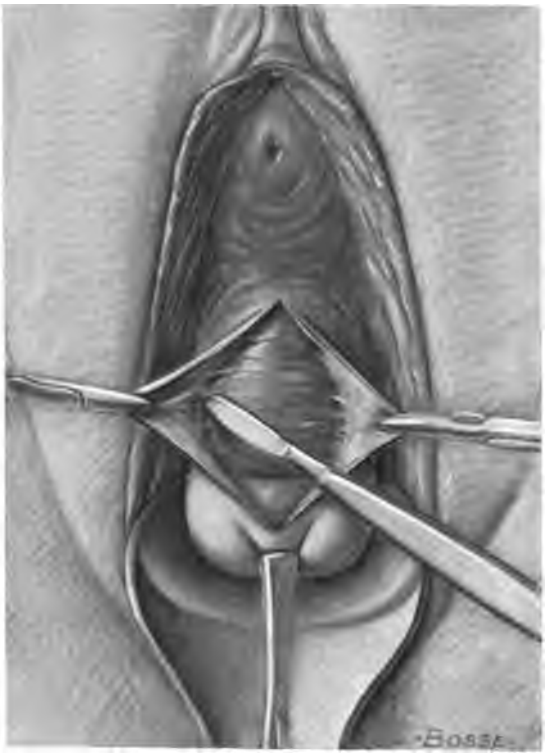

FIG. 17.—Old method of separating bladder from its vagino-uterine connection by simple longitudinal incision, begun by dissection of vaginal wall from bladder. Then the bladder is to be picked up at the lower end of the incision, and is to be separated from its union to the cervix and uterus by blunt dissection.

and carcinomatous tumors of the ovary. Intraligamentous tumors and tumors with twisted pedicles, which Bürger says should be done through the abdomen, Abel does through the vagina. For Abel, adhesions are no contraindications. They must be extremely extensive he says, to furnish an obstacle which cannot be overcome by the vaginal route. Size is no obstacle so long as the ovarian tumors are cystic, says Abel. He finds the removal of small cystic tumors to be without danger. The vaginal operation for larger and complicated cystic tumors is less dangerous, and the same holds good in the case of dermoid cysts. He advises the abdominal method only for exceptionally large cystic tumors, for large solid tumors and for carcinomatous growths of the ovary. He further says, "He who can control the vaginal method to the greatest possible degree can, by *morcellement*, vaginally remove fibroid tumors which are scarcely considered possible." "It is not right to say that only myomata which extend to the umbilicus should be attacked vaginally and that larger tumors should be removed abdominally. This depends upon the size of the vagina, the motility of the tumor and the skill of the operator. There is no doubt that the vaginal operation, even if it lasts longer, because of a protracted *morcellement*, constitutes a much less dangerous attack than the abdominal operation."

Schauta says, "It is self-evident that the vaginal operation demands greater skill and experience than the abdominal." He is continually astonished how simple abdominal laparotomy now seems to him, in comparison with the vaginal operation. "It is natural that every operator should begin with laparotomy and then adopt the vaginal mode of operation. The reverse is scarcely possible. This is mainly the case because, without doubt, the vaginal operation gives better statistics than laparotomy and because it shows a smaller mortality. One can readily claim that an operation according to the vaginal method is also less dangerous than the same operation by means of laparotomy." We must always compare the same operations.

That injuries also occur in laparotomy is an old story. With Schauta, injuries formerly occurred more frequently with laparotomy than now by the vaginal method. "In the latter, injuries to the ureter or bladder occur less frequently than with laparotomy. That in the latter, too, intestinal injuries may occur without being recognized is well-known. These are not always major injuries; often they are not recognized; the serous covering is simply gone at a certain point. Injury to the intestine by the vaginal method is less dangerous than with laparotomy. In the former, intestinal contents follow a shorter path in their exit than in laparotomy. The vaginal method of operation should not be considered in a spirit of enthusiasm, but calmly and coolly. Wherever an operation can be carried out vaginally, it should always be done by this method. However, everything must be prepared for a laparotomy. That one should promise a patient to positively and surely complete an operation by the vaginal method is evidently out of question. He must always, in all cases, leave himself free to change the work and method of operation, even during the operation, in case this proves to be necessary."

TECHNIC OF THE NEW METHOD OF ANTERIOR COLPOCELIOTOMY.

Among the first to do vaginal celiotomy, for other purposes than hysterectomy, by the anterior vaginal route, namely through separation of the bladder and incision of the vesico-uterine fold of the peritoneum, were Mackenrodt and Dührssen, who chose this means of performing what is known as vagino-fixation. The early operations of Dührssen were done mainly through a transverse incision on the anterior wall of the cervix (Fig. 16). Later, attention was paid to adding a long longitudinal incision. Martin and others practised the longitudinal incision alone as a means of separating the bladder and thus entering the peritoneal cavity (Fig. 17). Subsequently, Dührssen and others increased the extent of the incisions by adding a longitudinal incision to the transverse one, making the operation of vaginal celiotomy in-

finitely easier. Separation of the bladder from the anterior vaginal wall was first practised by the use of the knife, and then was done by many with the aid of scissors, which procedure leaves a very oozing surface. Aside from the incisions themselves, which should be made with the scissors, the separation of the bladder from the anterior vaginal wall is readily carried out with the aid of gauze, while the separation of the bladder from the anterior wall of the uterus is readily accomplished with the aid of the fingers or of gauze. The important element in the successful carrying out of vaginal celiotomy is the combination of a transverse and long longitudinal incision with a thorough separation of the bladder, especially at its lower lateral attachments to the cervix. A further aid to the successful performance of the operation is the use of specula of proper lengths and widths, so that the cervix may be pulled far down toward the vulvar outlet, or pushed back in order to bring the fundus forward.

With these specula the bladder is held up out of danger, permitting work on the vesico-uterine fold of peritoneum and with the insertion of these wide flat specula into the peritoneal cavity the drawing out of even a large uterus is rendered easy, and exposure of nonadherent tubes and ovaries is made a relatively simple procedure.

This operation is divided into three stages:

1. Separation of the bladder by colpotomy. (*a*) From cervix and uterus; (*b*) from anterior fornix and anterior vaginal wall.
2. Opening of the peritoneum.
3. Delivery of the uterus.

SEPARATION OF BLADDER FROM THE CERVIX AND UTERUS.

A short posterior speculum is introduced and firmly pressed against the posterior vaginal wall and the perineum. The cervix is then firmly grasped by one or two volsella, which are best passed through both anterior and posterior lips. By firm, steady traction the cervix is brought as close to the posterior wall of the vulvar outlet as possible. A wide

transverse incision is then made with a pair of scissors just below the margin of the bladder, the incision passing well through the mucosa of the vaginal portion of the cervix down to the wall of the cervix. Two artery forceps are then applied to the upper margin of the incision on either side of the exact median line (Fig. 18). The lower part or base of the bladder is separated by firm rubbings of the gauze-covered index finger from the anterior wall of the cervix (Fig. 20) until the vesico-uterine fold of the peritoneum is reached (Fig. 16). This separation of the lower edge of the bladder must generally be begun with scissors in nulliparæ, in whom, in loosening the bladder, it is usually necessary to cut through a few firm bands uniting the bladder to the cervix (Fig. 19).

Further up the union of bladder to cervix is so loose that the separation is readily made with the finger. At times, however, there are firm connections more especially in the middle area than toward the sides of the cervix and uterus. The smooth peritoneal plica is readily recognized by the fingers, and can be drawn down and grasped with a clamp. The union of the peritoneum to the posterior wall of the bladder is readily separated before or after the opening of the plica. It is better that the fingers should now continue to separate the posterior wall of the bladder from the peritoneum which forms its posterior covering, and also forms the anterior wall of the vesico-uterine pouch. This separation should be carried upward for at least a distance of two or more inches above the base of the vesico-uterine cul de sac.

In nulliparæ, after separating the anterior fornix and bladder from the cervix, we sometimes find a thick vesico-uterine membrane which cannot be perforated by the finger or pushed back by blunt dissection. This must be cut through before we reach the vesico-uterine peritoneal fold. This membrane may be grasped by two forceps and cut through with scissors. When it is cut through, the finger passes into the sub-peritoneal connective tissue and we find the smooth, thin vesico-uterine fold. The plica is smooth and pinkish-white in color and *never* red.

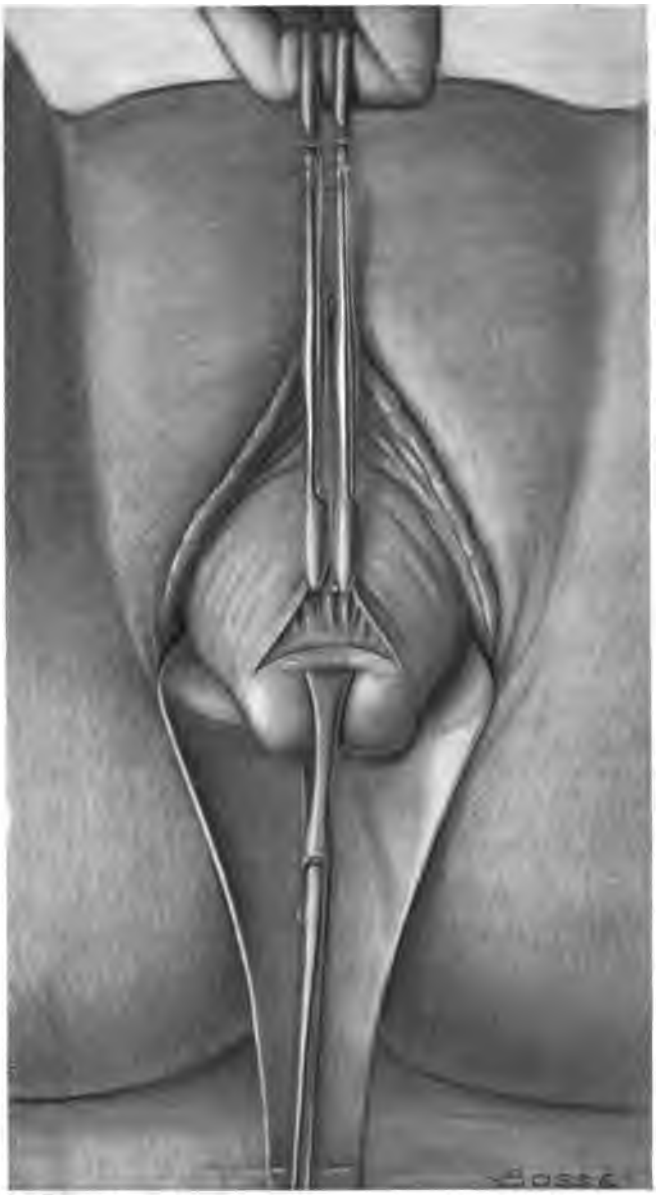

FIG. 18.—The lower border of the bladder can be readily fixed by introducing a sound into the bladder and noting the point to which the tip of the sound descends, so that it can be readily felt. A transverse incision is made with a pair of scissors through the entire width of the cervix a little below the lower border of the bladder. Two pairs of artery forceps are then attached to the median area of the upper margin of this incision. By pulling up on these forceps a series of bands which form the attachment of the bladder to the anterior wall of the cervix are brought into view.

FIG. 19.—The two pairs of artery forceps which have grasped the upper border of this transverse incision are pulled up tightly, and a short pair of blunt-pointed, curved scissors makes a few snips, separating the larger of these bands which unite the bladder to the anterior wall of the cervix. The tip of the scissors is held close to the cervical wall.

FIG. 19.—The two pairs of artery forceps which have grasped the upper border of this transverse incision are pulled up tightly, and a short pair of blunt-pointed, curved scissors makes a few snips, separating the larger of these bands which unite the bladder to the anterior wall of the cervix. The tip of the scissors is held close to the cervical wall.

SEPARATION OF BLADDER FROM ANTERIOR FORNIX AND ANTERIOR VAGINAL WALL.

Through separation of the bladder from the cervix and lower part of the uterus in the manner just described the bladder generally retracts upward, so that a longitudinal incision 2 to 3 cm. long may be made in the anterior fornix at right angles to the transverse one before the lower border of the bladder is reached. A pair of long sharp-pointed scissors makes a slight cut in the vaginal mucosa between the two artery forceps (Fig. 21). The lower blade is then introduced under the vaginal mucosa between it and the attached bladder, and by a series of short cuts (Fig. 22), the vaginal mucosa is incised for a distance of from 2 to 4 1/2 inches, an anterior speculum being introduced to draw the vaginal mucosa of the anterior vaginal wall taut if necessary. With the first pair of curved round-ended scissors, a slight snip is made between the vaginal mucosa and the bladder at each corner to which the artery forceps is attached (Figs. 23–25). Then with the aid of gauze alone, the vaginal mucosa being first everted by the artery forceps, the bladder is gradually and carefully separated from the anterior vaginal mucosa (Fig. 24), throughout the entire length of the longitudinal incision.

The separation of the bladder at the lower areas, along the entire extent of the transverse incision, should be carried on to and beyond the lateral margins of the cervix (Fig. 26). Higher up the separation can be carried laterally as far as desired. It should be continued upward so that the bladder is separated from the anterior vaginal wall for at least 1/2 inch above the upper point of the longitudinal incision (Fig. 27).

FIG. 20.—The attachment of the bladder to the anterior cervical wall is now loosened by the index finger covered with gauze, which firmly presses against the anterior wall of the cervix and pushes its way upward by a series of short, steady rubbings, and so begins the separation of the bladder. As we go upward toward the vesico-uterine fold of the peritoneum, the separation of the bladder becomes much easier. The separation is continued laterally beyond the borders of the cervix and uterus, and the first part of the bladder separation is completed. The finger introduced between the bladder and the cervix and uterus readily makes out the vesico-uterine fold of the perit-

FIG. 20.

oneum, and a narrow straight speculum if introduced through this transverse incision, lifts the bladder upward, and discloses this peritoneal fold to the eye if desired (Fig. 16). The finger introduced along the anterior wall of the cervix and passed to its lateral borders readily feels the two pulsating uterine arteries.

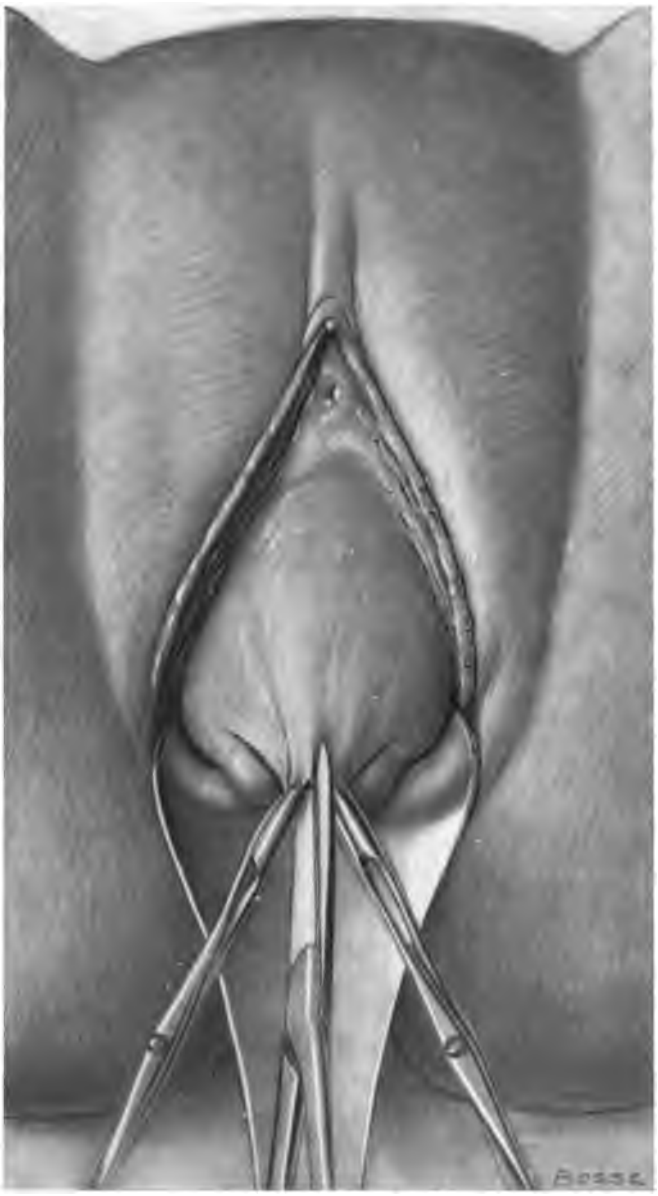

FIG. 21.—In some cases where the anterior vaginal wall is very lax, as in cystocele, a short anterior speculum, if introduced under the urethra, produces the taut condition desired for the next manipulation. The two artery forceps which hold the upper margin of the transverse incision are now used to pull down the anterior vaginal wall and put it on the stretch. A pair of long, narrow sharp-pointed scissors is now used for making a slight snip one-quarter of an inch long, immediately between the two artery forceps. This discloses the thickness of the vaginal wall. The lower blade of the sharp-pointed scissors is now gently introduced between the vaginal wall and the bladder, and by pressing upward with this lower blade the latter is seen to lie immediately beneath the vaginal mucosa. The scissors are then closed and the cut is made.

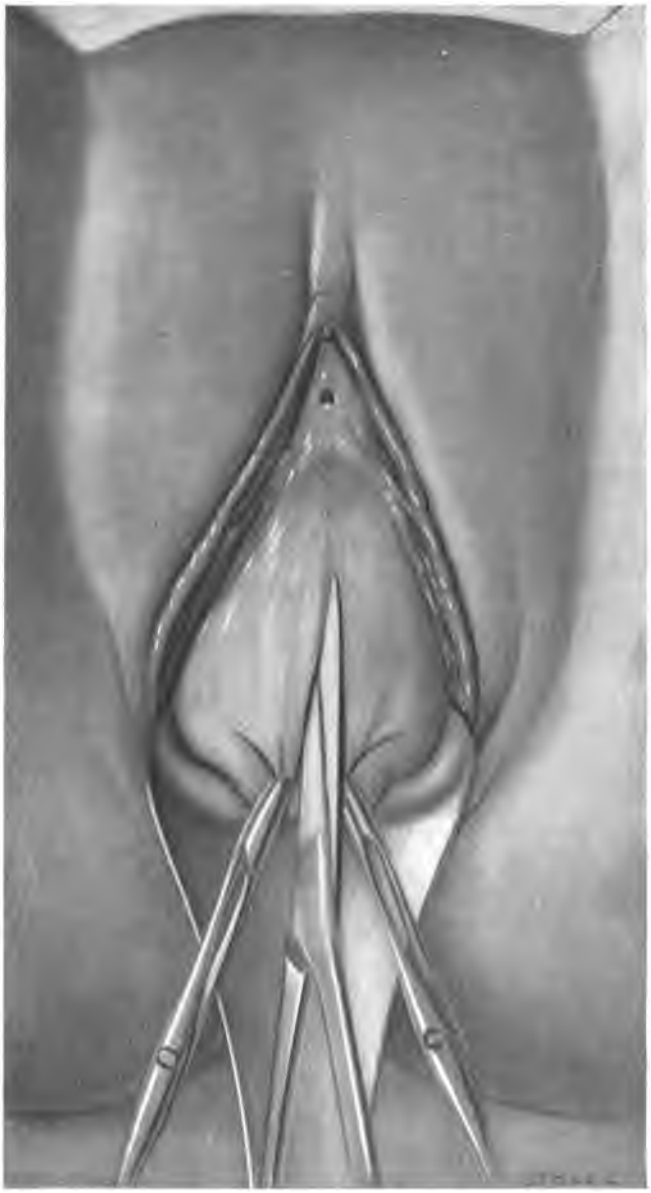

FIG. 22.—After each snip, the lower blade of the scissors is progressively introduced between the vaginal mucosa and the bladder, and the cuts are made in a straight line upward until, if desired, the cut reaches within an inch or half an inch of the external opening of the urethra.

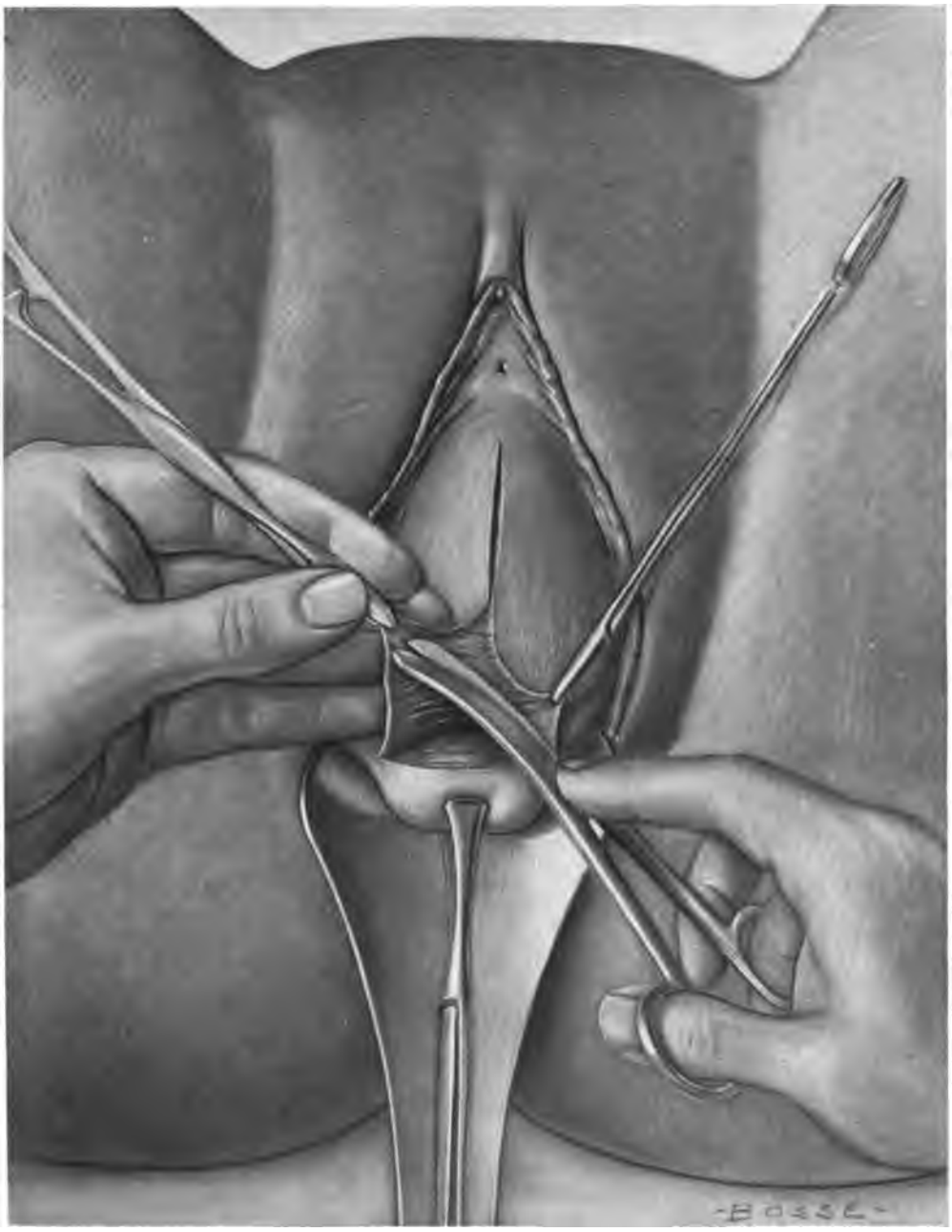

FIG. 23.—The artery forceps on the left side of the operator are then grasped between the thumb and first two fingers of the left hand, and that side of the anterior vaginal wall and its attached area of the bladder is everted and held in position noted above. A short pair of curved blunt-pointed scissors now makes a few snips in the immediate vicinity of the artery forceps, which step begins the separation of the bladder and its connective-tissue covering from the vaginal mucosa.

FIG. 24.—With the position continued as in figure 23, the right index finger covered with gauze pushes and rubs the bladder and its connective-tissue covering away from the anterior vaginal wall, a manipulation which is very easy in women who have borne children. This manipulation is more difficult in nulliparæ, because the anterior vaginal wall is thinner and the attachment of the bladder is more firm. The thumb covered with gauze may be used for this manipulation. In practically all cases the bladder peels off readily from this anterior vaginal wall and the process is continued upward for about two inches.

This separation of the bladder from the anterior vaginal wall is a point of great importance. Not only does the longitudinal incision give us more room, more ready approach to the vesico-uterine fold of peritoneum; not only does it give us more room after the peritoneum is entered, but it has separated the bladder from its connection to the antero-lateral vaginal wall and from its union to the lateral borders of the uterus and the adjoining area of the broad ligament. This complete separation of the bladder from its utero-vaginal relation puts the whole organ, so to speak, within our hands. The bladder shrinks to one-third of its usual size, and even if nothing more were done it would of itself be a better operation for cystocele than the ordinary form of anterior colporrhaphy. The separation of the bladder from the external limits of the anterior vaginal flaps really frees the bladder and the ureters to such an extent that when the bladder is lifted up by an anterior speculum the lower parametrium and the uterine arteries can be ligated without risk to the ureters, provided the sutures are passed fairly close to the lateral uterine wall. This inverted T incision is used by me in every vaginal operation included under the title of celiotomy. It is the ideal form of incision if one is to do only a simple colporrhaphy for cystocele, for, as stated above, the bladder is entirely removed from its utero-vaginal connection, it retracts up behind the symphysis, and if then an oval piece is resected from each flap and then the edges are united by interrupted sutures or continued sutures, the result of such a colporrhaphy is far better than that obtained by the usual method of resecting an oval anterior vaginal area and leaving the bladder still attached to cervix, uterus, and vagina. By this method (Fig. 27) we may readily incise and enter the bladder for the removal of foreign bodies and stones. This method is the ideal one for the surgical treatment of vesical fistulæ, as separation of the bladder from its environment renders closure of the vesical opening a simple step.

ENTERING THE PERITONEUM.

Where formerly the vesico-uterine fold was pulled down with forceps by the aid of the guiding fingers (Fig. 16) the lengthened vertical incision now makes this procedure readily possible with the aid of the eye. I have long since discontinued any attack on the plica not made with the aid of sight. Here lies the great superiority of the inverted ⊥-shaped incision with complete separation of the bladder, for we then have a ready approach to the peritoneum after the bladder is safely lifted up by the anterior speculum. A not too wide speculum of medium length is introduced beneath the bladder and the bladder is lifted up (Fig. 28). This exposes the point at which the peritoneum of the anterior and posterior walls of the vesico-uterine cul de sac unite. If the speculum is too long it draws the peritoneal fold too taut.

At this point the peritoneum is grasped in the median line with two forceps and is incised with a blunt-pointed scissors between them. This incision opens the peritoneal cavity. This incision is extended upward as far as the bladder peritoneum has been loosened, artery forceps being put on at successive stages to bring the peritoneum clearly into the field (Fig. 29). At this point, if desired, the bladder may be still further separated and the longitudinal incision further increased. The base of the vesico-uterine pouch may be likewise incised transversely, a procedure which is often of assistance (Fig. 30).

If we are to simply enter the peritoneal cavity for the performance of a pelvic operation, and are not to sew the uterus to the peritoneum

FIG. 25.—The same manipulation is now carried out on the other flap, the artery forceps being held with the left hand and fingers, as illustrated above. or else they may be held with the right hand and the snipping with the scissors may be begun with the left hand. After this snipping has been done, it is better to hold the artery forceps in the right hand and to peel off the bladder with the left thumb covered with gauze. In peeling off the bladder as in figure 24, the process should be continued down to the lateral margin of the cervix and uterus. As the bladder is separated along the two lateral sulci oozing and bleeding are noted, and occasionally a small, tiny artery spurts, for we are approaching the ureter and the uterine arteries and their accessory arteries and veins. Occasionally, it is necessary in the manipulation noted in figures 20 and 24, to use a small artery forceps and place a ligature on a spurting vessel located over the bladder or on the anterior or lateral wall of the cervix. Usually compression alone by an artery forceps suffices.

FIG. 25.

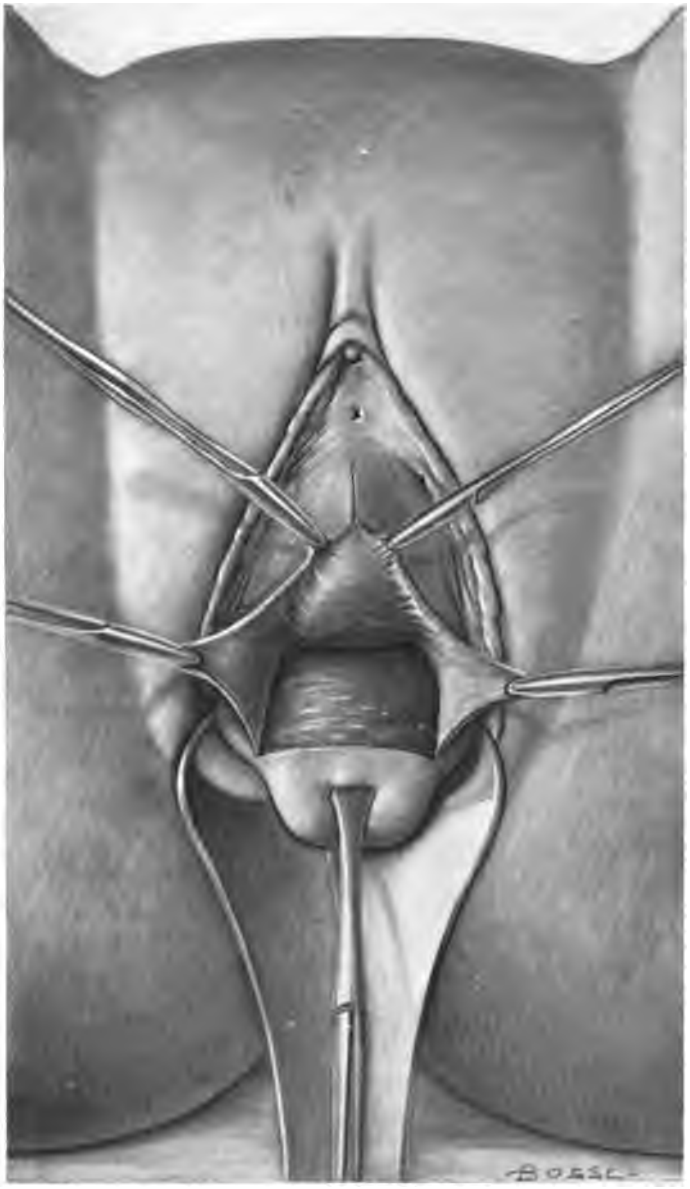

FIG. 26.—Another pair of artery forceps is then applied to either edge of the vaginal flap a little below the highest point from which the bladder has already been separated. The separation or peeling off of the bladder is now continued, first on one side and then on the other, with the index finger or thumb of either hand covered with gauze, until the bladder is separated as far as the longitudinal incision has extended. As we approach the upper area depicted in figure 26, the vaginal mucosa in the region of the urethra is often extremely thick and wrinkled and hyperplastic. Here the bladder may be separated first, and then the longitudinal incision in the vaginal wall may be made with the scissors.

FIG. 27.—On completion of these manipulations, we have the bladder completely separated from the anterior wall of the cervix and uterus and entirely loosened from its connection to the anterior wall of the vagina. The anterior wall of the vagina is now represented by two large lateral flaps. The surface of the bladder usually oozes, but spurting vessels need be compressed or tied. The elasticity of the bladder wall is apparent from the fact that it shrinks considerably in size and has a tendency to be drawn up toward the urethra and behind the symphysis. An anterior speculum may now be introduced underneath the bladder, and the bladder is lifted up out of the field of observation.

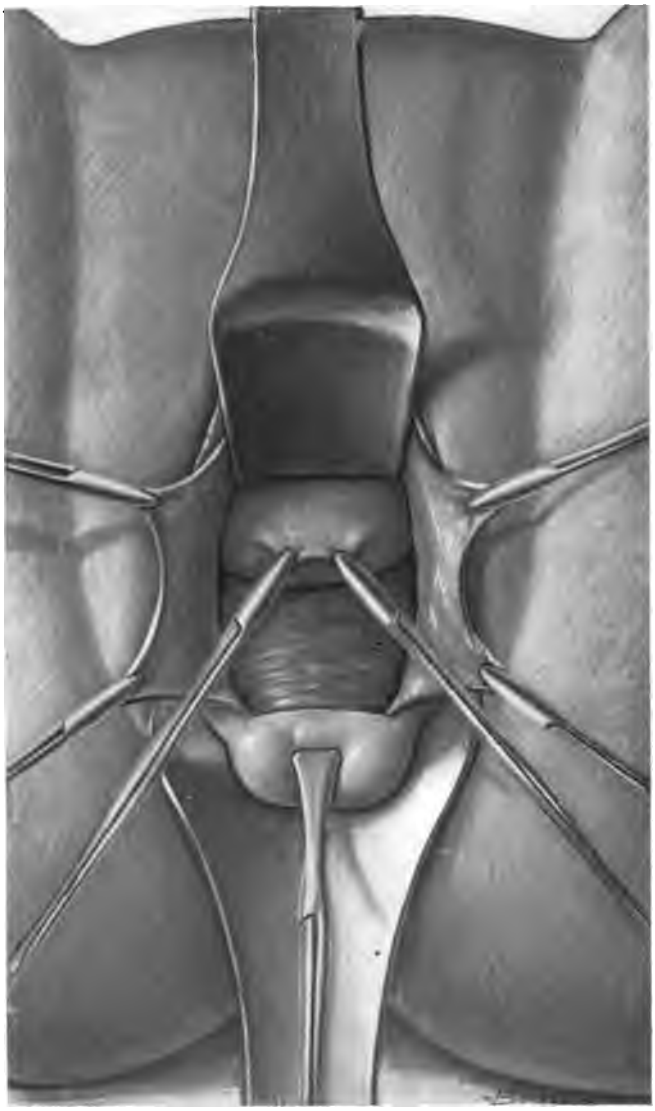

FIG. 28.—The bladder having been lifted up by an anterior speculum the vesico-uterine fold of peritoneum, which now comes into view, may be grasped and pulled downward by two artery forceps.

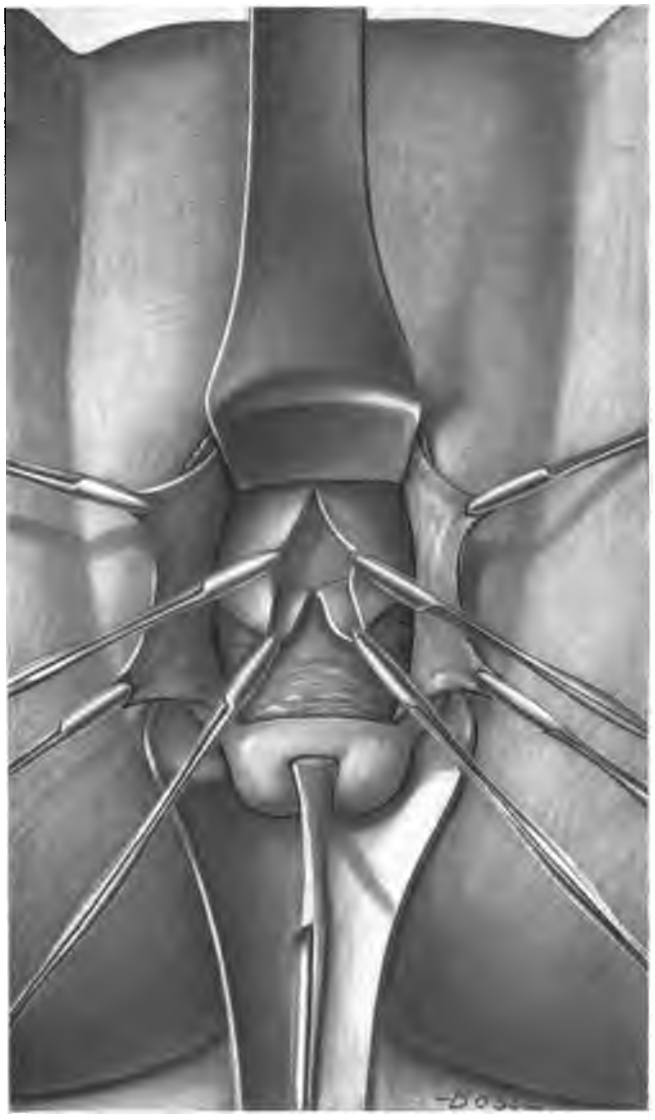

FIG. 29.—Between the two artery forceps a pair of long, blunt scissors cut through this peritoneal fold. The lateral borders of this incision are grasped by artery forceps and more of the peritoneal fold is pulled into view, and the incision is extended still further. This fold of the peritoneum which is being pulled into view by successively applied artery forceps, is loosely attached to the posterior wall of the bladder, and its separation may be aided by the introduction of the index finger, which readily peels it off. In this manner, a longitudinal incision three to four inches in length may be made through the vesico-uterine fold of the peritoneum.

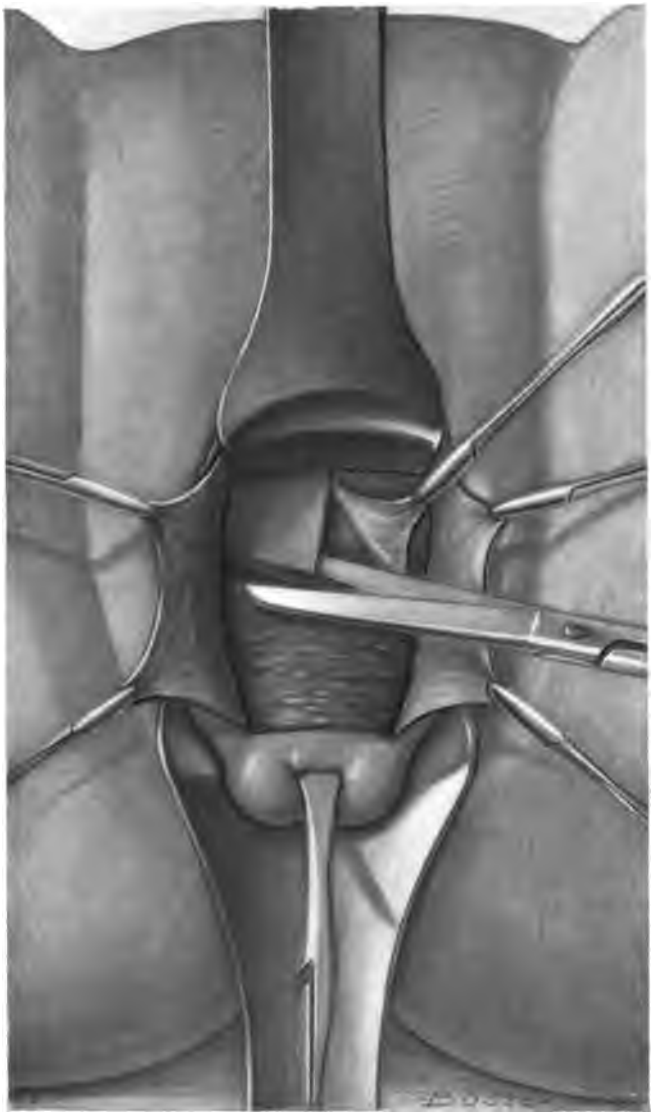

FIG. 30.—In addition to the longitudinal incision through the peritoneum, a transverse incision may be extended to the lateral borders of the uterus. In many cases no longitudinal incision is made and the peritoneum is incised transversely, in the manner depicted above, by the scissors.

(vesico-suspension, vagino-suspension), or if we are to do a vaginal hysterectomy the transverse incision suffices. This may be readily closed on completion of operation by two or three interrupted sutures. If, however, we wish to attach the uterus to the peritoneum which has been dissected from the posterior wall of the bladder (vesico-suspension), or if we are to attach any area of the uterus to any point of the anterior vaginal flaps with the peritoneum intervening between these two (vagino-suspension) the vesico-uterine plica should be incised in a longitudinal fashion.

It is of advantage to pass a suture or to apply artery forceps at the upper end of the plica incision, if longitudinal, and two sutures at the lateral borders of the incision. By this means the peritoneum may be readily brought into view, on completion of the operation, for the purpose of sewing the incision in the peritoneal fold.

DELIVERY OF THE UTERUS AND ADNEXA.

With the anterior vaginal incision it is always advisable to deliver the uterus into the vagina before attempting to deliver the adnexa or to carry out an intraperitoneal examination or any operative procedure. This is easy if there are no adhesions, if the ligamentum infundibulo-pelvicum is long, and if the upper part of the broad ligament is not sclerosed. If these abnormal conditions are not present, it is easy to subsequently deliver nonadherent tubes and ovaries. If any of the above-mentioned conditions prevail, the delivery of the uterus and especially of the tubes and ovaries is more difficult. A wide speculum of fair length is introduced through any form of incision which has been made in the vesico-uterine peritoneum, and frequently intestine or omentum will then present in the field. At this stage, the short posterior retractor is removed, and a long posterior retractor is introduced, which is used to push the cervix back and thus aid in bringing the fundus forward (the volsella being taken off), or else by the aid of the volsella, if not removed from the cervix, the

cervix is pushed and held back firmly, which manipulation has also a tendency to rotate the fundus forward. With great care a pair of volsella takes a firm grasp on the anterior uterine wall at the highest accessible point, which precedure is perhaps best done before the cervix is pushed back (Fig. 31). Gentle traction on this volsellum serves to pull the lower part of the uterus more clearly into view. Volsella are applied regularly at higher points to the anterior wall of the uterus (Fig. 32), and by gentle traction, by movement from side to side, aided by a slight rotary movement, the fundus is gradually pulled into view and then pulled out into the vagina along the under surface of the wide speculum which was introduced anteriorly into the peritoneal cavity (Fig. 33). At this point it becomes evident that a long longitudinal incision in the anterior vaginal wall and a thorough separation of the bladder, especially at its lateral attachments to the cervix, long incisions into the vesico-uterine peritoneum, and the introduction into the peritoneal cavity of a wide speculum, are important factors in bringing readily into the vagina a uterus of even large size.

When the uterus is *fixed* through adhesions to its posterior wall it may be advisable, instead of using volsella, to pass sutures through the anterior wall of the uterus at successively higher points and in this way bring the fundus toward the vagina. Sutures when tearing out would lacerate the uterus less than the volsella and they permit of more ready tactile approach to the fundus and posterior wall of the uterus in separating adhesions with the fingers or with the scissors from the posterior wall. Volsella fill up the vagina. When they do tear out they cause greater injury.

Sometimes it is necessary to pull one side of the uterus so that one horn lies nearer the median line. Sometimes it is necessary to pass side retractors into the peritoneal cavity to deliver a large fundus. When the uterus has been drawn into the vagina the space left between its posterior wall and the anterior speculum is a very

FIG. 31.—After the vesico-uterine fold of peritoneum has been incised, either by a wide transverse cut or by a long longitudinal incision, a fairly wide, long speculum is introduced into the peritoneal cavity, and is pressed up firmly against the symphysis. A pair of volsellum forceps now grasps the anterior wall of the uterus within the peritoneal cavity, care being taken not to grasp the omentum or intestine, which often now present in the field of operation. By a pull on these volsellum forceps the fundus of the uterus is drawn forward and another pair is applied above the first pair, and so on in succession until the fundus is reached. As this manipulation is being carried out, the operator or an assistant is to push the cervix backward into the vagina.

FIG. 32.—As the fundus begins to appear, the last applied volsellum is pulled forward and the uterus is drawn forward from side to side, so that by a series of rotary movements it is gradually pulled through the peritoneal incision. At the same time it is of greatest importance to push the cervix back until it has eventually been moved up to the upper part of the vagina. If necessary, another pair of volsellum forceps is applied, care being taken that their application is made to the middle line of the uterus. In the act of pulling the fundus through the peritoneal incision into the vagina, it is sometimes difficult to tell whether we are applying volsella to the median part of the uterus or whether the forceps have been applied to one or other of the cornua, in which event the uterus may or may not be so readily pulled forward, and some of the larger veins in the broad ligament may be punctured and cause oozing.

FIG. 33.—Shows the uterus drawn out through the vagina and beyond the vulva in cases with no adhesions of the adnexa and with nonsclerosed broad ligaments. The tubes and ovaries are readily brought forward into view over the posterior wall of the uterus. It is now, especially, that intestine and omentum may present. They may be kept out of the field of operation by gauze sponges on sponge holders, or by elevating the foot of the table.

roomy one, provided the longitudinal incision in the anterior vaginal wall has been a long one, provided the incision into the vesico-uterine fold has been a long one, and provided the speculum is wide. The fingers may then be introduced through this space, may palpate the tubes and ovaries, bring them into view, loosen adhesions, draw out small cysts or tumors, or enucleate adherent tumors or pus sacs. Delivery of the uterus is more difficult if the incision into the peritoneum has been a longitudinal one than if the incision has been a transverse one. While the uterus is being delivered into the vagina through a longitudinal incision in the peritoneal plica, the lateral margins of this peritoneal plica are put on the stretch and more so, since the wide anterior vaginal speculum has been introduced to lift the bladder up out of the way. The ovaries and tubes must then be delivered manually or otherwise around these firm peritoneal pillars, a manipulation which is frequently found to be anything but simple.

INDICATIONS FOR ANTERIOR COLPOCELIOTOMY.

Anterior vaginal celiotomy is either primary, and done as a celiotomy for the purpose of performing an intraperitoneal manipulation or operation, or else it is simply an essential step in the performance of an operation for cystocele, for prolapse, etc. We are concerned in the selection of this route not so much with what can be accomplished through the vagina, but with what in our hands may be done well, safely, and with advantage to the patient and with benefits superior to those offered by abdominal laparotomy.

There are certain disorders of a gynecological nature for the correction of which vaginal operation should be selected because it offers the only cure or a better and more certain cure of the condition in question, or because such an operation is less dangerous or more readily accepted by the patient.

This is especially the case in the surgical treatment of:

1. Cystocele.

2. Descent of the uterus.

3. Prolapse of the uterus.

4. Many cases involving hysterectomy.

The indications which I have made for myself are the result of observation and study, modified by the test of actual experience over a period of many years. They are not given with any other purpose than to express a personal conviction with the feeling that the reason for every choice is founded on the result of practical tests. One point is to be made clear and that is, that vaginal celiotomy is not so difficult in multiparæ with roomy vagina, when the cervix can be pulled far down toward the perineum, and it is in these cases that most of the following indications are found.

Indications which I feel worthy of general acceptance for the use of vaginal celiotomy are:

1. Exploratory celiotomy for non-tangible pelvic conditions, such as sterility or suspected ectopic gestation, accomplished by delivery of uterus and adnexa.

2. For the production of artificial sterility by excision of part of the tubes.

3. Conservative or minor operations on adnexa with only slight or cobweb adhesions, especially if at the same time retroflexion or retroversion or descent or cystocele furnish indication for the performance of vaginal suspension.

4. For the removal of small movable cystic tumors of the ovary or tube.

5. For the removal of small fibroids of the uterus, care being taken to select such cases as are suitable for myomectomy.

6. Vaginal celiotomy may be used for movable retroflexion or retroversion of the uterus, to be corrected either by vaginal suspension of the uterus, vaginal fixation of the uterus, vaginal shortening of the round ligaments, or fixation of the round ligaments to the anterior wall of the uterus.

The Alexander-Adams operation meets all the indications unless we are dealing with pathological ovaries, tubal disease, peritoneal adhesions or other pathological intraperitoneal involvements evidenced by symptoms. With disease of the appendix, or if we are dealing with congenital retroflexion associated with long uterus or short anterior vaginal wall, a vaginal operation is not advisable.

If the retroflexion, retroversion or retrodisplacement is associated with parametritis involving the posterior parametrium or the utero-sacral ligaments, no matter what operation is chosen, the posterior parametrium should be incised and freed by a transverse incision passing into the cul de sac of Douglas, and this incision should then be sewed in a longitudinal direction (Fig. 12).

7. For the correction of cystocele, with or without uterine displacement, to be treated by the method of vaginal suspension in the child-bearing years or by vaginal fixation in the non-bearing.

8. For descent of the uterus, if we are dealing with a large, heavy organ, especially if the patient be fat, if the abdominal walls are lax; to be corrected by vaginal suspension in the child-bearing age; by vaginal fixation in the non-bearing patient, plus amputation of the cervix and perineorrhaphy if needed.

9. For the cure of prolapse of a large heavy uterus. A high amputation of the cervix, resection of the posterior vaginal wall, and a high perineorrhaphy are essential additions to a thorough vaginal fixation. This, of course, is to be done only in the non-bearing woman, and in the others an area of the tubes is to be excised.

10. (*a*) Hysterectomy for uterine disease (including carcinoma of the fundus and fibromyomata), if the uterus is not too large to be delivered into the vagina and if it is not essential, as in carcinoma of the portio or cervix, to remove an unusually wide area of the base of the broad ligaments, etc. (*b*) The most frequent indication for hysterectomy is found to be fibrosis uteri.

The choice of the vaginal operation is *debatable*.

1. In certain cases of ectopic gestation. This operation, in my opinion, is permissible if we are not dealing with tubal abortion or tubal rupture; if there is no actual active hemorrhage going on, and if there is no hematocele. This really includes cases where vaginal celiotomy is done for diagnostic reasons in suspected ectopic gestation, and then conditions being found favorable the operation is completed vaginally. As to the advisability of this operation in cases which are so often diagnosed only after the symptoms of intraperitoneal hemorrhage make themselves evident, I am opposed to the vaginal route, for haste is a most essential element, and for that reason an abdominal operation is indicated in almost all cases. Dührssen, however, employs vaginal celiotomy for 70 per cent. of his cases of ectopic gestation.

2. Not too large movable unilocular cystic tumors, situated anteriorly to uterus. The mortality in abdominal treatment of movable cystic tumors of whatever size is so slight that the argument of lower mortality can scarcely be made. In the case of multilocular tumors, however, time is taken up with the successive vaginal opening of the various chambers.

3. Inflammation of adnexa in multiparæ with roomy vagina, only if the adnexal tumors are not situated too far lateral to the uterus. Salpingo-oophorectomy or hysterectomy. I do not consider the vaginal method advisable for the removal of pus tubes or of tubo-ovarian cysts adherent to the lateral pelvic walls, unless at the same time a hysterectomy is done, for without the latter step the operation is not so clean-cut; finger dissection is rendered more difficult; raw surfaces are left; the peritoneum is more extensively injured; the sigmoid likewise. It is difficult to check oozing, and drainage, if needed, means incision of the posterior cul de sac.

If the uterus is not drawn into the vagina we have to begin the removal of the tubes at the uterine horn and, by tugging on ligatures, work gradually along with the fingers which from time to time are introduced into the pelvic cavity to loosen adhesions.

If the uterus can be drawn into the vagina we have a space over the posterior wall of the uterus sufficient to introduce two fingers of one hand, and then the fingers of the other, to loosen the adhesions.

If the uterus is fixed by adhesions to its posterior wall it may be necessary to do a posterior celiotomy, in order to free the fundus.

If, as usual, both tubes are badly involved, this entails a great deal of work; copious oozing, much denudation of peritoneum, and what remains is an absolutely worthless uterus. Hence all such conditions should be treated by vaginal hysterectomy with splitting of the uterus.

Otherwise, great difficulty is experienced in reaching the ligamentum infundibulo-pelvicum and the brittleness of this ligament often causes decided bleeding.

If we attempt conservatism in operating on pus tumors and leave the uterus and one ovary behind, we often have to drain through the cul de sac of Douglas. Hence abdominal laparotomy is best.

Vaginal hysterectomy for double pyosalpinx, when we have reason for removing the chronically inflamed uterus at the same time, is a valuable operation. In the vast majority of cases of pyosalpinx, the abdominal operation permits of perfect removal of both involved tubes, the thorough stopping of all oozing, and the careful covering of areas denuded of peritoneum. Thorough resection of the tubes at the uterine cornua permits of retention of the uterus without risk of future infection from that organ. After double abdominal salpingo-oophorectomy, ventral fixation or the Gilliam operation is always practised by me in order that the uterus may be kept well away from future possible adhesions.

4. Fairly large and irregular fibroids, where preliminary delivery of the uterus is not possible, for myomectomy.

5. Fairly large fibroids, not intraligamentous, for hysterectomy.

Vaginal celiotomy is *contraindicated* in the following instances. These naturally include all the conditions not mentioned above, but inasmuch as the element of situation, size, adhesions, and danger

of injury to the bladder, uterus, and intestine, furnish the basis for the contraindications an enumeration of the various contraindications shows the logic for this grouping.

(1) *a*. In the presence of a pregnant uterus. *b*. Shortly after labor or abortion, except in the possible event of hysterectomy.

(2) If a previous vaginal celiotomy or separation of the bladder has been done.

(3) If the appendix is involved, as not infrequently happens with right-sided tubo-ovarian conditions, and if the abdominal method permits of an advantageous operation (which is not the case in cystocele and prolapse).

(4) If the gall-bladder or other intra-abdominal organs are to be explored.

(5) *a*. Nulliparæ or multiparæ with such a small vagina that it is necessary to incise the perineum. *b*. Nulliparæ in whom the anterior fornix is of such small curve as not to permit of a long incision or in whom the cervix cannot readily be brought down to the perineum.

(6) Tumors fixed antero-laterally to the uterus, which situation makes it difficult to bring the uterus into the vagina. An essential to ready removal of structures by vaginal celiotomy is the ability to bring the uterus into the vagina so that then, by various manipulations, the tube, ovary or tumor may be enucleated and brought into view.

(7) In instances where injury to the uterus in inflammatory diseases may cause extension to the other side. I think the vaginal operation is founded on a poor basis in the case of one-sided pyosalpinx or salpingitis; for the manipulation through which the uterus goes in the performance of a vaginal celiotomy is such that its structure to a certain extent is invaded and the probability of stirring up a recrudescence of the original active or latent infection and thus transmitting it to the non-affected side is great. Therefore, an abdominal operation is better, unless we are dealing with a double pyosalpinx and chronic metritis, in which case a complete hysterectomy, preferably vaginal, is indicated.

(8) Tubes, ovaries, or tumors fixed far to the lateral wall of the pelvis, including double pyosalpinx, unless hysterectomy is done.

(9) A uterus fixed by dense adhesions to the posterior pelvic wall or to the sigmoid or the rectum.

(10) Tumors fixed posteriorly to the uterus.

(11) Ovarian tumors with twisted pedicles.

(12) Large multilocular ovarian tumors, especially if adherent.

(13) Large solid ovarian tumors.

(14) Dermoid tumors of the ovary, especially if fixed.

(15) Intraligamentous tumors and intraligamentous hematomata if high up in the broad ligament.

(16) Most cases of ectopic gestation.

(17) Large irregular fibroids of the uterus, especially those with intraligamentous extension. *Morcellement* is a dangerous procedure in the case of degenerating or necrotic tumors. In my opinion the best method for the treatment of large fibroid of these types in the combination of the vaginal and abdominal routes, if we believe in the removal of the cervix.

CONSERVATIVE OPERATIONS.

The method of entering the peritoneal cavity by the anterior route is no longer a haphazard procedure. It is a method which does no injury to any structure; it makes clean-cut wounds and nicely dissected surfaces and gives entrance into the peritoneal cavity through a space several inches in diameter.

This method has great value as a diagnostic step. The vaginal method has this advantage over the Alexander-Adams, for it permits of the examination of the adnexa, where so often are found cobweb adhesions of the tubes and ovaries, hydrosalpinges, small dermoids and small cystic degenerations of the ovary, which latter condition, according to Dührssen, may cause severe menorrhagia which can only be overcome by resection of part of the ovaries.

It is evident that the long longitudinal incision in the anterior vaginal wall and a thorough separation of the bladder, especially at its lateral attachments to the cervix, a roomy incision into the vesico-uterine peritoneum, the introduction into the peritoneal cavity of a wide speculum are important factors in bringing the adnexa readily into the vagina. If the uterus be large, or if the uterus swells through congestion after its delivery in the vagina (a change which often makes reposition more difficult), the space above the uterus can be made more roomy for intraperitoneal manipulations if the posterior speculum is taken out, and if the fundus of the uterus is then pulled down or pressed down against the perineum. Rotation of the uterus so that one horn lies more anteriorly brings the adnexa of this horn more readily into view, and discloses the full width of the broad ligament for examination or operative procedures. The loosening of mild cobweb adhesions with a freely movable uterus is accomplished almost by the delivery of the uterus itself. After the uterus is in the vagina gauze sponges or holders or the introduced fingers readily roll the adnexa into view.

If the contents of the tube are serous, the outer end may be opened and the tube may be washed out with salt solution. If the outer end is too firmly closed, this area may be resected and a new ostium may be made with union of the mucosa to the peritoneum (Fig. 34), or one or more ostia may be made in the course of the tube. If the tube is resected to any great extent, it may be split in a longitudinal manner at the remaining outer end, and then by union of mucosa to the peritoneum a large special ostium is established. The ovary may be readily brought into view if the ligamentum ovarii and the ligamentum infundibulo-pelvicum are not too shortened (Fig. 35).

Cysts may be opened, corpus luteum cysts may be shelled out and hematoma of the ovary may be removed. Any desired portion of the ovary may be removed (Fig. 36). If the entire ovary is to be taken out the meso-ovarium should be ligated by mattress sutures

FIG. 34.—The outer end of the tube is resected in an oblique manner after mattress sutures have been applied to the mesosalpinx parallel to the area to be resected. The mucosa is then united with the peritoneal covering of the tube throughout the entire circumference. If an ostium is made in the course of the tube by the aid of a long slit or by exsection of an oval piece, then the mucosa and peritoneum are united in the same manner.

FIG. 35.—The ovary may be brought into the field of operation by clamps applied in succession to the upper part of the broad ligament, to the tube, or to the ligamentum ovarii. The ovarian tissue at the meso-ovarium is then grasped so that the ovary may be removed by mattress sutures applied to the meso-ovarium or else any desired area of the ovary may be taken away.

applied before any cutting is done. If the ovary, however, cannot be drawn out sufficiently well the mattress sutures should be tied with cutting after each suture is applied, passing thus step by step to the extreme limit of the ovary.

Conservative operations on the adnexa, especially where little is felt on bimanual examination, as in cases of sterility, furnish no contraindication, as a rule, because of adhesions or pus accumulations. However, I do not find the method well adapted to conservative operations in nulliparæ, for these vaginal intraperitoneal operations do not permit of nice adaptation, of clean-cut edges, of cutting or lengthening the ligamentum infundibulo-pelvicum, all elements greatly to be desired in every case, especially in those where slight adhesions have produced marked suffering.

The vaginal route can safely be used for the removal of small movable hard ovarian tumors, small fibroids of the uterus, and smaller or large movable ovarian cysts. It may also be used in certain early cases of ectopic gestation where no active bleeding is going on.

Unless there is sclerosis of the ligaments the ovary comes easily into the field of operation. If not, the ligamentum ovarii or the tube and upper part of the ligament are grasped by forceps, and in this manner the ovary is brought where operative procedures on it may be carried out with ease (Fig. 35). If a horn of the uterus is rotated anteriorly, the corresponding tube, round ligament and ligamentum ovarii are more easily approached. If retractors are introduced in the antero-lateral region of the operative area the adnexa are more readily exposed.

Ovarian cysts, unless very small, must be punctured and freed of their contents before they can be delivered. If the cyst wall is thick delivery is simple, for various areas are grasped in succession until finally the cyst lies outside of the vulva; only the pedicle remains to be ligated. If the cyst wall is thin this method of delivering the tumor is not easy as too energetic traction tears the structures. In the case

of dermoid cysts the same procedure is necessary. It is, therefore, always advisable, before puncturing cysts, to introduce plenty of gauze into the peritoneal cavity to catch up as much of the outflow as may not pass out through the incision. It is always preferable to introduce a trocar into the larger cysts, and in this way keep the structures more clean, and prevent dribbling into the peritoneal cavity.

Ectopic gestation, with the tube not greatly enlarged, may be treated conservatively through the vagina. With small ectopic tumors an operation through the vagina is occasionally to be preferred. With this method it is easy to remove an ovum not yet expelled from the tube. The uterus is brought out and the tubes become visible and may be reached by the fingers; the corresponding ovary with the tube is loosened from adhesions and is brought out into the field of operation. If the tube is intact, it is split, the egg is removed and incision is closed, so that the lumen is preserved. If the tube cannot be preserved, it is removed by tying the mesosalpinx in small sections; the end of the tube remaining near the cornu is left open if the mucous membrane looks normal. The retained end of the tube is split and the mucous membrane around the incision is united with the serosa forming a large artificial open end (Fig. 34).

Vaginal myomectomy should only be attempted in roomy vagina. In the case of subperitoneal tumors it should be our endeavor to deliver the uterus into the vagina, provided the uterus is not too large or irregular in outline (Fig. 37).

Vaginal myomectomy is indicated with tumors the size of a fist, when these make interference necessary through decided continued bleedings, or through pressure symptoms. One can never make a mistake if he limits this indication to solitary tumors. If many nodules are present, it is not alone possible that one or more of these may be left behind, but the uterus may be so cut up and mutilated, that restoration of a passably functionating organ may be impossible. With the presence of numerous nodules, especially of the subperitoneal

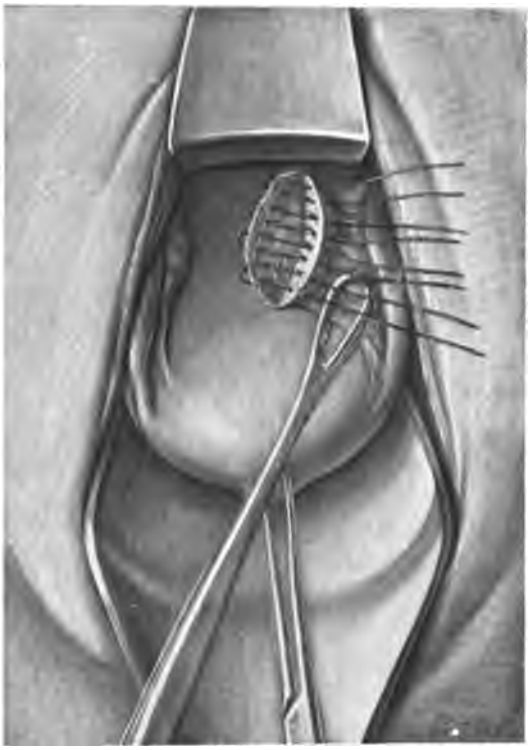

FIG. 36.—A single large follicle cyst or a corpus luteum cyst, or a hematoma of the ovary may be shelled out, or any desired part of the ovary may be exsected in wedge-shaped manner and the remaining structure of the ovary may then be brought together by mattress sutures which should not be tied too tightly. If the meso-ovarium is ligated in its entirety the ovary atrophies.

FIG. 37.—The removal of subperitoneal fibroids is accomplished by incision of the peritoneum over the summit of the tumor. The tumor is then grasped by volsellum forceps and the handle of the knife or blunt-pointed scissors are then used to shell out the tumor from its covering of peritoneum and from its uterine bed. The resulting opening must be closed so that no spaces are left. In the case of small tumors this may be done by interrupted peritoneal sutures passed deeply through the bed of the removed growth and in the case of large openings in the uterus by buried catgut sutures applied in layers. The peritoneal edges must be carefully approximated so as to diminish the risk of subsequent adhesions of intestine or omentum.

variety, it may be difficult to deliver the uterus into the vagina. Under such circumstances, however, the vaginal method is not difficult if hysterectomy be chosen. Should tumor or tumors be of such dimension that we cannot get uterus into the vagina, we have to enucleate them while the uterus is still partly in the peritoneal cavity.

Subserous myomata of the anterior uterine wall are grasped by forceps before delivery of the uterine fundus, and are removed. We then attack the myomata lying higher along the uterine fundus and the myomata of the posterior corpus wall.

Interstitial or submucous myomata of the anterior uterine wall may be exposed through division of the latter and removed by enucleation or morcellement. The same is done with myomata of the posterior corpus wall, if uterus can be delivered first. If not, we may open the uterine cavity by splitting the anterior wall and then enter the posterior wall from the mucous side, to enucleate and remove the myomata of the posterior wall or else the posterior peritoneal route is chosen as the means of attack.

If, after splitting the cervix and uterus, we can leave sufficient good tissue behind, we may then be able to preserve a uterus. If we have to split the cervix and are obliged to do enucleation or morcellement, it is often difficult to save the uterus. If we are able to bring the uterus into the vagina at first, we can then, as a general rule, save the uterus if so desired.

All in all, whether done through vagina or abdomen, enucleation of larger myomata is more dangerous than hysterectomy. Enucleation is advisable only where future conception is an important matter.

RETRODEVIATIONS.

Vaginal celiotomy is used very extensively for the correction of movable retroflection and retroversion, especially when dealing with slightly involved adnexa or sterility without apparent cause.

In fixed retroflexion and retroversion and in retroflexion with diseased adnexa, especially when adhesions are present, the correction of the uterine dislocation is of secondary importance. The disease of the adnexa and the peritoneal condition are the elements of importance, hence the discussion of this question appears elsewhere.

The methods used are vesical suspension, vaginal suspension, vaginal fixation, shortening of the round ligaments and fixation of the round ligaments to the anterior wall of the uterus. This method of approach comes into competition with the Alexander-Adams operation and with the various abdominal operations of shortening the round ligaments, fixing the round ligaments, shortening the utero-sacral ligaments, fastening the round ligaments to the anterior wall of the uterus, ventral suspension and fixation, and Gilliam's admirable operation. In my opinion the Alexander-Adams operation meets all indications for movable retroversion and flexion with normal adnexa except, perhaps, when the uterus is large or descended, or in case of congenital retroflexion with long uterus and short anterior vaginal wall.

With a uterus in retrodisplacement through posterior parametritis, the Alexander-Adams operation and the other operations should be combined with a transverse incision in the cul de sac of Douglas, to be sewed longitudinally.

A selection from these various methods, whether by the abdomen or vagina, is one of choice. It may be said, however, that vaginal celiotomy has this advantage over the Alexander-Adams operation in that it permits of desired exploration and is readily carried out where an abdominal incision does not seem warranted because of insufficiently marked abdominal and pelvic symptoms, or when there is absolute refusal on the part of a patient to submit to such an ordeal in cases with sufficient indications, such indications, however, not including the appendix. The mortality by these various methods is probably about the same. An important difference, however,

concerns the subsequent difficulties which may be encountered in labor and the element of recurrence of the displacement. In avoiding difficulty in labor after abdominal operation, I believe that ventral fixation of the round ligaments (Gilliam) meets the indications, even in cases of large uteri with descent, if the abdominal wall is not too lax, and, more particularly, if there is a retrodisplacement due to posterior parametritis, which latter condition demands correction, and in cases of long uterus and short anterior wall with congenital retroflexion. Danger of dystocia in labor is absent. Objection is made to vaginal attachment of the uterus because of the possibility of difficulties in labor. Vaginal fixation of the uterus should never be done in women who may become pregnant without exsecting part of the tubes. It may be said that if the incision in the vesico-uterine peritoneal fold be sewn before the attaching sutures are tied, so that a suspension and not a fixation is done, the element of danger in labor is almost eliminated. If the lower part of the uterus is attached, danger is not present even if fixation takes place. With vaginal shortening of the round ligaments, with vaginal fixation of the round ligaments to the anterior wall of the uterus, dystocia in labor is out of the question. Therefore the selection of the method is one of individual choice and there is certainly no unanimity on this question.

It may be of interest to trace the development of the various vaginal operations from the first suggestion made by Sänger on.

Sänger said "We may obtain a direct action on a previously anteverted corpus uteri through the medium of a transverse separation of the vaginal fornix, through opening of the plica anteriorly and fixation of the corpus uteri with silver thread to the vagina, the wound then being united longitudinally whereby the collum at the same time is forced backward into its normal position, or by introducing the index finger into the dilated uterus and passing through a silver thread from the anterior fornix without opening the same." Schücking

was the first to introduce a curved needle into the uterus and pierce its anterior wall at the fundus and pass it out between the uterus and the bladder into the anterior fornix. The needle was then threaded with a strong silk thread and drawn back, the two ends of the suture which extended out at the anterior fornix and the external os were brought firmly together and tied. The uterus was then held in decided anteflexion until its peritoneal covering united to the peritoneum i.e. the vesico-uterine plica. Frequent injuries to the bladder led to modifications which followed the other of Sänger's suggestions with the purpose of getting the bladder out of the way.

Dührssen and others in their early operation on movable retroflexion and retroversion per vaginam did not open the vesico-uterine fold of peritoneum; they simply pushed the bladder off from the collum and the uterus and fixed that area of the uterine wall somewhat above the internal os to the vagina by passing a suture into the uterus through the unopened plica (Fig. 38). This method gave no permanent results and Dührssen later opened the vesico-uterine fold of the peritoneum in order to fix the fundus uteri itself directly to the vaginal wall.

At this early period in the development of vaginal fixation of the uterus, it was the general plan after opening the plica to fix the area of the uterus just above the level of the internal os to the edges of the vaginal incision which was frequently made in a longitudinal direction. Fixation of the area just above the level of the internal os was practised, because it was not necessary to deliver the uterus and because this was the highest area readily accessible. Mackenrodt divided the anterior vaginal wall from the portio almost up to the urethra. He separated the vaginal wall from the bladder and pushed the bladder up and freed it from the cervix. He then fastened the bladder with several catgut sutures. Then fixation sutures were passed through the edges of the vaginal incision and through the anterior wall of the collum and uterus, as a result of which this area of the uterus was fixed to the anterior wall of the vagina. The bladder

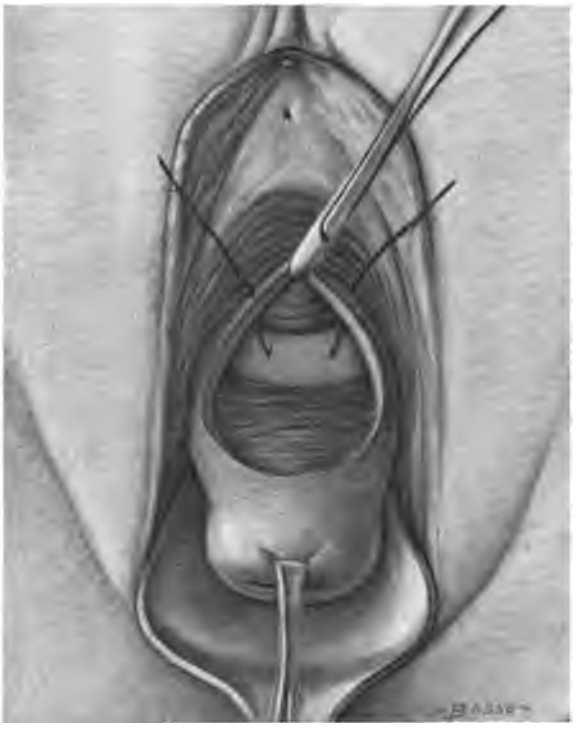

FIG. 38.—The first attempts at vaginal attachment of the uterus were made with the aid of a transverse incision in the anterior fornix and separation of the bladder from the cervix and uterus, so that the vesico-uterine fold of peritoneum was brought into view. One or more sutures were then passed through the edge of the vaginal incision and then through the uterus, passing through the unopened plica. The transverse vaginal incision was sewn in a longitudinal manner. Retrodeviation recurred in these cases.

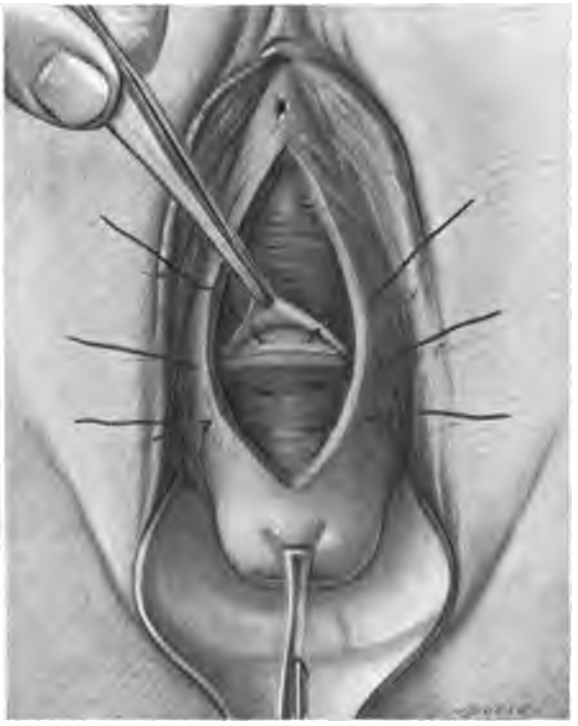

FIG. 39.—The method adopted by Martin included a longitudinal incision in the anterior fornix, separation of the bladder from the vaginal wall and from the cervix and uterus, opening of the plica and the passing of sutures through the margin of the vaginal incision, through the anterior peritoneal fold, through the uterus, and out in the corresponding fashion. The lower sutures passed through the margin of the vaginal incision and through the anterior wall of the cervix in the area from which the bladder had been separated and pushed up.

FIG. 40.—With the aid of a transverse incision in the anterior fornix, sometimes amplified by a short longitudinal incision, the bladder was pushed back from the cervix and uterus by Dührssen. The plica was opened in a longitudinal fashion and fixation sutures were passed through the edge of the vaginal incision and then the fundus of the uterus, the peritoneal fold not being interposed. This produced a sero-fibrous fixation of the acutely flexed fundus and caused dystocia in labor.

FIG. 41.—To avoid dystocia in labor in consequence of the firm union resulting from the method depicted in figure 40, Dührssen passed one or more sutures through the vaginal edge, through the peritoneum, then through the uterus, then out through the peritoneum and the vaginal edge. Before tying this silkworm-gut suture or sutures, the longitudinal incision in the peritoneum was sewn. The result avoided dystocia in labor, for the attachment of the uterus to the vagina is by means of a sero-serous union.

which was pushed forward and upward was not affected by the uterus and the uterus remained firmly fixed anteriorly. The majority of the operators in order to practise this method of fixation of the lower area of the uterus used the longitudinal incision and did not find it necessary to deliver the uterus into the vagina (Fig. 39). Dührssen who used the transverse incision and who fixed the higher areas of the uterus had to develop more of the uterus and even to deliver it into the vagina to perform his operation, and later increased the extent of his incision because of his original efforts in the direction of intraperitoneal operations especially on the adnexa. The fixation of the fundus resulted in an unusually firm union, a too firm union of the acutely anteflexed fundus and produced disturbances in labor (Fig. 40). To avoid this, Dührssen insisted subsequently on the sewing of the incision in the plica before tying the attaching sutures, which, according to the new modification, now passed through the vagina, peritoneum, fundus, peritoneum, vagina (Fig. 41). The transverse incision in the vagina was sewed in a longitudinal manner.

With the original transverse incision of Dührssen, it is easy to do a vaginal fixation without delivering the uterus, but difficult to get the uterus into the vagina except in the case of multiparæ. When the uterus is so delivered, even in the case of multiparæ, little room is left for extracting the adnexa or for operating on them. Dührssen then added a longitudinal incision to the transverse. As the indications for extracting the uterus into the vagina broadened in order to remove fibroids, to perform operations on the adnexa including ectopic gestation, the fornix incisions were made more extensive by all surgeons.

In fixing the upper part of the fundus to the transverse incision as Dührssen did, the uterus became acutely flexed. To avoid trouble in pregnancy the peritoneum was made use of and a suspension was performed. As the indications developed for fixing the uterus without any flexion, with the definite purpose of so sewing the fundus

as to support the bladder and remove the latter from extensive contact with the vaginal wall, especially in non-bearing women, the fundus was fixed higher and higher on the anterior vaginal wall and the longitudinal incision became continually of increased length.

If the uterus is attached by fixation or suspension sutures which pass through the uterus at the lower part of the fundus the danger in pregnancy is slight, even if fixation results instead of suspension.

It is advisable, if there be no cystocele, to attach only a definite area of the uterus somewhat above the level of the internal os to the edges of the longitudinal incision in the vagina by the method of suspension, to close the plica and dystocia in labor is avoided.

HOW TO PASS UTERINE SUSPENSION OR FIXATION SUTURES.

If the peritoneum is not to be sewn again after any attempted operation a transverse opening is a good one. A transverse opening, however, may be closed also. Always close the plica if pregnancy is possible. A transverse incision in the peritoneum does not lend itself readily to a vaginal suspension operation unless the lowest area of the fundus is to be attached (Fig. 39, Martin).

The plica should be incised longitudinally as far as desired if it is intended to sew it again after operation. It is wise then to catch the upper end of the plica incision by forceps or catgut sutures. This longitudinal opening with its lateral edges may obstruct extraction of the fundus and adnexa and should be especially long in nulliparæ.

To deliver the uterus a speculum is introduced into the peritoneal cavity, the cervix is pushed back by the posterior retractor, or with large vagina by cervix volsellum, and the anterior wall of the uterus is grasped by tenaculum forceps applied in succession higher and higher until the fundus is grasped and delivered by rotatory or side-to-side motions, which in the case of a large uterus brings one horn and then the other horn of the uterus through the plica pillars.

It is always advisable to deliver the uterus into the vagina. This is easy, if there are no adhesions, if the ligamentum infundibulo-pelvicum is long, and if the upper part of the broad ligament is not sclerosed. It is then easy to deliver non-adherent tubes and ovaries. If any of the above-mentioned conditions prevail, delivery of the tubes and ovaries is more difficult. It is more difficult to deliver a large uterus if the plica incision has been a longitudinal one than if the incision has been a transverse one. While the uterus is being delivered into the vagina through a longitudinal incision in the peritoneal plica, the lateral margins of this peritoneal plica are put on the stretch, especially so, since the anterior vaginal speculum is introduced to lift the bladder up and out of the way. The uterus must then be delivered between these firm peritoneal pillars and this manipulation is frequently not simple. In replacing the uterus these peritoneal pillars often obstruct the ready return of the body of a large uterus into the pelvic cavity. Unless the peritoneal edges either at the upper end or laterally, or both, are held by forceps or ligatures, the body of the uterus in being pushed back does not pass readily through the incision. Also, if the edges of the plica incision are not held by forceps it is difficult to find it when desirous of passing the suspension sutures.

In order to avoid subsequent disturbances in labor through sewing of the uterus to the vagina, three methods are possible: the vesico-suspension of the uterus, vagino-suspension, and shortening of the round ligaments. Suspension is done by Dührssen in two ways: (*a*) Either one or two catgut sutures are passed through the upper part of the anterior wall of the uterus and the bladder peritoneum. (*b*) A silkworm-gut suture is passed through the upper part of the uterus and the bladder peritoneum and the anterior vaginal wall and is removed in six weeks. With either of these modifications the greatest stress is to be laid on the special suture of the peritoneal opening. This peritoneal union is firm enough to hold the uterus

in anteversion, and loose enough to be stretched by the pregnant uterus without annoyance. This is proven by over 100 normal labors which Dührssen observed after the second modification.

If the sutures pass only through the uterus and bladder peritoneum (Fig. 42–43) any later change which actively pulls the uterus backward can lead to a recurrence of the retro-flexio. Hence this method of vesico-suspension is indicated only for very movable retroflexion. (In that case, it is advisable to adhere to the transverse fornix incision with a small longitudinal incision and not separate the bladder too thoroughly from the anterior vaginal wall; for if this were done the uterus, with its tendency to retroflex, would easily pull the whole bladder with it.)

After opening the plica, several silk sutures are passed through the vaginal wall near the urethra, then through the peritoneum, then through the anterior uterine wall 2 cm. above the internal os, then through the peritoneum, and finally through the right vaginal edge (Fig. 44). To avoid too firm union, the incision in the plica is first closed by continuous suture. The union of the bladder peritoneum to the anterior vaginal wall furnishes a fixed point for the attachment of the uterine wall. The peritoneum may be united by special suture to the serous covering of the uterus, or this may be accomplished by this same continuous running suture, which is made to catch the anterior uterine wall (Fig. 46).

As a result of this operation, the lower part of the uterine fundus just above the internal os is attached to any desired point of the anterior vaginal wall. The space between the attached point and the upper part of the fundus forms a recess in which rests the bladder which should have been displaced upward and removed more or less thoroughly from contact with the vaginal wall. The fundus, whenever it tends to move backward, through distention of the bladder or for other reasons, exerts tension on the attached part of the vaginal wall and pulls it upward and backward.

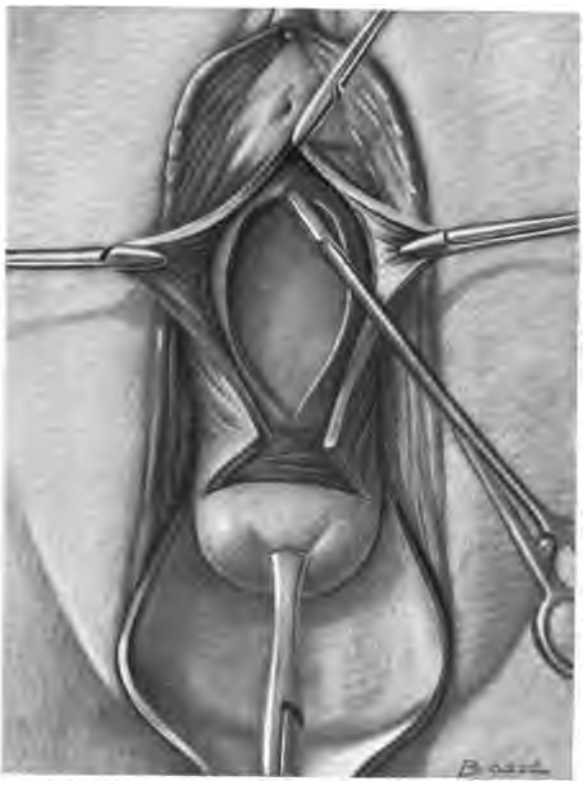

FIG. 42.—An anatomical representation of the inverted ⊥-shaped vaginal incision, with thorough separation of the bladder from the cervix and uterus and from the anterior vaginal wall, so that the bladder is pushed up almost out of view. The longitudinal incision in the peritoneal plica is shown, and through it is seen the anterior wall of the uterus. Three artery forceps are attached to the two anterior vaginal flaps. The one long artery forceps is attached to the upper end of the incised peritoneal plica. The uterus may be united to the peritoneal plica alone (vesico-suspension) or to the anterior vaginal flaps with the peritoneal plica intervening (vagino-suspension) or to the vaginal flaps directly, by bringing the uterus out through the peritoneal plica into intimate contact with the anterior vaginal flaps (vagino-fixation).

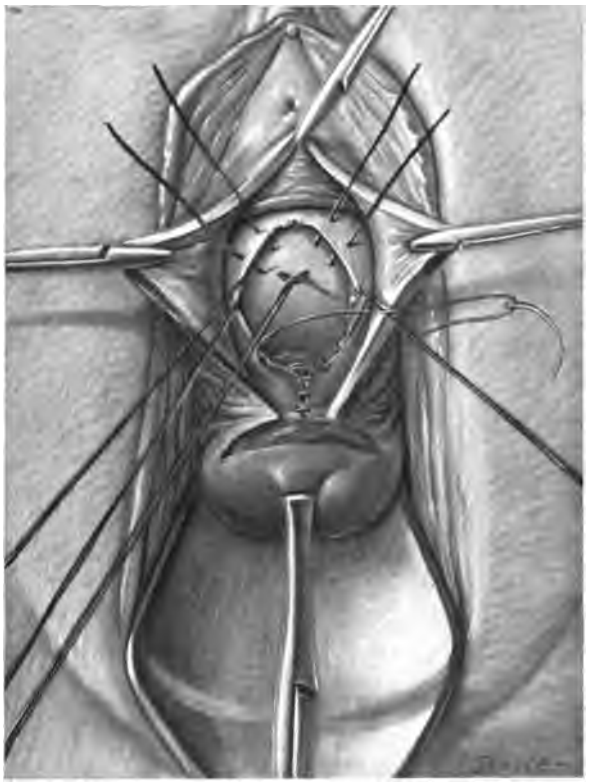

FIG. 43.—Vesico-fixation of the uterus. The anterior wall of the uterus is to be attached to the peritoneum which has been dissected away from the posterior wall of the bladder. The longitudinal incision into the peritoneal plica must be closed with continuous running suture. This is shown by the needle and catgut with which the closing of the plica incision is being done from below upward. The uterus is held in the desired position by a provisional suture in its anterior wall. The edges of the peritoneal plica are brought into relief by three provisional sutures, two applied to the lateral margin and one at the upper angle of the incision in the plica. The bladder is seen just below the highest artery forceps. As a rule, the best results are obtained in vesico-suspension if the bladder is not thoroughly separated from its attachment to the anterior wall of the vagina.

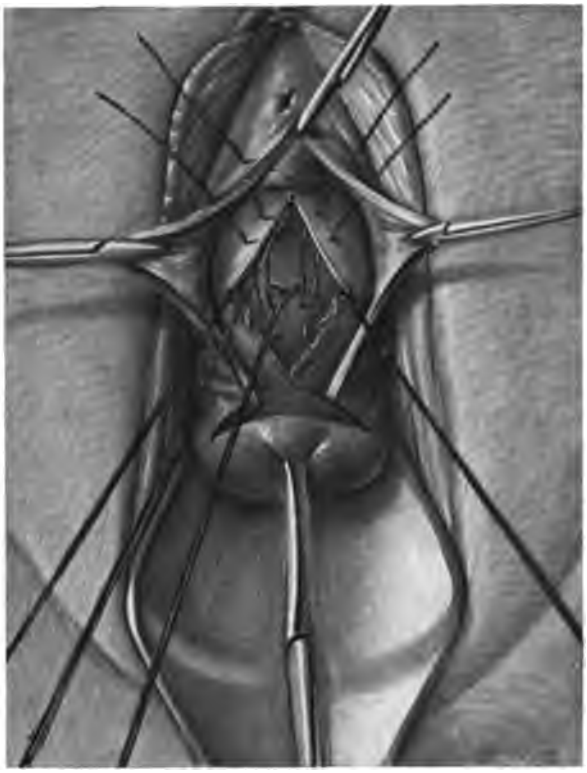

FIG. 44.—Vagino-suspension of the lower part of the uterus. The attaching sutures pass through the upper part (or any part) of the vaginal flaps, through the lateral borders of the peritoneal plica and through the lowest area of the uterine body. The uterus is held forward by provisional suture and the edges of the peritoneal plica are brought into relief by three provisional sutures. The incision in the peritoneal plica must of course be sewed as in figure 43 and figure 46 before the attaching sutures are tied.

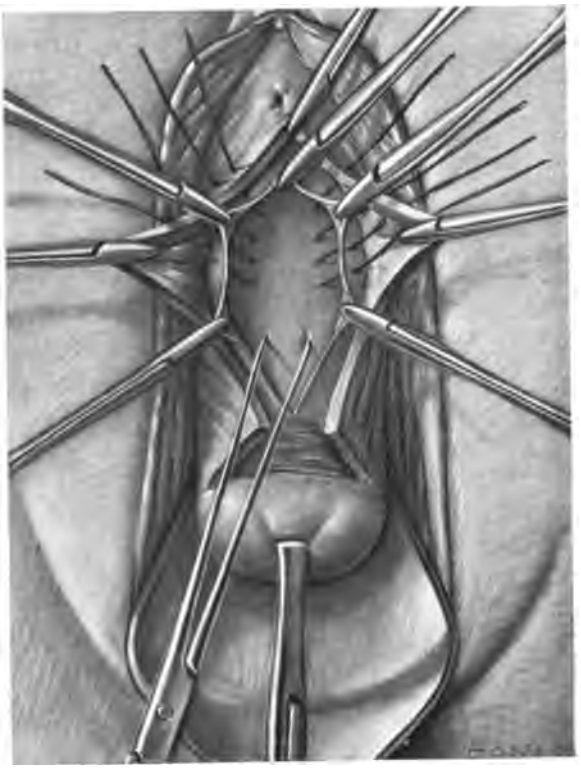

FIG. 45.—Vagino-suspension of the upper area of the uterus. Sutures are passed through the edge of the vaginal flap on one side, through the edge of the peritoneal plica of the same side, through the fundus uteri, and then through the peritoneum and vaginal flap of the other side. The incision in the peritoneal plica is sewn before these sutures are tied. The fundus is held forward by a volsellum. The flap edges and the edges of the peritoneal plica incision are brought distinctly into view by applied forceps.

If there is a tendency to cystocele and if care is taken to close the plica the bladder is kept more thoroughly and more permanently away from contact with the anterior vaginal wall if the fundus of the uterus is attached to the anterior vaginal flaps (Fig. 45). This holds the fundus more anteriorly, it is less influenced by distention of the bladder and subsequent development of a retroversion or retroflexion is prevented.

The suspension sutures may be passed either before or after the uterus is replaced. If the fundus of the uterus is to be attached, the sutures may be passed before replacing the fundus. In passing these sutures before replacing the uterus, the anterior speculum should be taken out and the ligatures should be passed through one vaginal flap, vesico-uterine peritoneum, serosa and uterus, then out through vesico-uterine peritoneum and the opposite vaginal flap. The peritoneum is sewed after the uterus is replaced into the pelvis (Fig. 46). There can be no disturbance in labor if the peritoneal fold is sewn. If the round ligaments are shortened, or if they are sewed to the anterior wall of the uterus, closure of the peritoneal fold is easy. As a general rule, the plica should be sewed. If the lower part of the uterus is to be attached the sutures may be readily passed after replacing the fundus; a volsellum applied to the lower area of the fundus marks the part on the uterine wall through which the sutures are to pass.

It has been claimed that this method, when carefully done, avoids dystocia in labor. Personally, I hesitate to make too high an attachment of the fundus, even if only a suspension be done, in any case in which future pregnancy is possible. As a matter of fact, by far the largest number of such operations, where cystocele is present, are done in women past the child-bearing age or in women who have a sufficiently large family. In such instances, fixation of the fundus to the anterior vaginal wall is done (Fig. 50). The incision in the peritoneal plica is not sewed, and excision of a definite area of either tube

prevents further conception. In such cases the operation is done more readily through a transverse incision in the plica (see Fig. 30).

In doing a vaginal shortening of the round ligaments, an operation which is inappropriately termed a vaginal Alexander-Adams, the round ligament on either side should be grasped with forceps or by having a suture pass through it about 1 1/2 inches away from the uterus. This may be done when the uterus has been pulled forward under the anterior speculum, but not into the vagina. This position of the uterus allows the round ligament to be pulled out so that it may be readily sewed. It is advisable to deliver the uterus in these cases for inspection of the adnexa. If this is done the upper part of the broad ligament is put on the stretch and it is difficult to pull out the round ligament in sufficient length to shorten it. The ligamentum rotundum should be caught by suture or clamp and then the uterus should be replaced toward the peritoneal cavity which so relieves the tension on the upper part of the broad ligament and the round ligament that the latter projects into the vagina sufficiently to be properly shortened. The ligament may be shortened by simply having two adjoining surfaces sewed together by interrupted sutures over a distance of 1 1/2 to 2 1/2 inches or more, or else a duplication is made, and the round ligament is sewed to the anterior wall of the uterus by interrupted sutures (Fig. 47). This latter method is the better of the two.

In cases where pregnancy is not to take place, or when pregnancy is excluded by disease of the adnexa or by excision of the tubes, the uterus is brought into intimate contact with the raw surfaces of the uterine vaginal flaps without intervention of the vesico-uterine fold of the peritoneum (Fig. 52). Hence, in performing this operation it is not necessary to make a longitudinal incision into the vesico-uterine fold to enter the peritoneal cavity, a simple transverse incision suffices.

The sewing of the uterus to the vagina and placing it underneath

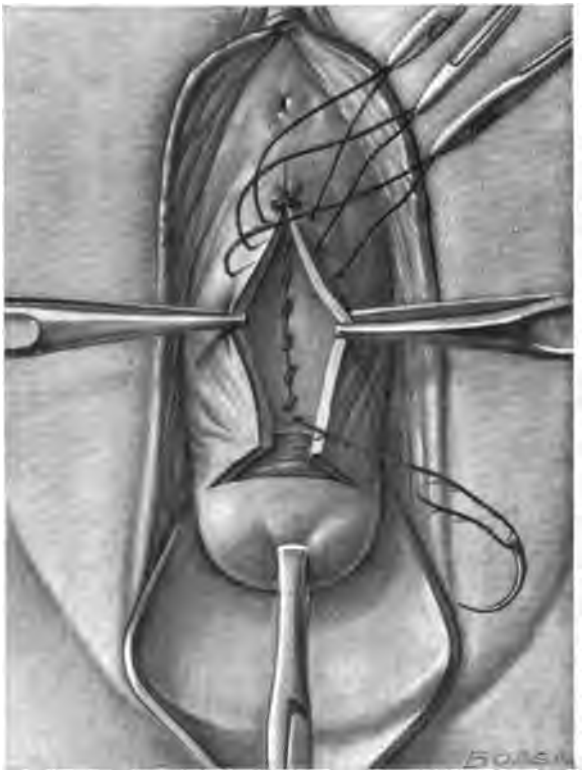

FIG. 46.—In all operations, excepting vagino-fixation, the incision in the peritoneal plica should be carefully sewn before the attaching sutures are tied or on completion of any intraperitoneal operation. As this incision in the peritoneal plica is being sewn, the needle may be made to pass at the same time through the anterior wall of the uterus and thus make the sero-serous union to the uterus more certain. The plica incision may be closed from below upward, or from above downward.

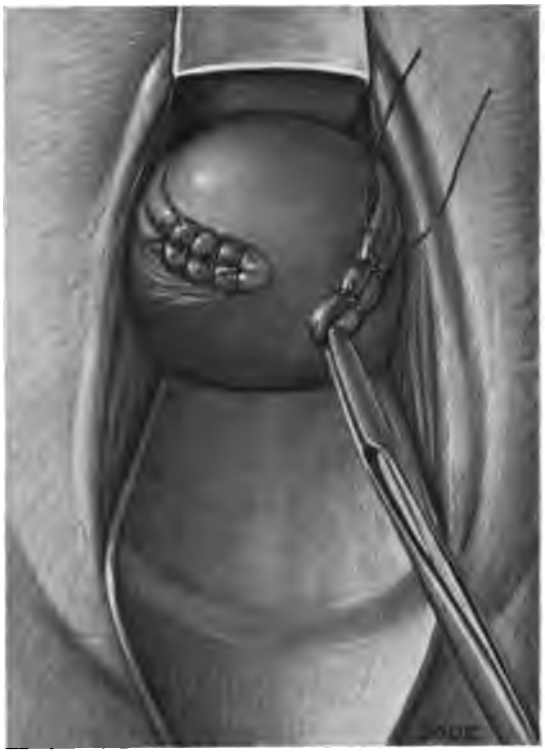

FIG. 47.—Either before the uterus is completely delivered through the vagina or after the uterus has been delivered and then pushed back so as to diminish the tension on the broad ligaments, each round ligament is drawn forward by a long artery forceps and sewed, (*a*) as on right side of the drawing, by interrupted silk sutures which unite the two surfaces of the duplication of the ligament, or (*b*) as on left side, where the silk sutures which unite the two surfaces of the duplication pass, at the same time, through the anterior surface of the uterus. During this manipulation the uterus is held in the position shown by a volsellum or by a provisional suture attached to the uterine wall.

the bladder is a great change in the normal relations. It is rarely, however, that any annoyance in the bladder function is experienced. A few days after the operation there is some difficulty, but shortly after the annoyances are almost nil. Fixation holds the uterus permanently in its new position, the union between the uterus and vagina is firm and serofibrous. The anterior wall of the uterus is held against the vagina in pregnancy so firmly that the natural upward extension of the fundus would be prevented. The obstacles in labor through such malposition of the uterus, of the cervix, and of the fetus are so marked that vaginal fixation should never be done in women who may become pregnant.

CYSTOCELE AND VAGINO-FIXATION.

The methods usually employed in the treatment of cystocele are those of an ordinary simple anterior colporrhaphy, or a more extensive anterior colporrhaphy, so extensive that the entire width of the anterior vaginal wall is removed and brought together to form a sharp-angled union of the lateral vaginal walls. The simple form of anterior colporrhaphy would be productive of better results if it were associated with a complete separation of the bladder from its utero-vaginal seat. The bladder shrinks of its own accord, when so separated, as a result of its natural elasticity, and a good sized area may then be more readily taken from the anterior vaginal wall, and part of the anterior vaginal wall may then be *attached* to the former cervico-uterine situation of the bladder, so as to keep the latter organ up out of the way. This can be very successfully accomplished by the use of the inverted ⊥-incision, associated with complete separation of the bladder. Any desired area of either flap is resected and then the flaps are united by interrupted or running catgut sutures. The sutures which unite the lower area of the flaps may at the same time pass through the lower area of the uterus below the vesico-uterine peritoneum and through the upper area of the cervix. In this operation the bladder may be reefed a trifle, and may be united by two or more catgut sutures to a higher area of the vesico-uterine peritoneum, or, to the anterior surface of the utero-cervical area. The peritoneal cavity may be entered and the fundus uteri sewed to the vesico-uterine plica only. This, combined with an excision from either flap, is a combination of anterior colporrhaphy and vesico-suspension.

The very high vaginal suspension described in figures 44 and 45 is also a procedure which may be used. Either the lower part of the

uterus is attached to a higher area of the vaginal flaps with intervention of the vesico-uterine fold of the peritoneum or else the fundus is attached to the highest point of the longitudinal incision in the anterior vagina, with intervention of the vesico-uterine peritoneum.

An objection to this method may be found in the fact that the bladder is kept anterior to the peritoneum which is reflected from its posterior wall, and this peritoneal fold which is now attached to the anterior wall of the vagina limits the backward displacement and dilatation of the bladder, and keeps it within very narrow boundaries. This operation guards against a subsequent altered position of the uterus itself and permits of pregnancy, according to Dührssen, without danger of dystocia. This limitation of the excursions of the bladder might be overcome by making use of a transverse incision in the plica and then using this apron of the peritoneum as an intervening peritoneal fold when uniting the fundus to the upper end of the longitudinal incision. If then the vaginal flaps are united in their lower area without being sewed to the peritoneum of the uterus, too firm fixation of any part of the uterus would be avoided.

The best method in women who are no longer to bear children, in my experience, consists in so placing the bladder that it is put backward into the peritoneal cavity, resting upon the posterior surface of the uterus, and the uterus is fixed to the anterior vaginal wall—acting as a buffer against any descent of the bladder—fixing the uterus in a position from which it can never retrovert or markedly descend or prolapse; for retroversion is the first step in the development of a marked ptosis, descensus or prolapsus uteri. The operation is an extension of the original principle of Dührssen and Mackenrodt, who originated this procedure in its earlier form for the correction of uterine retrodeviations.

Cystocele in its real, uncomplicated type is a true hernia of the bladder, with the uterus, even though somewhat descended, still in anteflexion or retroversion. There are variations from this type,

of course, for with a very marked ptosis, or descensus or total prolapse of the uterus, there is more or less descent of the anterior vaginal wall up to the extreme degree of complete eversion of the vagina. In these cases, of necessity, the bladder follows the downward course of the anterior vaginal wall. There are other instances in which the descent of the vagina is more marked than is the ptosis, or descent of the uterus, so that in some cases the prolapsing vagina may be the responsible factor in causing a retroverted and descending uterus to end in total prolapse. In these cases, when the uterus by its marked descent fixes our surgical attention on that organ mainly, vaginal fixation of the uterus has, in the mind of almost any one, a reason for its performance. Inasmuch as the operation performed for that indication has as one of its most valid justifications the very fact that it puts the bladder out of the way and prevents forever a subsequent appearance of that organ in the vagina or beyond the vulva, there is no reason why the same operation should not be done when the bladder itself is the one organ which is out of place.

Vaginal fixation attaches the uterus so closely to the anterior vaginal wall that the union is and should be a most firm and unyielding one; hence in that event pregnancy should not be permitted. In a goodly proportion of cases, patients upon whom this operation is done are beyond the child-bearing years. On the other hand, a very large proportion are still menstruating, and pregnancy may in these cases be prevented by the simple step of resecting a portion of either tube. This step in no wise interferes with menstruation and does not induce an artificial menopause.

The present method is the result of years of experience by Dührssen and others, and has been sufficiently tested to warrant its general acceptance in the class of women who are no longer to bear children.

Figure 48 shows a typical, well-marked and extreme type of cystocele constituting a true hernia of the bladder with its covering of vaginal mucosa reduced to extreme thinness. The uterus is in anteversion

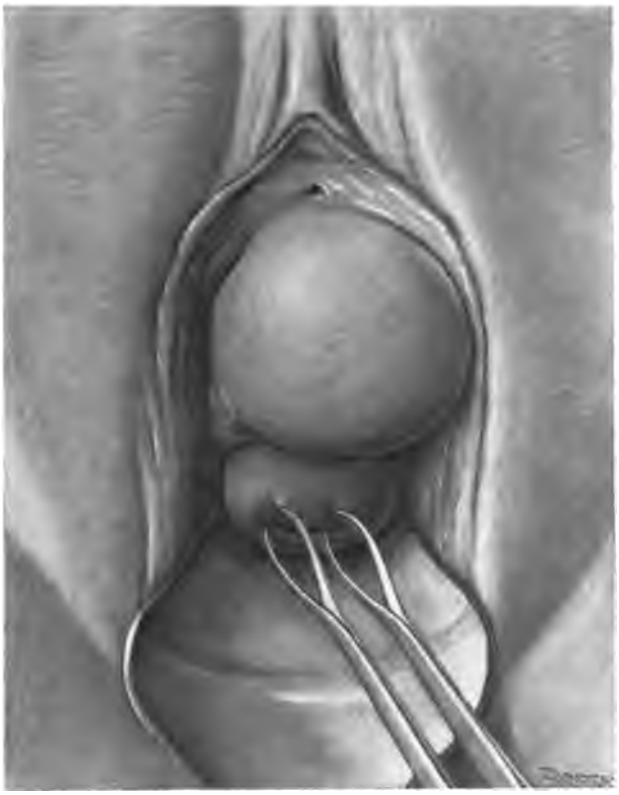

FIG. 48.—Typical marked extreme type of cystocele with the uterus anteverted and not descended. The cervix has been pulled down to the vulva by traction on volsella. This condition constitutes a real hernia of the bladder through the vesico-uterine ligaments and through the anterior vaginal wall.

and slightly descended. In such cases, as in all cases of anterior vaginal celiotomy, the operation is begun by a transverse incision made usually with the scissors across the anterior wall of the cervix just below the lower border of the bladder. The superior lip of this incision is lifted up by two pairs of artery forceps, and with the aid of scissors and the index finger covered with gauze the bladder is thoroughly separated from its attachment to the anterior wall of the cervix and from the uterus up to the vesico-uterine fold of peritoneum. A longitudinal incision is then made, beginning at the middle of the transverse incision and extending up very close to the urethra. This incision is made by a pair of long, sharp-pointed scissors, the lower blade of which is introduced between the vaginal mucosa and the bladder; by successive snips the incision is extended to any desired length. (Figs. 18-22.)

After the longitudinal incision has been made the two artery forceps which have been applied to the superior lip of the transverse incision are used to evert the vaginal mucous membrane, and dissection of the bladder is begun with a few snips of the scissors and is then continued with the finger or thumb covered with gauze until two very large flaps result from complete separation of its attachment to the anterior vaginal wall. (Figs. 23-27.)

In extreme cases, like those illustrated by figure 48, the vaginal mucosa is so thin that its separation from the bladder has to be done with extreme care with a very sharp knife. Whereas, ordinarily, separation of the bladder is completed in three minutes; in a case like figure 48 it may take from ten to fifteen minutes to carry the dissection as far as illustrated in figure 49 in order not to injure the bladder, and to avoid tearing the vaginal flaps or leaving islands of vaginal mucosa behind.

Figure 49 shows two flaps produced by carrying the knife-dissection as far laterally as necessary, after which further separation of the bladder from these flaps can be carried out with the aid of the

finger covered with gauze. The character and form of the connective-tissue attachments of the bladder to the vaginal mucosa is well represented in figure 49. That this condition is a true hernia of the bladder is clearly illustrated in figures 48 and 49.

After the bladder has been thoroughly separated, an anterior vaginal speculum is introduced underneath the bladder, and the bladder is lifted up out of the way and pushed back of the symphysis. There is then exposed to the eye the fold of peritoneum which runs from the posterior wall of the bladder to the anterior wall of the uterus, the so-called vesico-uterine fold of peritoneum. This is lifted up with a pair of mouse-toothed forceps, and with a pair of scissors a transverse incision is made running the full width of the uterus (Fig. 30). The anterior vaginal speculum is then placed underneath the bladder and extending through this incision in the peritoneum into the peritoneal cavity, and the bladder is again lifted up out of the way and placed behind the symphysis. With the anterior wall of the uterus now clearly exposed to the eye, several tenaculum forceps are applied in succession, and the fundus is gradually pulled through this opening in the peritoneum, the cervix being at the same time pushed back over the surface of the posterior speculum into the vagina. When the uterus is finally delivered through the vagina beyond the vulva, we have a picture well represented by figure 33.

Figure 35 shows the space which exists between the anterior speculum which holds the bladder up out of the way and the posterior wall of the uterus, the space through which any intraperitoneal manipulation upon the tubes and ovaries must be carried out. It illustrates clearly the accessibility of the tubes in cases where it is desired to produce artificial sterility. This can be done by applying two ligatures about the tube, one inch apart, and then resecting the intervening area of the tube and burying the exposed ends under the peritoneum of the mesosalpinx. Attachment of the uterus to the anterior vaginal wall is then carried out after resection of any desired area of the anterior

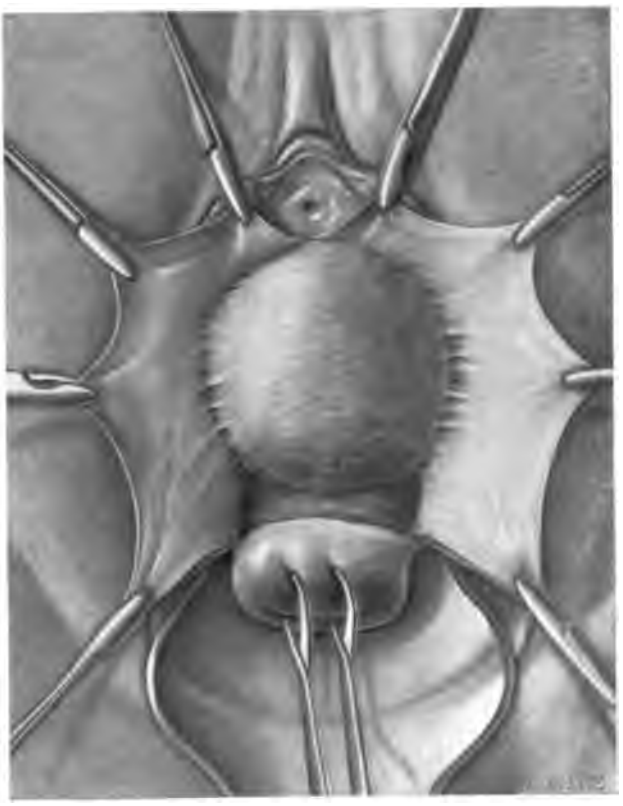

FIG. 49.—Two vaginal flaps have been dissected from the cystocele by the inverted ⊥ incision. The mucosa covering the most prominent part of the cystocele is of extreme thinness and so intimately connected with the bladder that separation can only be accomplished with the knife. The flaps are to be dissected still further in a lateral direction. The character of the connective-tissue attachment of the bladder to its vaginal covering is clearly shown. Because of the thinness of the vaginal flaps at their median area, and because of the superfluous amount of tissue, two semicircular areas are to be resected from either side, so that thick mucosa remains for attachment to the anterior wall of the uterus.

FIG. 50.—After delivery of the uterus into the vagina, the anterior speculum is removed, and four fixation sutures, two of silk and two of chromic catgut, are passed through the fundus uteri and the edges of the vaginal flaps, after resection of the redundant areas of the flaps. Two semicircular areas representing the superfluous mucosa of the anterior vaginal wall have been resected from either flap, so that the remaining vaginal tissue through which the sutures have passed furnishes thick mucosa for the attachment of the uterus. The bladder is to be seen above and posterior to the fundus.

FIG. 51.—After the fixation sutures have been passed through the vaginal flaps and the fundus uteri, the uterus is pushed back along the under surface of the anterior speculum, while the cervix is at the same time being pulled toward the vulva.

FIG. 52.—After the uterus has been replaced behind the vaginal flaps, but not through the plica incision, traction on the four fixation sutures brings the anterior wall of the scarified fundus into intimate contact with the raw surface of the vaginal flaps. The bladder now rests on the posterior surface of the uterus. The character of the anterior vaginal wall which now consists of only fairly thick mucosa, shows that a very large resection of the flaps of figure 49 has been made.

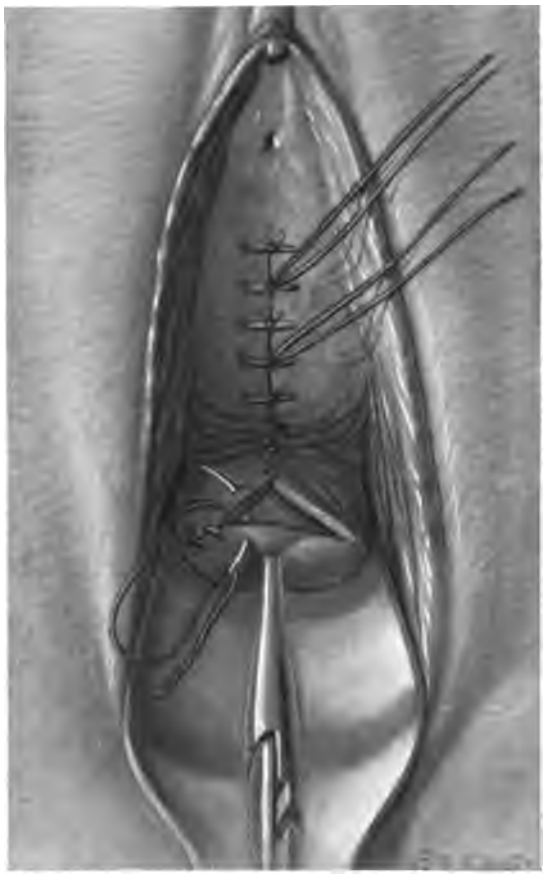

FIG. 53.—The four fixation sutures have been tied after resection of part of the anterior flaps; the two of silk are left long. The remainder of the longitudinal and the transverse incision are sewn with interrupted or continued catgut sutures. On completion of the operation, the vagina is packed with iodoform gauze and the cervix is pushed well up into the vagina.

vaginal flaps. For instance, most of each flap exposed in figure 49 is resected so that the remaining portions consist of thick vaginal mucosa.

Four sutures are now used, two of twenty-day chromic catgut No. 3, two of fairly heavy braided silk. The sutures are passed through the edge of the upper part of the longitudinal incision (after any desired resection of flaps has been done), then through the anterior wall of the fundus uteri at its uppermost part, and then through the edge of the opposite lateral vaginal flap (Fig. 50.) The anterior wall of the uterus is then scarified with a sharp knife so that union of the uterus to the raw surface of the vaginal flaps will be an intimate one. The cervix is then pulled out from the vagina over the posterior speculum and the fundus is pushed back along the under surface of the upper speculum within the peritoneal cavity (Fig. 51). Tension is then exerted on these four sutures and the anterior wall of the uterus is brought closely into apposition to the vaginal flaps, care being taken that no section of the bladder is allowed to intrude itself between the uterus and the vaginal flaps. This manipulation is illustrated in figure 52. With the uterus held in the position illustrated in figure 52, I very often pass a No. 2 chromic suture through the vaginal flaps and the uterine wall just above the uppermost of the four sutures, so that if traction on the four sutures is momentarily released no pouch of the bladder will descend to obstruct firm union while these four sutures are being tied as illustrated in figure 53.

It can be seen in figure 53 that the anterior wall of the uterus is firmly attached to the anterior vaginal wall, and the bladder, of necessity, is within the peritoneal cavity resting on the posterior wall of the uterus. The upper part of the longitudinal incision may be united with running catgut suture before the procedure illustrated in figure 53. As a rule, however, the four fixation sutures bring the edges of the vaginal mucosa sufficiently well together. The edges of the longitudinal incision, below the four fixation sutures, are then united by running catgut

suture and then the transverse incision is closed as illustrated in figure 53.

It is always advisable to leave a space in the transverse incision through which a twist of iodoform gauze may be introduced to drain off any oozing of blood which might accumulate between the lower part of the uterus and the vaginal flaps. The vagina is then thoroughly packed with gauze, introduced in such a manner that the cervix is pushed backward and upward into the hollow of the sacrum. The gauze is then removed at the end of five or six days; the silk sutures are allowed to remain from four to six weeks.

It is always advisable to catheterize these patients for four or five days, as slight difficulty in urination may be experienced, but generally for only a very short time.

In many cases it is found that with a long cervix or descended uterus the cervix does not remain sufficiently high up and far back in the vagina, so that a high amputation of the cervix, unless the uterus is very small, is very often an advisable step.

These drawings, however, simply illustrate the technic in the performance of vaginal fixation.

TWO POINTS OF IMPORTANCE IN THE PERFORMANCE OF VAGINO-FIXATION FOR DESCENSUS UTERI.

Vagino-fixation of the uterus attaches the fundus uteri to the anterior vaginal wall and places the bladder on the posterior wall of the uterus.

In order to perform this operation to the greatest advantage to the patient, it is necessary that the fundus should be well up behind the symphysis and that the cervix should be thrown high up and as far back as possible toward the hollow of the sacrum. The cervix takes this position when vaginal fixation is done to correct retroversions or retroflexions which are not complicated by elongatio colli, by cystocele, by descent of the uterus or by descent of the vaginal walls. Then the simple operation of vaginal fixation usually suffices except in those

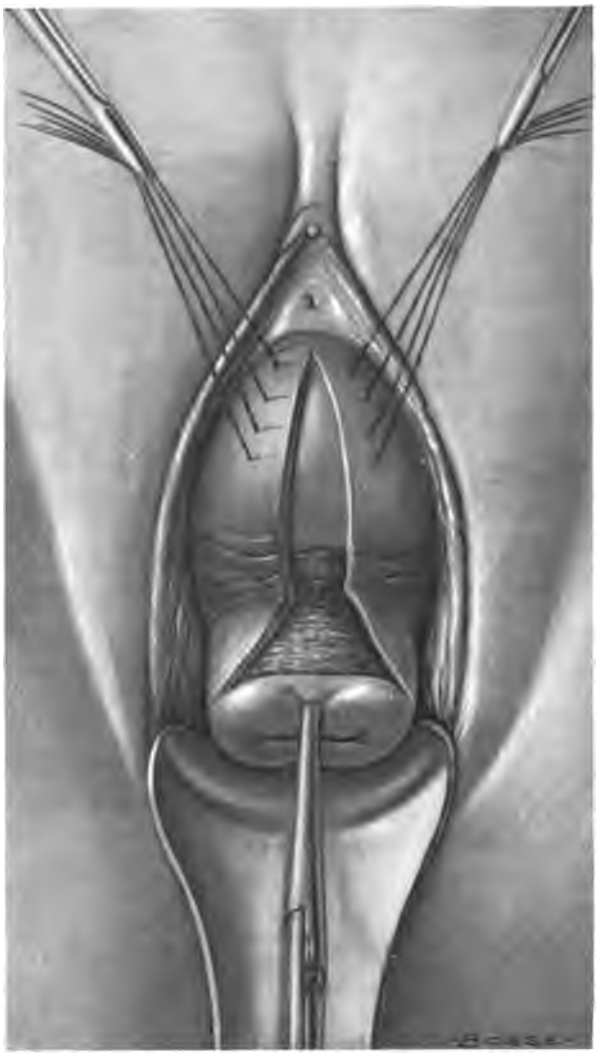

FIG. 54.—Four fixation sutures, two of chromic catgut and two of silk, bring the scarified fundus of the uterus into apposition with the anterior vaginal flaps in the performance of vaginal fixation.

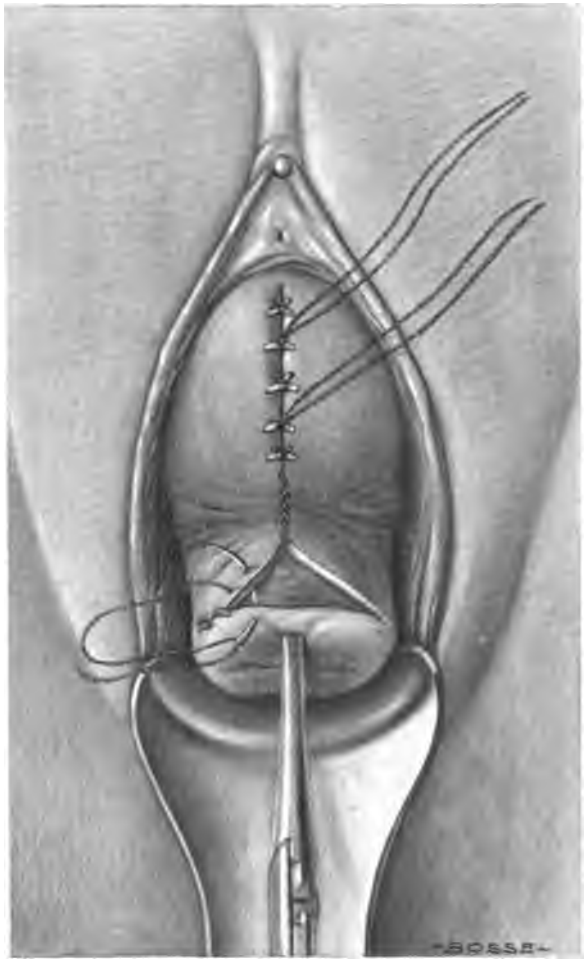

FIG. 55.—The fixation sutures which attach the fundus uteri to the anterior vaginal flaps are tied, and the remainder of the longitudinal and transverse incision is united with continued or interrupted catgut sutures. The position of this uterus shows the fundus to be sagging down into the vagina and the cervix to be dropping down toward the vulva. On completion of the operation the vagina is thoroughly packed with gauze. Subsequent examination often shows the cervix to be acutely flexed and to be descended toward the vulva. This happens particularly when simple vagino-fixation has been done, without resection of part of the anterior vaginal flaps, for descensus uteri, or for cystocele associated with descensus uteri, with long uterus and elongatio-colli. The drawing shows this condition in an exaggerated form. Hence vagino-fixation of the uterus as the sole procedure does not suffice in such cases.

FIG. 56.—To avoid sagging of the fundus and projection of the cervix toward the vulva part of each anterior flap is resected and a high amputation of the cervix is begun after the uterine fixation sutures have been passed but not tied. After a transverse posterior incision, the lower lip of the incision is grasped by artery forceps and discloses the connective tissue bands, uniting it to the posterior wall of the cervix.

FIG. 57.—Upward dissection with the gauze-covered index finger separates the vaginal mucosa from the posterior wall of the cervix up to the cul de sac of Douglas which is seen just beyond the tip of the finger.

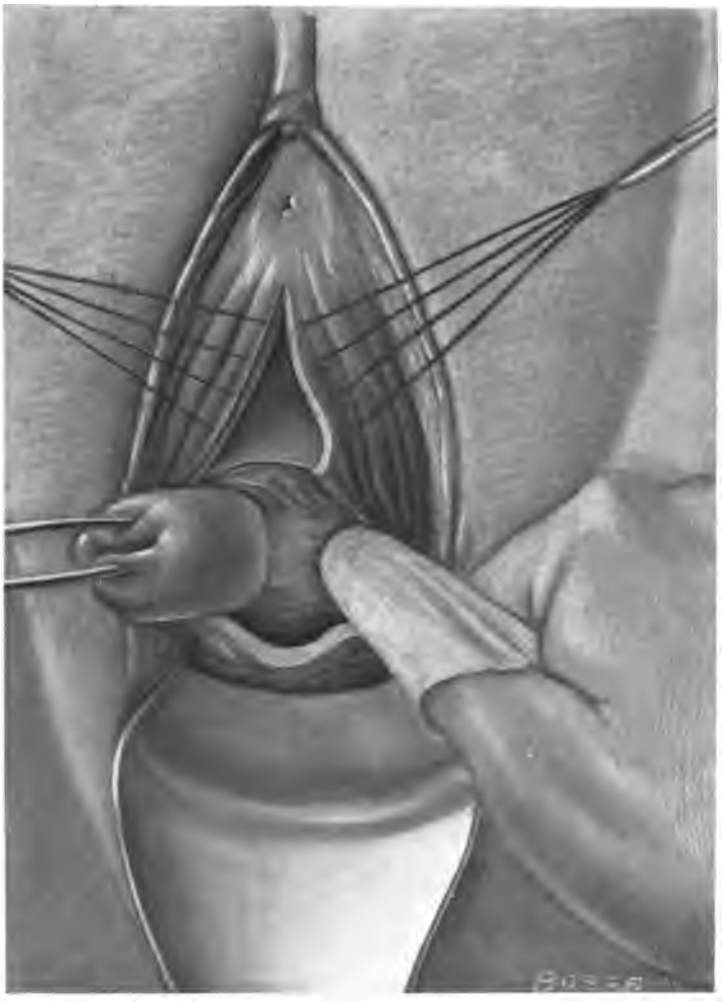

FIG. 58.—To completely separate the cervix from its enveloping mucosa, the bridge of mucous membrane covering the lateral wall of the cervix is incised with scissors and is peeled upward with the gauze-covered thumb until the area of the internal os and the uterine arteries is reached.

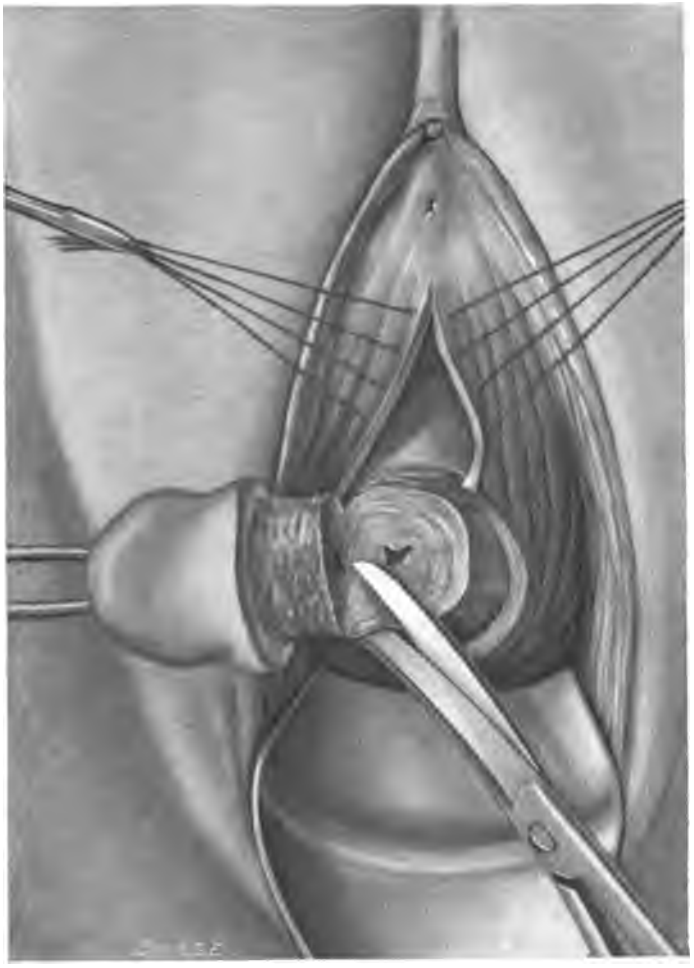

FIG. 59.—The cervix is amputated at a very high level, often very near the lower border of the peritoneum covering the uterus.

FIG. 60.—The anterior lip of the cervix is grasped with volsellum forceps and the posterior part of the separated vaginal tissue is united to the cervix by three chromic catgut sutures passed deeply through the structure of the cervix and then well away from the vaginal edge. The three sutures are passed through the vaginal mucosa at such distances from each other as to take up a certain amount of surplus between them when tied.

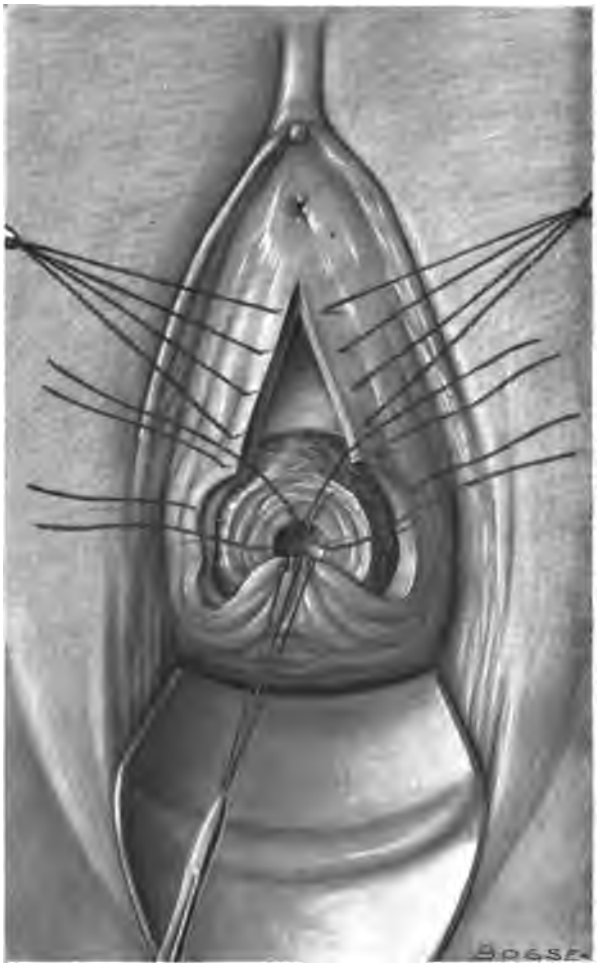

FIG. 61.—After the three posterior sutures are tied two cervico-vaginal sutures are passed on either side, at the antero-lateral area of the circumference of the cervix. These when tied bring the edges of the lower end of the longitudinal incision in the anterior wall fairly close together.

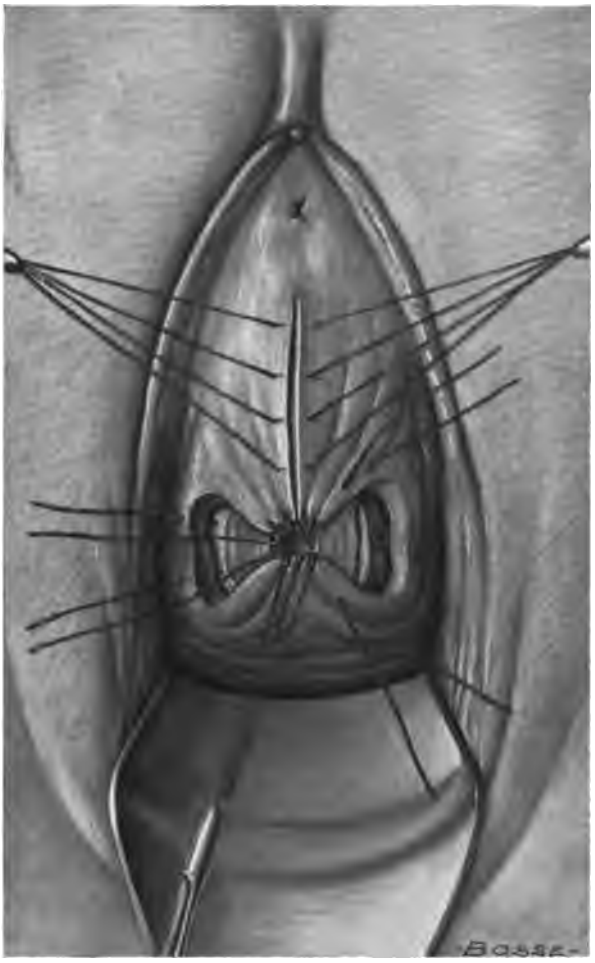

FIG. 62.—After tying the posterior and the antero-lateral sutures the lateral area of the cervix still remains to be covered by the vaginal mucosa. This may be done as on the left side of the drawing by passing cervico-vaginal sutures and thus covering the cervix by pleated mucosa, or as is done on the right side of drawing, by passing one suture through the vaginal mucosa, then through the cervix and out of the cervical canal, then back through the cervical canal and the cervical tissue and finally through the vaginal mucosa. This is to be followed by several up and down sutures through the vaginal mucosa alone, as shown by the one external suture on the right side.

cases where the anterior vaginal wall is congenitally a short one, in which cases vaginal fixation is contra-indicated.

If in the above-mentioned class of cases of retroversion or retroflexion complicated by elongatio colli, by cystocele, by descent of the uterus, etc., the simple operation of vaginal fixation is done the operation fails of its best results as can be seen from figures 54 and 55.

Figure 54 shows the fixation sutures which are to unite the anterior wall of the uterus to the anterior vaginal wall in the simple operation of vaginal fixation.

Figure 55 shows the sutures tied and the longitudinal and transverse incisions in the act of being closed by running catgut suture.

Figures 54 and 55 show in an exaggerated form the lack of tautness in the anterior vaginal wall in the case of simple vaginal fixation done for cystocele with descent. The important point to be noted, however, is the faulty position of the cervix. (The cervix and uterus are shown for purposes of demonstration much further out beyond the vulva than is actually the case.) This demonstrates that the lack of tautness in the anterior vaginal wall is not alone responsible for the position which the cervix has assumed. The trouble is that the uterus in its new position is too long, hence the simple operation does not throw the cervix high up and far back when, as is depicted in this drawing, we are dealing with an enlarged or elongated uterus, a uterus which has descended. It is necessary to overcome this obstacle when dealing with ptoses of the uterus when the uterus is enlarged and elongated, when there is an elongation colli, or when there is a cystocele with descent of the uterus, and most certainly is it necessary in the major degrees of ptosis and in the case of total prolapse of the uterus. To overcome this obstacle it is necessary (1) to perform a high amputation of the cervix at the level of the internal os. (2) It is necessary to make a taut anterior vaginal wall to which the fundus is to be fixed. While this tautness may be produced without resection of any part of the flaps, it is often advisable to resect an oval or a

triangular area from each of the two flaps produced in the anterior vaginal wall after separation of the bladder. This tautness may be produced by either one of two methods of attaching the vaginal mucosa to the new cervix opening after an amputation of the cervix has been done.

The accompanying illustrations show the two methods of accomplishing these steps. In any case of simple vaginal fixation sutures are passed through the edges of the flaps and through the anterior wall of the uterus. The following drawings, Figs. 56-62 inclusive, show the amputation of the cervix without resection of any part of the anterior vaginal flaps; and the drawings, Figs. 63-64, show the same operation completed by resection of a large portion of the anterior vaginal flaps. After the uterus has been replaced within the peritoneal cavity, and after four fixation sutures have been passed through the vaginal flaps and through the uterine wall, the cervix, grasped with a volsellum forceps, is pulled down toward the vulva. A transverse incision is made through the posterior wall of the cervix, and the upper lip of the incision is grasped with two long artery forceps as shown in figure 56. The finger covered with gauze dissects the lower lip of the incision away from the posterior wall of the cervix up to and beyond the peritoneal fold of Douglas (Fig. 57). The cervix is then pulled out and to one side; a snip with a pair of scissors cuts through the vaginal mucosa on the lateral wall of the cervix which still remains as a bridge separating the transverse incision on the anterior cervix wall from the transverse incision on the posterior cervix wall, and the index finger or the thumb, covered with gauze, pushes up this vaginal mucosa and separates it from the cervix up to the situation of the uterine arteries, as is shown in figure 58.

Figure 59 shows the amputation of the cervix carried on at the level of the internal os. The cervical canal is then dilated, after the anterior lip has been grasped by a volsellum forceps, and the vaginal mucosa is then united about the internal os. Chromic catgut sutures

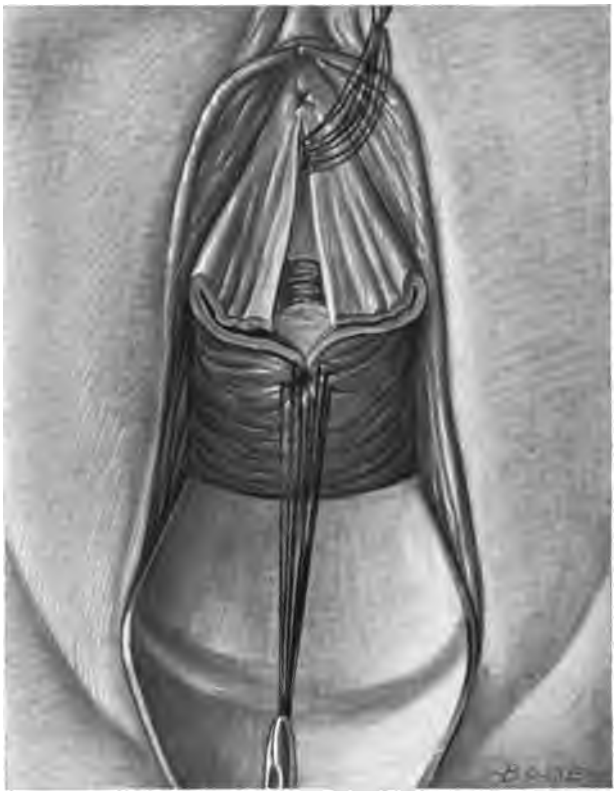

FIG. 63.—Instead of passing the cervix sutures as depicted in figures 60, 61, and 62, the cervico-vaginal sutures are passed first through the posterior wall of cervix and then out from these in direct continuity on either side, passing thus toward the anterior wall of the cervix and taking up the slack in the posterior and lateral fornices. Thus two very large anterior vaginal flaps result. These when resected to the desired extent furnish a taut anterior vaginal wall. In the early part of the operation four fixation sutures have been passed through the anterior wall of the uterus only, and have been grasped with artery forceps. These are to be threaded and passed through the edges of the uterine vaginal flaps later on after the cervix has been thoroughly covered, and after the excess of the vaginal flaps has been resected.

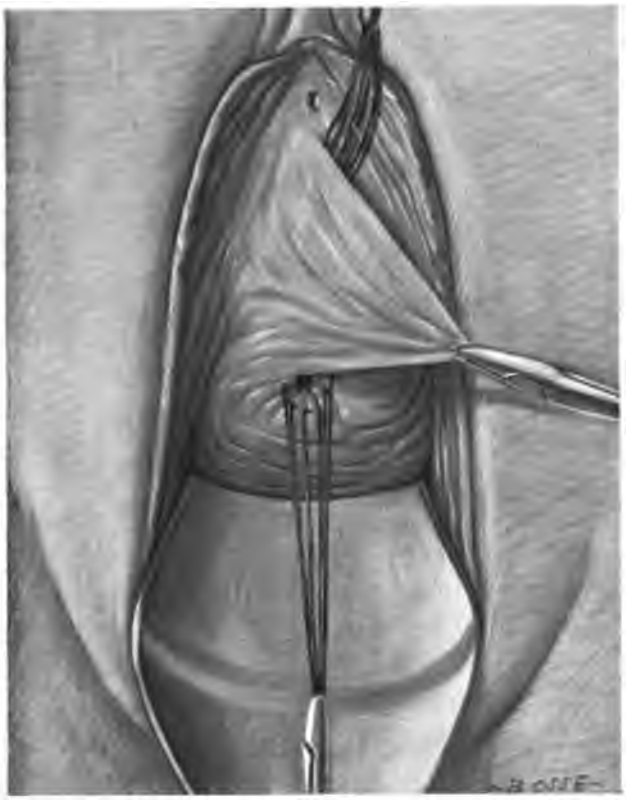

FIG. 64.—The two anterior vaginal flaps resulting from the method depicted in figure 63 may be resected in any desired form Oval, small or large triangular areas may be resected, after which the sutures which have been passed through the anterior wall of the uterus in the early part of the operation are threaded and passed through the edges of the vaginal flaps.

Nos. 3 and 4 are passed through the cervical canal, through the entire wall of the cervix, and out through the vaginal mucosa. The first three are passed as shown in figure 60 and then are tied. The succeeding sutures are passed, two on either side, as shown in figure 61. These are passed in such a manner that they bring the two edges of the longitudinal incision almost into apposition when tied as shown in figure 62. The remaining area of the lateral walls of the cervix may then be closed or covered in either of two ways: either by passing sutures as shown on the left-hand side of figure 62 through the cervix and out through the lateral vaginal mucosa just as the other cervico-vaginal sutures were applied, or, as shown on the right-hand side of the drawing, through the vaginal mucosa, then out through the cervical canal, then back through the cervical canal and out through the vaginal mucosa, the next suture to that being passed either in the same way or simply straight up and down through the vaginal mucosa (Fig. 62). In this way the entire cervix is covered by vaginal mucosa after which the four utero-vaginal fixation sutures are tied.

If this operation is performed in the case of cystocele or descent of the uterus with lax anterior vaginal wall, a condition shown in figure 62, the disadvantage resulting from the failure to resect parts of the anterior vaginal flaps is evident. The method which best overcomes this disadvantage is the following:

Fixation sutures are passed through the anterior wall of the uterus but are not passed through the vaginal flaps as was done in figure 54, but are simply allowed to pass out through the vagina and are to be held by artery forceps for subsequent use. The attaching of the vaginal mucosa to the cervix is begun as in figure 61, by three sutures which are tied, but the subsequent sutures take up the lateral borders of the vaginal mucosa closely, allowing of no such reefs as are evident in figure 62. As a result of this procedure all the surplus vaginal mucosa in the fornix is left as two redundant flaps shown in figure 63. Any desired part of these flaps is then

resected from the redundant tissue shown in figure 64, after which the four fixation sutures which have already been passed through the anterior wall of the uterus are then threaded in a needle in turn and passed through the edges of the anterior vaginal flaps to complete the vaginal fixation. As a result of these two important steps the anterior uterine wall is attached in a manner which lifts the uterus up and holds it in a more elevated and nearly horizontal position, and the hypertrophied, often elongated cervix has been amputated. These procedures allow the lower end of the uterus to be thrown high up and far back. This method of attaching the vaginal mucosa around the internal os takes away much of the enlarged calibre of the upper vagina, a condition so often present with descent of the uterus and due to the existence of a large relaxed fornix and of posterior enterocele. The advantage gained by the removal of this condition in the upper vagina can be fully appreciated, however, only when the subject of total prolapse of the uterus is considered.

TOTAL PROLAPSE OF THE UTERUS.

Slight ptosis of the uterus may occur with the fundus in anteflexion or anteversion, but marked ptosis of the uterus implies an associated retrodeviation. Neither can the uterus leave the pelvis or vagina if situated in physiologic anteflexion. It must first come into a position in which its axis has almost the same direction as that of the vagina. A *retroversion* or slight retroflexion then permits abdominal pressure, among other accessory factors, to cause a ptosis of severe degree.

If a severe degree of ptosis carries the uterus down no further than to the vulva, such an hysteroptosis may be defined by the term descensus uteri. If the uterus descends beyond the vulva, the condition is called a prolapse. Only a small proportion of retroversions end in marked ptosis or in descensus or in prolapse. These do not occur if there are no lengthened ligaments, if the broad ligaments are elastic or sclerosed, if the utero-sacral ligaments are short, if there is no tugging by a loosened vagina, if there is no atrophy of the perivaginal tissue, if there is no injury to the levator ani muscles, etc.

With marked ptosis of the uterus there is descensus vaginæ. The anterior wall of the upper vagina and the posterior wall of the upper vagina are descended in association with any marked descent of the uterus. The nearer the portio approaches the vulva, the more is the vaginal canal shortened, until in the more extreme cases the latter also finally lies outside the vulva. This secondary involvement of the anterior vaginal wall must be distinguished from true cystocele. The term cystocele seems to be applied to any protrusion of the mucous membrane of the anterior vaginal wall which is externally visible, or which actually extends beyond the external genitalia. True cystocele is really a hernia of the bladder through the lower half of the

anterior vaginal wall, which occurs without marked ptosis of the uterus.

Complete prolapse of the uterus necessarily rolls the vagina out. However, descent of the lower vaginal walls may occur primarily, or simultaneously with marked ptosis of the uterus. Descensus uteri and this true prolapse of the vagina are due to the same causes, but each may have an influence on the other, and they are then two interdependent affections.

There persists, especially after several or instrumental labors, an elongation of the round ligaments and of the six consecutive tissue ligaments associated with the uterus and, more especially, the ligamenta cardinalia. There is deepening and sinking of the peritoneal pelvic recesses anterior, and especially *posterior, to the uterus*. Since the normal anteverted or anteflexed position of the uterine fundus is maintained only if the cervix is high up and far back, such descent of the cervix and fornices permits the fundus to drop back into retroversion unless there be present unusually short and muscular round ligaments.

Injury to the anterior and posterior attachments of the levator ani muscles has the greatest bearing on this question. Injury to the anterior fibers may aid in the development of cystocele. Injury to the posterior fibers of these muscles, even when the perineum is not torn, results in a very flabby vulvar outlet, and when the perineum is torn, in a hernia of the rectum (rectocele). Many cases do not result in more than uterine ptosis, or retroversion, or retroflexion, even when they develop cystocele, or both. Loss of the support which the levator ani furnishes the vagina may be of importance. In many cases the uterus is elongated, much enlarged, the cervix is thickened and hypertrophic and the vaginal mucosa very thick. There is *subinvolution*, and at times atrophy of the elastic periuterine and perivaginal tissues. There is not infrequently associated with this condition (even where labors have not been numerous or instrumental) a state of *general*

inelasticity associated with flabby subinvoluted abdominal walls and with varying degrees of gastroptosis and enteroptosis. What effect may persistence of retroversion and descent associated with intra-abdominal pressure and accessory pressure have in such cases? It leads to further uterine descent, and then, if we have perivaginal atrophy, large vagina, thickened mucosa, we observe further *vaginal descent:* (1) pushed down by uterus; (2) pulling uterus down; or (3) occurring simultaneously with uterine descent, but primarily independent of it.

The vagina, except at its outer end, is simply surrounded by connective tissue. The only thing which prevents the vagina from being pushed down by abdominal pressure is the action of the levator ani muscles and the character of the connection of the vagina with the surrounding connective tissues. The levatores ani and constrictor cunni are decidedly stretched and often torn, and as a result the narrow vagina is widened and the original narrow slit becomes a large canal. Atrophy or degeneration of certain tissues about the vagina may cause the mucous membrane *to lie in folds*, as is so frequently the case at the climacterium, when there is a resorption of fat and a change of the connective tissue, a disappearance of active elastic fibers, and a loosening of the various relations. (Such changes not infrequently occur also in younger women).

The pathological factors may be grouped as follows:

1. Tendency to inelasticity.
2. Labor injuries, especially if repeated.
3. Subinvolution; ligaments, uterus, vagina, etc.
4. Primary ptosis leading to retroversion. Since retroversion is present, attention has been paid to the retrodeviation, and while this is an important pathological factor, the elements of subinvolution, injury to the various muscles, atrophy and predisposition are overlooked.
5. Posterior enterocele and large descended fornix.
6. Large vagina.
7. Vagina loosened, giving no support.

8. Loosened vagina, actively tugging upon the uterus.
9. Bladder torn from its fastenings.
10. Splanchnoptosis and intra-abdominal pressure.
11. Vocation
12. Age. Most of the extreme cases after the menopause age, when there is great atrophy of the elastic fibers.

Primary descensus and prolapsus uteri are due to inelasticity and stretching of the ligaments connected with the uterus, especially the ligaments cardinalia, and to inelasticity of the pelvic connective tissue. A good perineum and a good vagina often keep the uterus from coming down too far for varying periods of time. Often, too, the vagina does not so much pull the uterus down as it fails to keep it up. Loose vagina, on the other hand, may in some cases eventually pull the uterus down, unless all things are favorable, such as good broad ligaments, or sclerosed broad ligaments and utero-sacral ligaments. For such secondary descensus, then, the soil must be ready, even though it is due in a great measure to the action of the prolapsing vagina on the uterus.

The variations from the normal are indicated by the following types: (1) ptosis alone; (2) cystocele alone; (3) ptosis and cystocele; (4) ptosis, retroversion, with or without cystocele; (5) descensus to vulva; (6) descensus with hypertrophied cervix and thickened mucosa; (7) prolapsus outside of the vulva; (8) prolapsus with elongatio colli and hypertrophy; (9) prolapsus with vagina pushed down; (10) prolapsus with vagina pulling down; (11) prolapsus with complete peeling off of the posterior vaginal wall.

In the most extreme cases all union of the vaginal canal with surrounding and connective and elastic tissues has been dissolved; all relations of fornices to normally situated peritoneal or uterosacral structures has been altered; all attachment of the uterus to fixed points of the pelvic wall has ended in tremendous elongation or atrophy.

Surgically, therefore, we have to take into consideration the following points, which are:

1. Bladder and anterior vaginal wall.
2. Retrodeviation.
3. Elongated uterus, hypertrophied cervix.
4. Roof of vagina, which should be restored to its former elevation.
5. Posterior enterocele.
6. Capacious vagina, descended vagina. Injury to levatores ani.
7. Rectocele and perineum.

1. We must correct the descent of the bladder which has come down together with the anterior vaginal wall or which constitutes a hernia of the bladder through the anterior wall. On thorough separation of the bladder to loosen it from all union, the bladder shrinks and this method of dissection furnishes thick flaps of vaginal mucosa and submucosa. For cystocele alone we may, then, do a resection of flaps and an anterior colporrhaphy and stop.

2. We must place the uterus in such a position that future retrodeviation is avoided and subsequent descent prevented. By entering the peritoneal cavity we take out the uterus, fasten it to the anterior vaginal wall after resecting part of the anterior vaginal wall. The bladder thus rests on the uterus and if the utero-vaginal union is a firm one the bladder can never descend. This fixation of the uterus does not elevate the fundus above the normal, but puts it behind the symphysis. (Ventrofixation demands good abdominal walls, firm union on the part of the uterus, and then the uterus has to bear the great tugging force from below, and no certainty of permanent correction of the cystocele results.)

3. As a rule, now, the cervix of the vagino-fixed uterus is acutely flexed, having a tendency to project down toward the vulva, showing that fixation of the uterus fundus does not shift the elongated and hypertrophied cervix up and back as we might wish. Therefore a high amputation of the useless cervix is done to permit the uterus to assume a more horizontal position.

4. The fornix or roof is thus placed at an elevation approximating

the normal. The lower end of the uterus is by this method thrown upward after a high amputation, the uterus then lying more horizontally, even more so than normally. Although the fundus is not elevated (*i.e.*, toward the abdomen), yet its position is well fixed and the area of the new external os is elevated and thrown back. The simple method of amputation is of itself sufficient to shift and lift the fornix upward only if the vaginal walls are not loosened, if the cervix is not large, if the vagina is not large, and if the upper posterior vaginal wall is not prolapsed.

5. We now do away with the posterior enterocele, which is as much a hernia in the posterior fornix as is the cystocele in the anterior. With large cervix and prolapse of the upper posterior vaginal wall, we must sew the vaginal mucosa about the cervix in such a manner as to do away with the surplus fornix tissue. This ends in the removal of two vaginal flaps, which narrows the upper vagina very much. This step and the resection of the posterior vaginal wall overcome the posterior enterocele.

6. We make the vagina of small calibre, constituting a canal whose walls are fixed. We must narrow the entire lumen of the vagina by resection of the posterior vaginal wall and union of levatores ani.

7. We now correct the rectocele and repair the perineum and the relaxed pelvic outlet by a high colpoperineorrhaphy—an essential point is the sewing of the separated levatores ani across and in front of the denuded rectocele. By beginning the denudation from below in the performance of this step, we get a very thick vaginal wall down to the mucosa, and then extend the separation of the posterior vaginal wall up to the cervix in order to carry out step 6.

In the extreme type of total prolapse with great hypertrophy of the cervix (Fig. 65) the following method is to be practised:

Taking firm hold of the vaginal portion of the cervix a transverse incision is made with the scissors. The upper margin of the incision is grasped by two forceps and lifted up. With the preliminary aid

FIG. 65.—Drawing of typical form of old complete prolapse of the uterus with tremendous hypertrophy of the cervix so that the cervix is larger than the fundus. The area around the external os often evidences large decubitus ulcers.

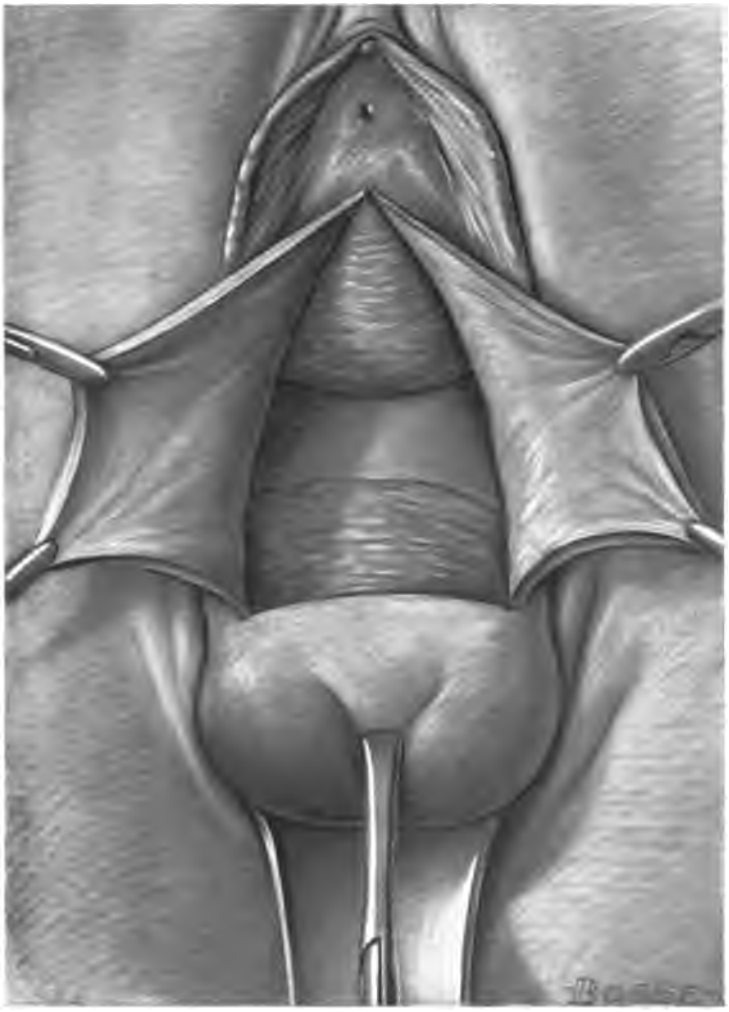

FIG. 66.—The anterior vaginal wall has been dissected away by the inverted ⊥-incision. The bladder has been thoroughly separated from the anterior wall of the cervix and uterus so that it is retracted upward. Beneath it the vesico-uterine fold of the peritoneum is seen, unopened. The bladder is thoroughly separated as well from the upper areas of the vaginal flaps.

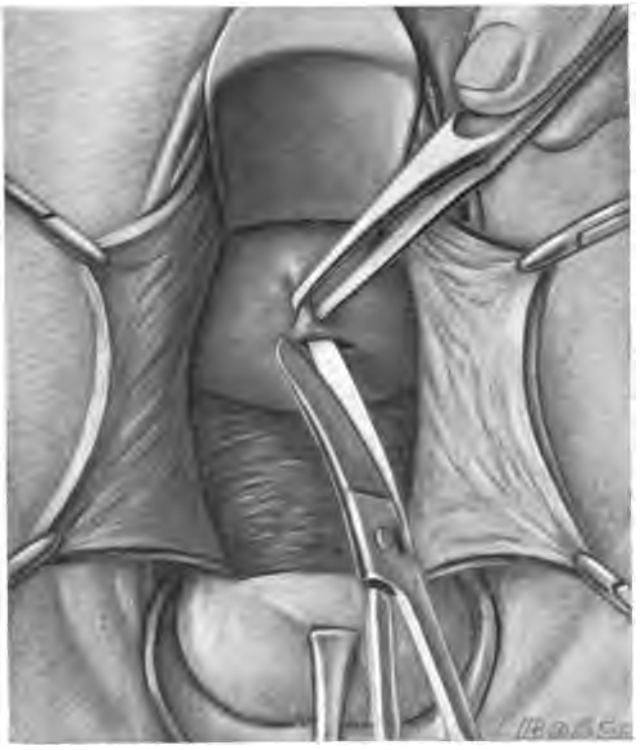

FIG. 67.—The peritoneal cavity is entered by a wide transverse incision, the peritonea fold being grasped by mouse-toothed forceps and easily incised. The bladder is held completely out of sight by the anterior speculum.

FIG. 68.—The anterior speculum having been introduced through the transverse incision in the peritoneal plica, the anterior wall of the uterus is grasped by successively applied volsella, the cervix is at the same time pushed back either by the posterior speculum or, better, by volsella attached to the cervix. The fundus is readily drawn out through the vagina beyond the vulva. Between the posterior wall of the uterus and the anterior speculum is a wide space through which the adnexa are delivered and examined. If by any chance the patient may still conceive, an area of each tube should be resected.

FIG. 69.—To prevent conception the mesosalpinx is tied by two or more mattress sutures at any desired point. The tube is ligated at two points three quarters of an inch or more apart, and the intervening area of the tube is removed in such a manner that the exposed ends of the tubal mucosa may be covered by fine catgut sutures which unite the two layers of the mesosalpinx.

of the scissors and then of the fingers covered with gauze, the bladder is dissected off from the anterior wall of the cervix and the anterior wall of the uterus up to the vesico-uterine cul de sac. The bladder is freed entirely from its median and lateral union to the cervix and uterus. The two forceps on the upper edge of the incision are now pulled downward, and a pair of straight sharp-pointed scissors make a single snip between the two forceps. After this little cut is made, we readily see the thickness of the vaginal wall and note the plane of separation between it and the bladder. Introducing the lower blade of the scissors carefully in this plane, between the vaginal mucosa and the bladder, we incise, by continuous snips of the scissors, the anterior vaginal wall to any desired distance, usually going to within an inch of the external urethra. That being done (and the method is easy except where the mucosa is thin), the two future flaps resulting from this longitudinal incision are then everted, and turned inside out by the two pairs of forceps. A pair of scissors makes a few snips at the corners near the forceps, to loosen the attachment of the bladder. With the finger covered with gauze, an important aid, the bladder is peeled off from these two anterior flaps of the vaginal wall as far as one chooses to go laterally. The same thing is done on either side. Having carried the separation of the bladder upward a short distance, forceps are applied in succession along the cut edges of this longitudinal incision, and the bladder is thoroughly separated from all union with its surrounding vaginal structure (Fig. 66). Finally, the bladder is pushed out of the way by a retractor applied underneath it, and what is now disclosed to view is the vesico-uterine fold of peritoneum. This is carefully pulled out and makes just as distinct a fold as does the peritoneum when doing an abdominal laparotomy.

Since we are going to do a vaginal fixation we make a transverse incision in the peritoneum (Fig. 67). It is then easy to bring the fundus into the vagina through this peritoneal incision.

Pushing the anterior retractor into the peritoneal cavity, the fundus

is brought out along the under surface of the retractor, while the cervix at the same time is being pushed back. When that is done, in the average case, the fundus is clearly in view (Fig. 68). The last applied volsellum makes the fundus hang down, and we have a space of a diameter of several inches, through which we can do the tying off of the tubes (Fig. 69) or resection of the ovaries or other operations which are considered necessary. The length of the longitudinal incision in the vaginal mucosa shown in the drawing, figure 66, determines the size of the space through which we bring the uterus out. The uterus must be brought out in order to have free observation and an unobstructed field for intrapelvic operations.

The complete separation of the bladder from its attachment to the cervix, to the anterior wall of the uterus, to the lateral margins of the lower part of the uterus, and to the anterior fornix and anterior vaginal wall permits the bladder to shrink up to a very small size and permits of its dislocation into any desired relation to the uterus. It is therefore obvious that if the uterus is now attached by its anterior surface to the vaginal flaps, so that the fundus lies up behind the symphysis, the bladder must of necessity then rest on the fundus and posterior wall of the uterus and can never again come into contact with any area of the anterior vaginal wall. It is desirable, before attaching the uterus, to resect such an area of the anterior vaginal flaps as will make a taut anterior vaginal wall—a wall of such a nature that it neither permits the fundus to sag down into the vagina nor forces it too far back from intimate relation with the symphysis. In this position of the uterus the bladder assumes a new and permanent relation to the posterior uterine wall. It is not necessary, nor do I deem it advisable except in rare instances, to sew the peritoneum on the posterior wall of the bladder to the peritoneal covering of the posterior wall of the uterus at the level of the internal os. Resection of the flaps and fixation of the uterus to the anterior vaginal wall may be carried out at this stage, but in most cases the fixation

FIG. 70.—If the uterus is now to be united to the anterior flaps which have been diminished in size by any form of resection, triangular or oval, then fixation sutures, two of silk and two of chromic catgut, are passed through the edges of the vaginal flaps and through the anterior wall of the fundus (Fig. 50). If the attachment of the uterus to the anterior vaginal flaps is to be done at a later stage of the operation, the four fixation sutures are simply passed through the anterior wall of the uterus and grasped by forceps as above. These are threaded and passed through the vaginal flaps later on, as in figure 78.

FIG. 71.—The fundus has been replaced into the peritoneal cavity; the cervix has been pulled further out beyond the vulva and up toward the urethra, and the dotted line shows the point at which the scissors make a wide transverse incision through the posterior vaginal mucosa.

FIG. 72.—The upper lip of the vaginal incision is grasped by one or more forceps and, with the aid of scissors and the gauze-covered index finger, the bands uniting the mucosa to the posterior wall of the cervix are dissected upward to the cul de sac of Douglas, and the peritoneum may then be dissected and pushed further up without entering the peritoneal cavity.

FIG. 73.—The cervix is then pulled to one side and the bridge of thick mucosa intervening between the anterior transverse incison in figure 66 and the posterior incision of figure 72 is incised down to the structure of the cervix itself and the gauze-covered thumb dissects this and its underlying connective tissue, rich in blood supply, up away from the cervix itself until the area of the internal os and the uterine vessels is reached.

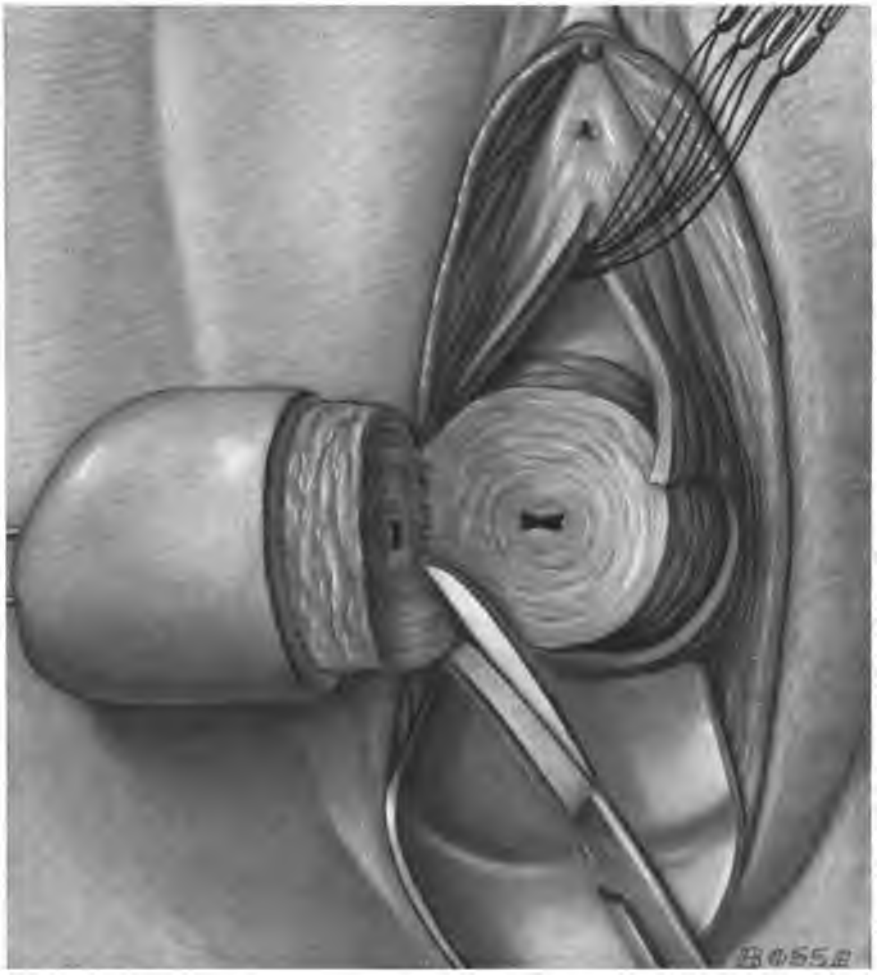

FIG. 74.—The huge hypertrophied cervix is amputated at any desired level, care being taken not to cut the uterine arteries. It may be necessary to keep the bladder away from the field by an anterior retractor So soon as the cervix has been cut, a large volsellum should grasp the anterior lip. The volsellum is left out of this drawing so as not to obstruct the view.

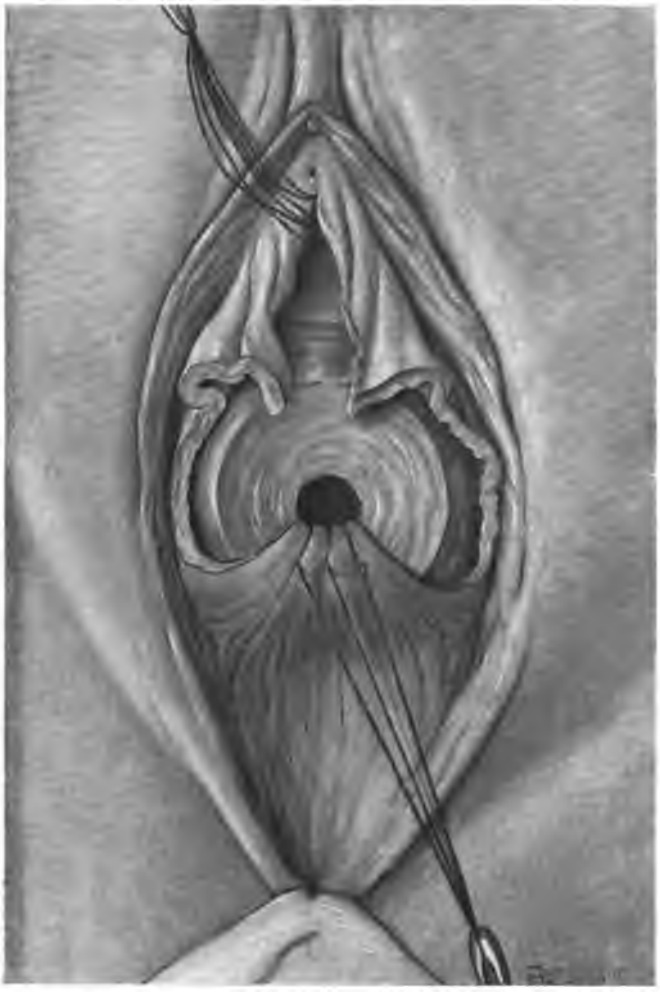

FIG. 75.—Heavy chromic sutures are passed through the cervical canal, through the structure of the cervix, and through the vaginal tissue a good distance from the edge and are then tied while the vaginal mucosa is brought up to thoroughly cover the exposed lower end of the uterus. While this is being done the volsellum should still be in place on the anterior lip of the cervix. After a few sutures have been tied this may be removed.

of the uterus to the resected flaps may be allowed to wait until the next two steps of the operation have been completed, viz., the amputation of the cervix and the correction of the posterior enterocele. If the uterus is now to be fixed to the anterior vaginal wall, I pass four sutures, two of heavy braided white silk and two of No. 3 chromic, through the edges of the anterior flaps and through the upper part of the uterine fundus. If the fixation be allowed to wait, four fixation sutures are carefully passed through the fundus, and their ends are grasped by artery forceps (Fig. 70). These sutures are subsequently threaded and passed through the vaginal flaps after the next two steps have been carried out.

A high amputation of the enormously hypertrophied cervix is now in order. The fundus is replaced into the pelvic cavity with or without fixation to the flaps and the cervix is pulled down beyond the vulva and lifted up toward the urethra (Fig. 71). A transverse incision is made through the vaginal mucosa at as high a point as possible without entering the cul de sac of Douglas; the upper edge of the incision is grasped with a mouse-toothed forceps and the index finger covered with gauze, sometimes aided by short snips of blunt-edged scissors, separates the vaginal wall from the posterior wall of the cervix (Fig. 72) up to the peritoneal fold of Douglas, and continues to dissect this peritoneal fold upward for a considerable distance from the posterior wall of the uterus. We still have each lateral wall of the cervix covered by a bridge of vaginal mucosa. This bridge is incised with scissors down to the actual structure of the cervix, first on one side and then on the other, and then this lateral bridge of vaginal mucosa with its submucous connective tissue is peeled away from the cervix by upward rubbings of the gauze-covered thumb (Fig. 73). This peels away from the cervix smoothly and easily up to the uterine arteries. In this maneuver, as well as in the subsequent dissection of the posterior vaginal wall, there is considerable oozing, which is of minor importance. Side

retractors are introduced then into the vagina if necessary, the bladder is held out of the way by an anterior retractor if necessary and the cervix is amputated at the level of the internal os by the aid of scissors (Fig. 74). If this amputation is carried on from one side to the other, or from the anterior wall of the cervix down through the posterior, cutting of the uterine arteries should be avoided. As soon as the canal of the cervix is invaded, the thick, anterior lip should be grasped with single-pointed volsellum. After amputation of the cervix the uniting of the vaginal mucosa around this new external os is begun, first at the posterior wall, No. 3 chromic catgut sutures being used, the vaginal mucosa being caught at least 3/4 of an inch from the edge, in order to thoroughly cover the denuded lower end of the uterus (Fig. 75). Sometimes the cervix which is cut off is larger than the uterus which is left. When this is done, in the cases that are not extreme as regards size of uterus and cervix, and degree of prolapse, etc., one begins to unite the edges of the dissected wall around the cervix, as is done in a simple typical high amputation. The sutures are passed through the cervical canal and through the structure of the cervix, and the vaginal mucosa is thus fastened all the way round, until finally we have a new covering around the cervical canal held by three sutures behind, the same in front, and several laterally, with the formation of a nice artificial os.

The method of sewing after high amputation of the cervix must meet with modification when the prolapse is extreme.

After the first suture is applied and tied, the others are applied close to this one, first on one side and then on the other, care being taken to take up the vaginal mucosa snugly, so as to allow of no reefs or folds. In the same manner sutures are then applied to the lateral wall and then to the antero-lateral walls of the cervix. In this way the surplus of the posterior fornix and of the two lateral fornices is done away with (Fig. 76).

A large surplus of vaginal flaps is now noted, which consist of

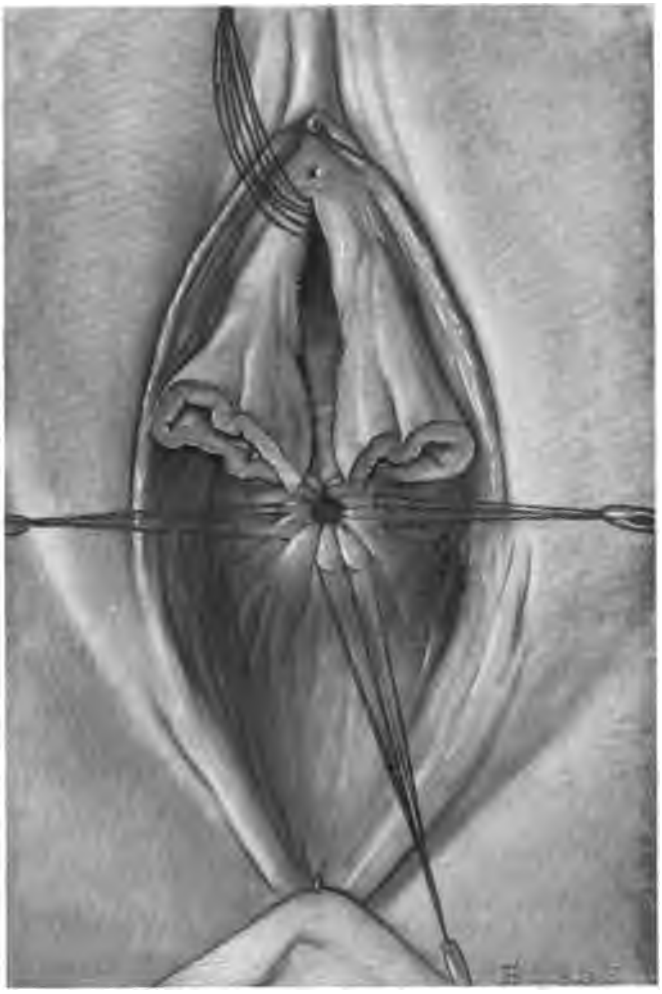

FIG. 76.—The cervix is covered in continuity by the vaginal mucosa, sutures being applied in succession on either side of the first three, all the slack in the posterior and lateral fornices being taken up, so that the surplus of the vaginal mucosa seen in figure 75 results in the production anteriorly of two unusually extensive flaps of mucosa.

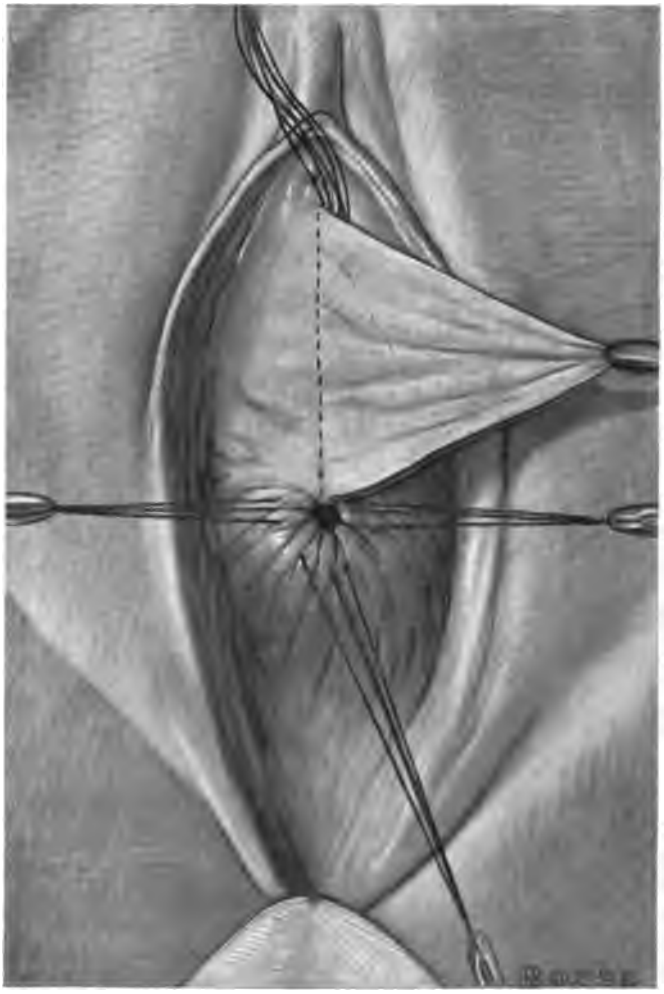

FIG. 77.—Each flap is then drawn over to the opposite side and is resected to any desired extent, oval or semicircular or triangular areas being removed.

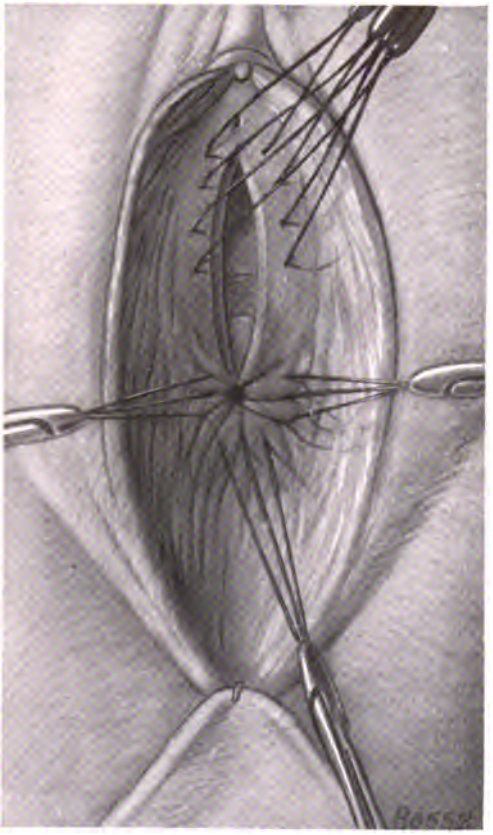

FIG. 78.—After resection of any desired area of the anterior vaginal flaps the sutures passed in figure 70 are threaded and passed through the edge of the remaining anterior flaps. Sutures may be tied at this stage and the edges of the flaps be further brought together by running catgut suture, or the tying of these four fixation sutures may be left until the posterior vaginal wall has been thoroughly dissected and removed.

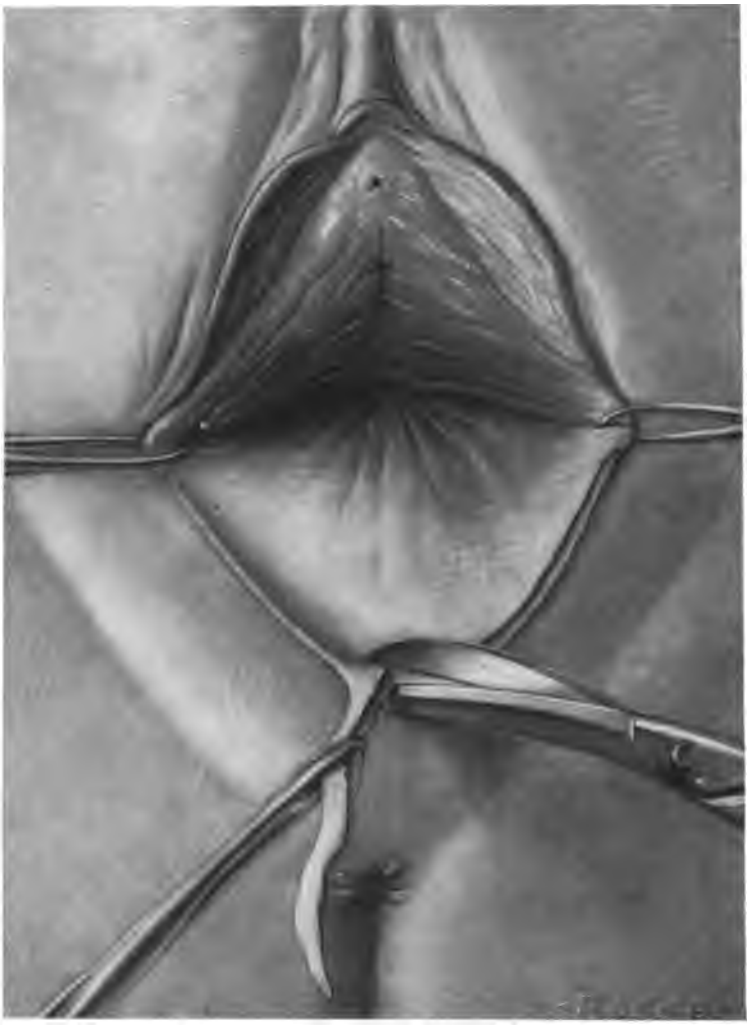

FIG. 79.—A pair of short curved scissors cuts a ribbon from the vagino-perineal junction, running from one volsellum to the other throughout the whole extent of the exceedingly loose and flabby outlet.

FIG. 80.—Three long artery forceps are applied to the lower margin of the resulting denuded area and by their weight separate the whole area to the extent of one-half inch. A pair of mouse-toothed forceps grasp the upper margin of the denudation and a sharp knife begins the dissection of the vaginal mucosa.

FIG. 81.—Three artery forceps are then applied to the upper margin of the incision; that is, to the lower edge of the upper flap. The upper flap is lifted up, the fingers held in such a manner that they support the vaginal flap. Upward dissection is continued with a sharp knife and then with the index finger covered with gauze, occasionally aided by snips with short blunt scissors.

the originally dissected anterior vaginal flaps plus the surplus gained from the posterior and lateral fornices. The flaps are drawn, first one and then the other, over to the opposite side, and a very large triangular area is cut away (Fig. 77). Now the uterus may be attached to the remaining vaginal flaps, each of the four fixation sutures which have been applied in the uterine fundus being threaded separately and carried through the vaginal flaps near their upper end (Fig. 78). These may now be tied, bringing the fundus into intimate relation with the newly formed anterior vaginal wall and the flaps below these fixation sutures are then united by interrupted sutures of No. 3 chromic, which pass through the anterior uterine wall at the same time, or else the tying of these four fixation sutures may be left until the complete dissection of the rectum from the posterior vaginal wall has been completed, for, if in some instances these fixation sutures are tied first, it is a more difficult procedure to carry out a thorough dissection and resection of the posterior vaginal wall.

The next step of the operation consists of a high colpoperineorrhaphy, which includes an absolute separation of the rectocele from the posterior vaginal wall to within 1/2 to 3/4 of an inch of the newly formed external os, this procedure being begun from below.

Two single-bladed volsella are attached to the lateral margins of the vulva at a point which is to constitute the lower end of the new posterior vaginal wall and the highest point of the new perineum. These are drawn apart (before this introduce an intrauterine strip of gauze), and a pair of curved scissors cuts a wide, tape-like strip from one volsellum to the other along the lower edge of the exposed vagino-perineal junction (Fig. 79). Three or more heavy artery forceps are applied to the skin edge after this strip has been cut away and are allowed to hang down, so that by their weight a half-inch wide denuded area is apparent. The upper edge of this denuded area is picked up with a mouse-toothed forceps, and a sharp knife begins the dissection of this thick posterior vaginal wall from the

underlying readily bleeding connective tissue (Fig. 80). After this dissection has been well started from one volsellum to the other, three or more artery forceps are applied to this upper flap. The forceps are grasped in the left hand and the fingers are placed behind the flap and the separation is continued with the knife from the underlying tissue and then continued by the index finger covered with gauze (Fig. 81). After the preliminary dissection with the knife has been well started the separation goes on easily, occasionally aided with the knife or with blunt-pointed scissors, the operator being extremely careful to avoid cutting into the rectocele.

Oozing is fairly brisk, but no attempt to check it with artery forceps need be made. The dissection should extend very far laterally, especially so into the lateral sulci in which rest the separated levator ani muscles. After the flap has been thus separated upward for a distance of 2 inches, it is pulled down taut and then bisected along the median line as far as the separation has been carried (Fig. 82). Artery forceps are then applied to the highest points of these flap edges and the separation from the rectum upward and laterally is continued (Fig. 83). As the separation extends higher the flaps are bisected in continuity and artery forceps are applied higher up in succession. In this manner, the entire posterior vaginal wall is separated to within 1/2 inch of its upper limit and very well into the lateral sulci of the vagina (Fig. 84). The flaps are then drawn down, first on one side and then on the other (Fig. 85); a large area is resected, beginning at each volsellum and extending upward to the highest point of the dissected flaps (Fig. 86). If the uterine fixation sutures have not yet been tied, they are tied now, and the union of the edges of what now remains of the posterior vaginal flaps is begun, with heavy chromic catgut, beginning at the highest point and gradually approaching the perineum. Occasionally one of these sutures is made to catch the connective tissue over the rectocele in order to reef it upward. As a rule, this is not advisable, as pockets may be formed, but with each successively

FIG. 82.—Dissection is continued upwards a certain distance, and is carried as far laterally as possible. This upper flap is now carried down and split in the median line throughout its entire extent.

FIG. 83.—The two resulting flaps are then lifted upward and the index finger covered with gauze continues the dissection of the flaps up toward the cervix and very far laterally into the sulci of the vagina.

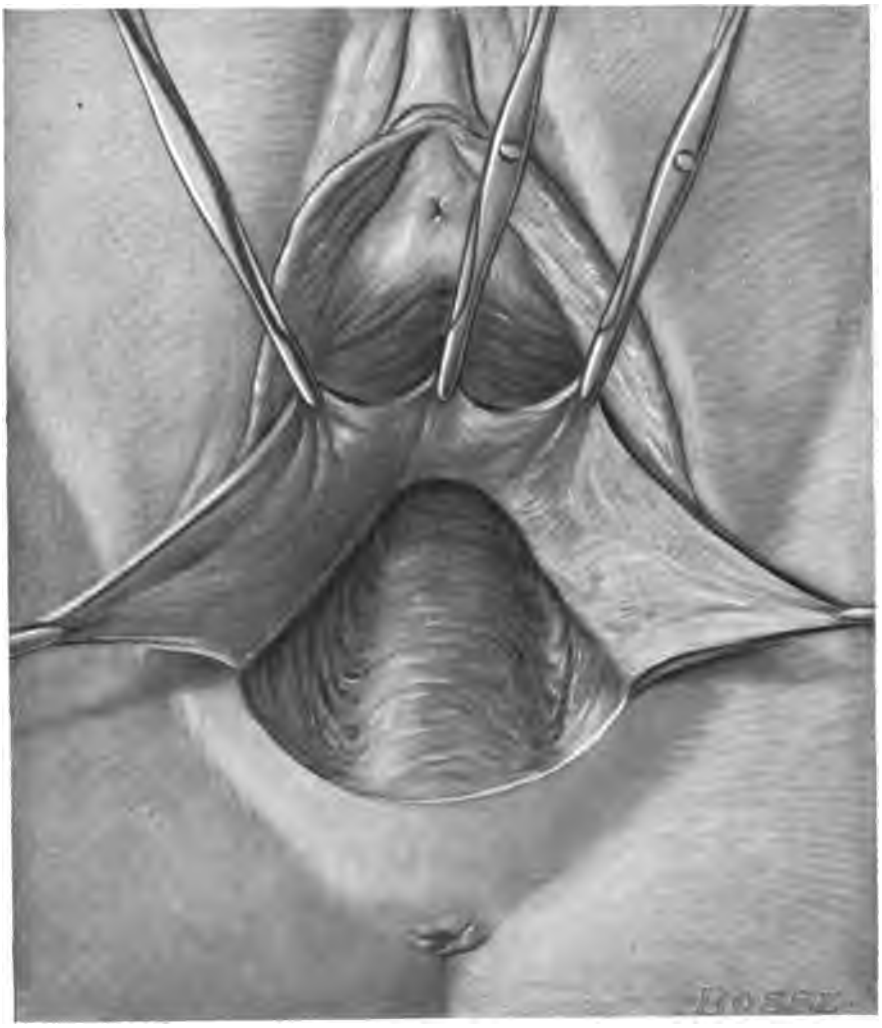

FIG. 84.—Upward dissection of the entire posterior wall is continued in the same fashion with additional splitting of the flap when necessary, until practically the entire vaginal wall has been freed up to within 1/2 inch of the cervix.

FIG. 85.—The two flaps are then drawn down and pulled to the opposite side in turn, and then, beginning from each volsellum and running at first transversely toward the median line and then upward in a longitudinal fashion, the two flaps are resected almost up to the lateral margins of the vagina.

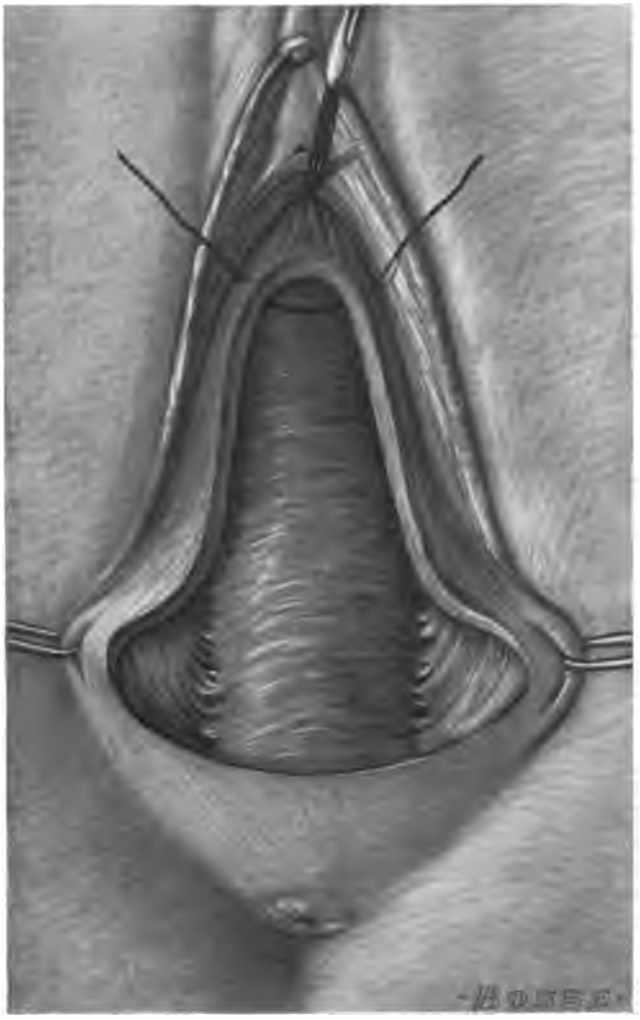

FIG. 86.—After the flaps have been dissected from the rectum and the posterior vaginal wall is excised as above, interrupted chromic sutures are passed uniting the lateral edges of the vaginal mucosa beginning above.

FIG. 87.—After the edges of the resected posterior vaginal wall have been united by interrupted chromic sutures a large denuded area is still left, in the center of which is exposed the wide rectum or rectocele.

FIG. 88.—A very long slightly curved heavy needle threaded with No. 4 chromic catgut is introduced 1/2 inch from the skin margin and external to the volsellum on the left side and is passed along the left lateral edge of the denudation under the levator ani and under the vaginal mucosa out at the highest point of the denudation or near the lowest applied chromic suture. Rubber gloves are worn.

applied suture the rectocele is pushed upward by a blunt-pointed instrument.

After several such sutures have been tied, it will be noted that the vagina has been reduced to a canal of very small calibre (Fig. 87), and this part of the vagina may now be gently packed with iodoform gauze. The lowest of these interrupted sutures pass not only through the edge of the mucosa but deeply under it to take up the muscular tissue in the lateral sulci. We now have left a large denuded area with the outline of a rather high colpoperineorrhaphy and some of the bulging rectocele at the lower area still remains to be dealt with. Inasmuch as the rectocele is a hernia through separated or torn levator ani muscles, these or the fascia which covers them must be brought still further together in such a fashion as to lie between the new vagina and the rectum, to be in front of the rectocele, and hold the rectocele permanently in check. Inasmuch as the healing of such a large denuded area is promoted to a great extent by the use of the smallest possible number of sutures, I begin the perineorrhaphy, with the very best results, with a No. 4 chromic catgut tension suture passed in the Waldo figure-of-8 fashion as a single stitch.

A very long heavy slightly curved needle is used, the left index finger is introduced for control into the rectum, so that the needle may at no point enter the lumen (Fig. 88). Of course, rubber gloves are worn. The highest area of the remaining denudation is brought into view by a pair of forceps applied to the upper angle, that is, to the last applied chromic suture which united the newly formed posterior vaginal wall. The needle is introduced on the left side, one-half inch or more exterior to the volsellum, goes in deeply through the lateral area of the denudation under the levator ani muscle. It is then continued up along the left lateral edge of the denudation close along the vaginal mucosa and comes out above the last applied chromic suture, best held by an artery forceps (Fig. 81). The needle is pulled through and with it the chromic catgut. It is now introduced on the

other side of the median line and passed down between the exposed connective tissue and the rectal mucosa over the finger in the rectum, half way between the median line and the volsellum on the right side. As the needle passes lower down and gets within an inch of the skin, it is passed deeply through the tissue, coming out 1/2 inch from the skin margin (Fig. 89). The needle and the chromic catgut are now pulled through and are passed in the same fashion, but from below upward, midway between the median line and the volsellum on the patient's left side. It is then passed upward, the point of the needle being controlled by the finger in the rectum, and makes its exit at the upper angle of the denudation through the vaginal mucosa (Fig. 90). It is then introduced on the other side of the median line, passes under the mucosa on the right lateral edge of the denudation, until the point reaches the depth of the right lateral sulcus and is thus passed deeply under the levator ani muscle and out external to the right volsellum 1/2 inch or more from the skin edge (Fig. 91). The needle and chromic catgut are then pulled through. In order to make the union of the posterior vaginal wall quite perfect, three chromic sutures are now passed (but not tied) through the edge of the mucous membrane forming the upper triangle of the lateral margins of the denuded area and out through a corresponding point on the other side (Fig. 92).

These are grasped by artery forceps, each one separately (Fig. 92). Sutures are now passed to unite the levatores ani of the two sides and form a bridge which is to firmly restrain the rectocele. One, two, or three chromic sutures are passed by a well-curved needle deep through the lateral sulcus of one side, in which rests the levator ani and its covering of fascia, and then through the other side in the same fashion (Fig. 92). I have not found it necessary to dissect out through the fascia any muscle bundles of levator ani muscles. These one, two, or three sutures are now firmly tied in front of the rectocele and their influence in pushing up and holding back the rectocele is readily apparent (Fig. 93). These are the only buried knots in this method

FIG. 89.—The needle is introduced on the other side of the median line and passed down under the exposed submucous tissue, the finger in the rectum guarding against the penetration of the rectal mucosa. It passes down halfway between the median line and the right edge of the perineal denudation. It passes out 1/2 inch away from the skin edge. (The needle is depicted above a little too far from the median line.)

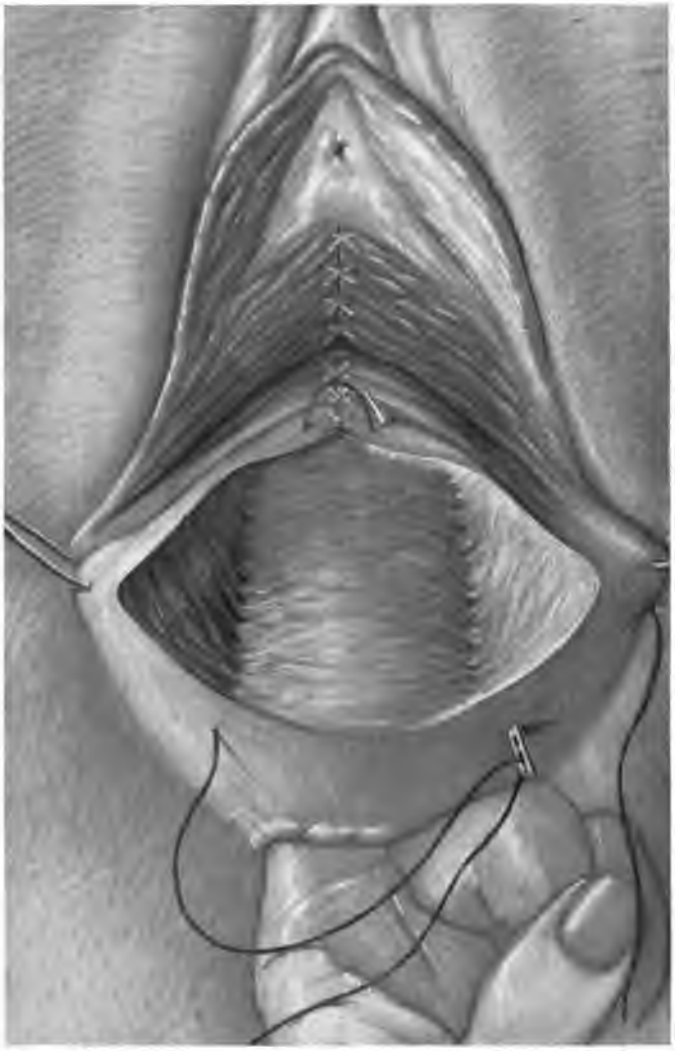

FIG. 90.—The needle enters on the left side of the median line at relatively the same position at which it made its exit in the drawing before and passes up under the exposed tissue between it and the rectal mucosa, halfway between the median line and the left lateral margin of the denudation. Its exit is shown above.

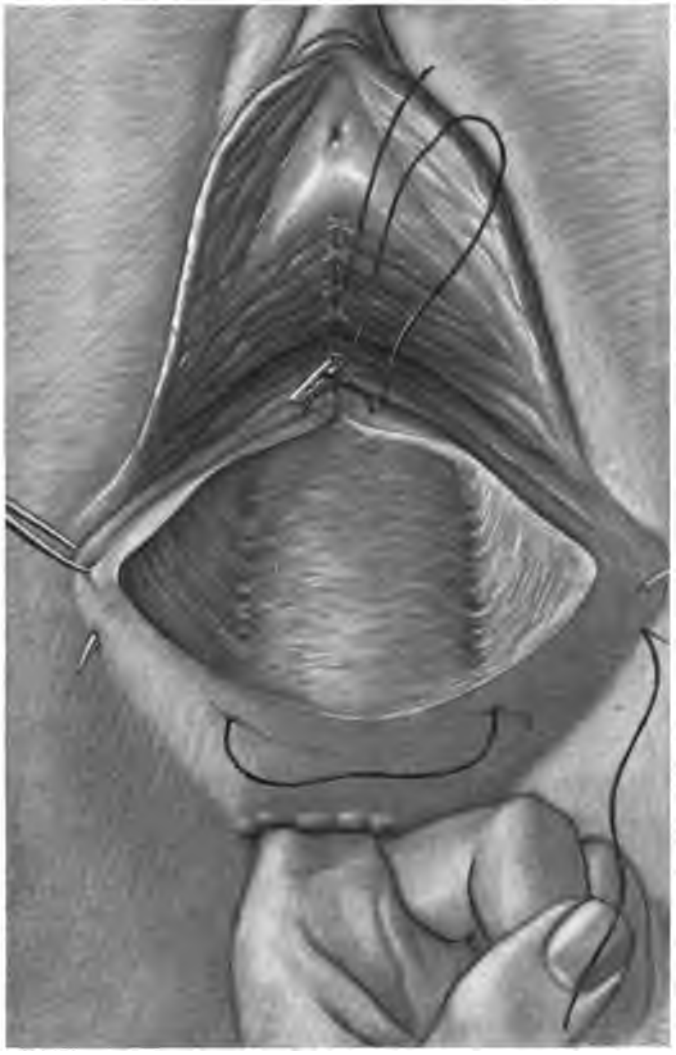

FIG. 91.—The needle then enters on the other side of the median line and passes down under the vaginal mucosa and then along the right lateral edge of the denudation, passing deeply so as to get under the levator ani muscle and then passes out 1/2 inch from the skin edge and external to the right volsellum.

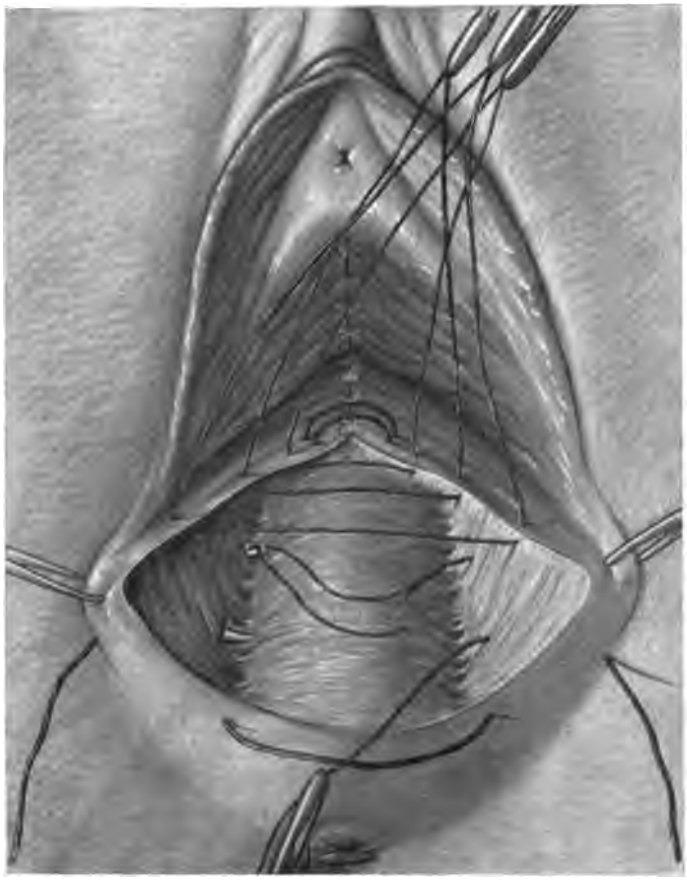

FIG. 92.—Three sutures are passed through the vaginal mucosa of the left upper lateral edge of the denudation and through the right upper edge of the denudation and grasped by artery forceps. These are tied after all the other sutures are tied and simply bring the vaginal mucosa of the new posterior vaginal wall neatly together. At the same time a short-curved needle takes a deep bite through the levator ani muscle in the left lateral sulcus, and is shown above in the act of taking a like deep bite in the right lateral sulcus. One, two or, better, three such sutures are passed.

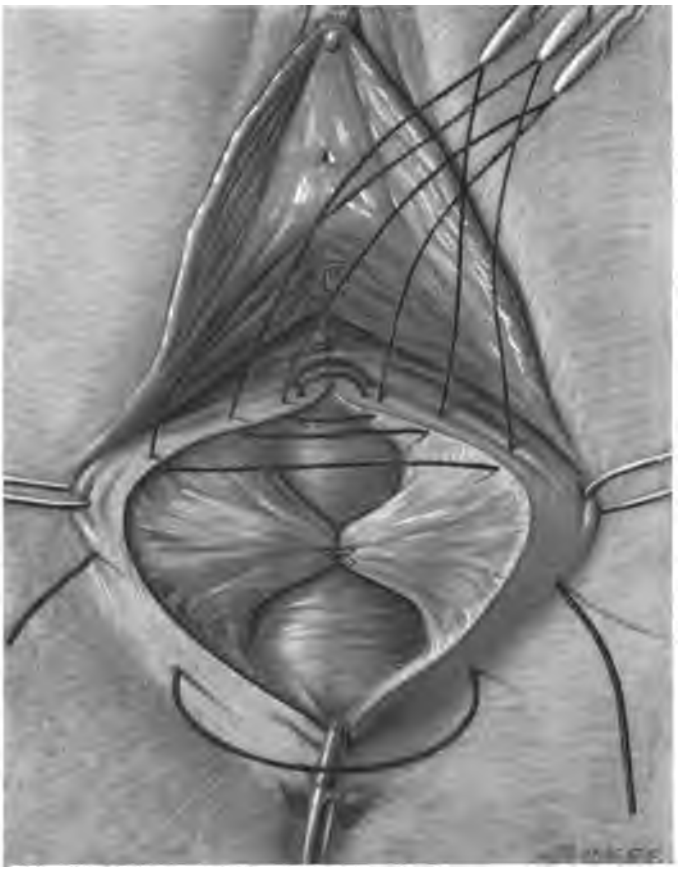

FIG. 93.—The above drawing shows how one of the sutures passed through the levatores ani muscles in the lateral sulci, when tied, forms a bridge over the rectocele and pushes it back in hour-glass fashion. Before tying this one, two others have been passed, one higher up and one lower down through the lateral sulci. Only one is tied in the above drawing to show the method of its action. The three sutures held in the upper part of the drawing by artery forceps are tied after the long figure of 8 chromic suture is tied. Before tying the long chromic No. 4 suture, the two volsella are removed and a pair of artery forceps is applied to the middle of the denuded posterior edge, and then the long No. 4 chromic suture is tied by pulling it in see-saw fashion.

FIG. 94.—After the tying of the long No. 4 chromic catgut suture, two or three other sutures are passed through the perineal skin edges and the three intravaginal sutures are tied.

FIG. 95.—As the last step in the operation, the sphincter ani is stretched very thoroughly. This permits the bowels to move daily without discomfort to the patient and without any harmful effect on the perineorrhaphy. The perineum is douched with a pitcher of sterile solution several times a day, especially after urination or defecation. Plenty of sterile gauze is applied over the vulva and frequently changed. No infection occurs.

of perineorrhaphy. A pair of artery forceps is now applied to the middle point of the skin edge, the two ends of the long single-stitch chromic suture are pulled on, in see-saw fashion, gently but firmly, and that part of the single-stitch suture which has passed from one side to the other over the skin edge is seen to take its place at a point almost midway between the entrance points of the suture held in the hands, and the artery forceps applied to what is now becoming the lowest point of the external perineal wound (Fig. 93).

When the two ends have thus been pulled on, the two lateral sides of the perineal denudation come together in absolute contact and a triple knot is tied and cut. Then the three chromic sutures which were passed and held by a pair of forceps are tied. They unite the lower end of the new posterior vaginal wall. Two or more chromic sutures are now introduced in the perineum itself (Fig. 94), to bring the skin edges nicely together, and the patient is catheterized. Strips of iodoform gauze are tucked into the vagina and the sphincter ani is given a most thorough stretching (Fig. 95). Then iodoform gauze is applied liberally over the vulva and perineum, and is renewed with sufficient frequency to keep this area very dry. The perineum is douched several times daily, especially after catheterization or defecation, with a quart pitcher full of sterile aluminum acetate solution. Catheterization is continued for three or four days and the patient is then allowed to void if she can. The bowels are permitted to act as soon as the patient is so inclined. As a rule a cathartic is administered per os on the third or fourth day.

The intrauterine strip of gauze, which is usually marked by having a piece of chromic catgut tied around the end, is pulled out without disturbing the vaginal packing on the third or fourth day. The vaginal packing of iodoform gauze is allowed to remain from five to eight days.

This operation is attended with a minimum of shock, the pulse rate in very few instances being over 90 on completion of operation.

Utilizing the vagino-fixation principle of Dührssen, the points of importance are:

1. Free separation of the bladder.
2. Great resection of the anterior and lateral vaginal walls, associated with special method of high amputation and of attachment of the vaginal mucosa around the cervix.
3. Removal of posterior enterocele.
4. Free separation of the rectum from the posterior vaginal wall.
5. Wide resection of the posterior vaginal wall.
6. High perineorrhaphy resulting in small introitus and firm union of levator ani muscles to hold back the redundant rectum.

RESULT.

The uterus is diminished in size and the big, long cervix with much portio mucosa is removed. The small uterus lies anteverted and behind the symphysis, and the uterus is fixed to the narrowed anterior vaginal wall. The cervix when amputated has the internal os thrown very high up and back. The narrowed upper vaginal lumen and the upper posterior fornix (so-called) are carried high up by the external os of the new cervix.

A narrow vagina is produced by resection of the posterior vaginal wall. The cure of rectocele is guaranteed by the union of the levator ani muscles and by a high perineorrhaphy.

This operation for prolapse restores the genital organs to an absolutely normal position, leaves a splendid, firm perineum, an exceedingly small introitus, and a vaginal canal longer than the average.

SIMPLE VAGINAL HYSTERECTOMY.

Simple vaginal hysterectomy is an operation which should be so carried out as to remove only the uterus. It should be so planned as to make the procedure as safe as any major operation in gynecology. It is indicated in conditions of the uterus in which malignancy is excluded. It can be used for fibroid tumors of the uterus, if the uterus is not too large to be delivered into the vagina. On completion of this method of hysterectomy the tubes and ovaries may be removed, with any desired area of the upper part of the broad ligament. This extended phase of simple hysterectomy applies to early cases of carcinoma of the fundus uteri: those cases which develop parametritic infiltration so late that hysterectomy offers a favorable hope of cure. The important indication for the simple operation includes intractable hemorrhages from the uterus which do not yield to conservative methods. These conditions are, in addition to fibroids and polyps, arteriosclerosis of the uterine vessels, myometrial degenerations, and fibrosis uteri.

There is a condition of the uterus, to which I have given the name *fibrosis uteri* characterized by a diffuse fibrotic change in the entire thickness of the uterine wall and in the cervix, as a result of which the uterus is elongated, wider, and thicker than the normal. This fibrotic alteration is recognized during operation by the fact that the vollsellum forceps, when grasping the uterine wall, break through it because of the brittleness of the tissue, and the pale pinkish-yellow color of the broken areas resembles in every particular the appearance noted in fibroids in the uterus.

Microscopic sections show the muscularis to be invaded by regular and irregular bundles of fibrous connective tissue, so that in many areas this tissue fills the entire field of observation. Arteries and veins are very much dilated, their walls are thickened, and frequently the

intima shows alterations of a typical nature. The contractility of the muscle fibers is altered, the interstices have been filled by this new growing tissue, and combined with this is a disappearance of the numerous elastic fibers of the uterus. The uterus has lost its contractile power, the vessels have been affected in a like manner, and the added loss of the contractile force of the elastic fibers tends to a ready bleeding from the uterine muscosa and to diminished ability to control this bleeding.

The premenstrual congestion which takes place throughout the whole genital tract, and especially in the uterine wall and in the mucosa, normally comes to a climax slowly and steadily. The final result of the congestive climax is the outpouring of blood. The normal uterus, with well-conditioned muscle fibers, with elastic connective tissue, and with elastic arterioles, resists for a period of twenty-eight days this congestion which ends in the expulsion of blood. Such a normal uterus limits the hemorrhage within the course of four or five days by the contractility of the muscular fibers, of the elastic fibers, and of the arterioles.

If the muscular fibers, the elastic fibers, or the vessels have lost to a greater or lesser degree their ability to contract or their ability to resist the congestive influence of the premenstrual period, bleeding either comes on sooner or, when it comes, lasts longer. This, of course, implies well-functionating ovaries producing the congestion which characterizes menstruation. The vast majority of these cases show ovaries which are large and plump. They evidence numerous follicles and possess the full power of the ovarian secretion to promote pelvic congestion. As a result of structural fibrotic uterine changes, since the ovaries are functionating, the menstrual congestion results in increased frequency of menstruation, in increased loss of blood, and in increased duration of the menstrual function. In many cases menstruation is no longer regular, passing from the type of menorrhagia to the type of metrorrhagia. Most of these cases of fibrosis occur in women in the late thirties and in the forties. These women are ro-

bust and well-built, and the menopause, if allowed come of its own accord, may only result after the lapse of many years.

As a result of the increased loss of blood and the tendency to the formation of clots, the blood does not find ready exit through the cervical canal, the walls of which are hard and fibrotic; painful menstruation is a very frequent complication. Nervous phenomena of pronounced type are among the annoying symptoms. There occurs in many cases what may be known as constitutional dysmenorrhea. For several days before menstruation and during the menstrual period congestion involves the entire nervous system, the various mucosæ of the body, and produces a sensation of fullness in the head, dizziness, nausea, anorexia, irritability, palpitation of the heart, restlessness, and sleeplessness. The annoying symptoms, the painful menstruation, and the great loss of blood often reduce these patients to a state of marked physical and nervous asthenia. While in many instances this uterine and constitutional condition results after two or three labors, in the majority of cases there is a history of frequent labors and often of several abortions. In all probability the element of subinvolution after frequent labors or abortions plus the associated congestion resulting therefrom are the etiological factors which lead, after the lapse of several years, to fibrotic structural changes in the tissue elements which make up the uterine wall. Prolonged congestion in the pelvis, altered circulation in the uterus and adnexa, and a general state of altered elasticity are associated factors. There seems to be in certain women a tendency to an alteration of the normal elastic fibers of the uterus and to their replacement by fibrous connective tissue, a condition which was well illustrated microscopically by the investigations of Pick. The uterine mucosa is, as a rule, in these cases, not hyperplastic, so that hyperplasia of the endometrium is not an important point in the causation of these prolonged profuse bleedings.

The medical treatment of this fibrotic alteration of the uterus includes anything which may increase the contractile power of the uterus, which may diminish the size of the uterus, which may diminish

the congestion in the uterus and in the pelvic structures. Among the drugs which are of value are the various preparations of ergot, stypticin, etc. Among the therapeutic measures are the intrauterine use of the positive electrode, the use of short, hot douches, the regular and systematic daily use of sitz baths of such temperatures as tend to permanently diminish the pelvic congestion.

Among the milder operative procedures are to be included very thorough curettage and the use of steam with or without the preliminary use of the curette. With any of these various combinations plus rest and the avoidance of exertion, particularly before and during the flow of blood, many of these patients may be so markedly improved after months or years that further intervention may be avoided. In many of these cases, even after temporary improvement of various durations, the trying annoyances recur. In a goodly proportion of cases the patients belong to that social scale which precludes the possibility of rest and the avoidance of exertion. Thereby one of our most important therapeutic measures is denied us. In other cases the patients find that the treatment which is necessary and the rest which is demanded interferes too much with their family and social obligations and prevents the leading of a life which is pleasurable and enjoyable.

The remedy which absolutely prevents the various combinations of symptoms is vaginal hysterectomy without the removal of the ovaries. In this way unbearable hemorrhage is prevented and the regular or irregular recurrence of the condition known as constitutional dysmenorrhea is at an end. (*Retention of the ovaries avoids the recurrence of constitutional symptoms of the climacterium.*)

Operation.—The following method of simple vaginal hysterectomy is practised by me: The cervix is grasped by a heavy pair of volsellum forceps and is pulled forward so that its posterior wall is exposed. A transverse incision is made through the vaginal mucosa about 1 inch above the external os. The upper margin of the incision is grasped by a long mouse-tooth forceps and a pair of scissors dissects off the vaginal mucous membrane by short snips passing through the connective

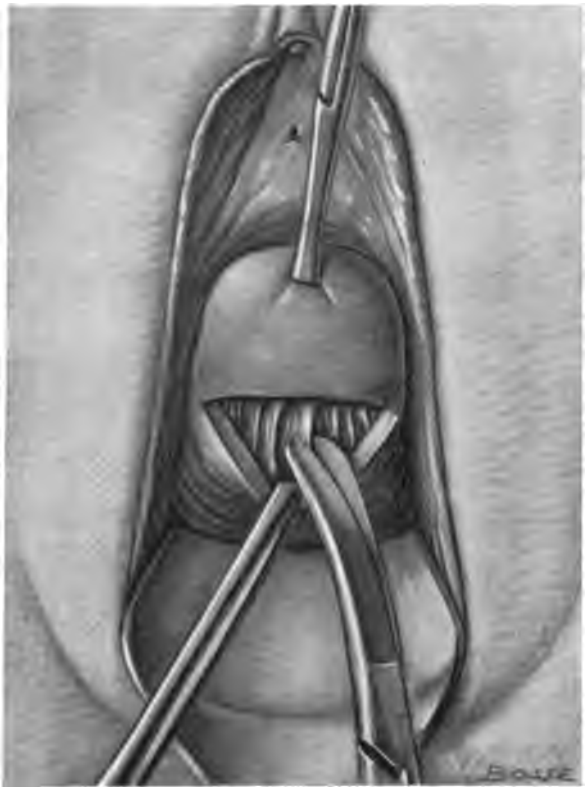

FIG. 96.—VAGINAL HYSTERECTOMY.

A transverse incision is made in the posterior fornix not an inch away from the external os. A pair of artery forceps grasps the upper lip of the incision and dull-pointed scissors snip the bands connecting it with the cervix.

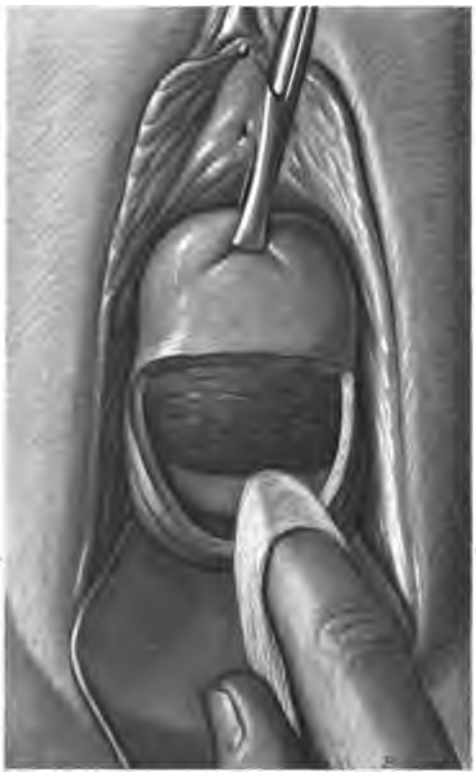

FIG. 97.—VAGINAL HYSTERECTOMY.

The index finger covered with gauze rubs the mucosa of the posterior fornix away from the cervix up to the cul de sac of Douglas, and then pushes the Douglas peritoneum upward to separate it still further from the cervico-uterine area.

tissue bands which connect the vaginal mucosa to the structure of the cervix (Fig. 96). A long pair of artery forceps then grasps this upper margin of the posterior incision and the finger separates the vaginal mucosa and the connective tissue still further from the cervix.

The cul de sac of Douglas is distinctly felt (Fig. 97). The cul de sac of Douglas is then incised, or perforated with the index finger (Fig. 98), the finger is introduced into the peritoneal cavity and the peritoneum is hooked by the finger tip and brought down so that a long pair of forceps placed at the lateral margin of the incision unites the peritoneum with the edge of the vaginal mucosa (Fig. 99). The same thing is done on the other side, so that the peritoneum and vaginal mucosa are held together at the lateral borders of the primary incision. These two forceps are of importance in that each limits the bleeding to a marked degree and serves to mark a point around which one of the final closing sutures is passed. The next step consists in making a transverse incision on the anterior wall of the cervix, the ends of which almost, but not quite, join the ends of the posterior incision. Two artery forceps are applied to the middle point of the upper lip of this incision and by traction the connective tissue bands which unite the bladder to the anterior wall of the cervix are brought into relief. Some of these are cut with snips of the scissors, and then the index finger, covered with gauze, separates the bladder from the anterior wall of the cervix and uterus up to the vesico-uterine pouch of peritoneum. The two anterior artery forceps being then put on the stretch, a pair of long sharp-pointed scissors is introduced between the vaginal mucosa and the bladder and the anterior vaginal wall is progressively incised for a longitudinal distance of 3 1/2 to 4 1/2 inches. Each artery forceps is then grasped in turn and with a slight rotation the vaginal mucosa is everted; a few snips with the scissors starts the separation of the bladder from the vaginal mucosa and the subsequent complete separation of the bladder from the vaginal wall is carried out with the index finger covered with anterior

gauze. These steps are the same as those in the performance of anterior vaginal celiotomy or vaginal fixation for prolapse of the uterus. These steps being completed, the bladder itself is held back by a retractor. In a proportion of cases the uterine artery can be either seen or readily felt on either side after thorough separation of the bladder (Fig. 100).

A ligature needle, threaded with large-sized silk or chromic, is then passed through the lower border of the broad ligament close to the uterus and below the pulsating artery (Fig. 102). The ligature passes out through the posterior incision in the peritoneum and is tied very firmly over the bridge of uncut mucosa forming the lateral covering of the cervix. Before tying this ligature, a slight snip is made in the vaginal mucosa to furnish a groove in which this ligature and its knot may rest to prevent slipping in the course of the subsequent manipulation (Fig. 103).

The long retractor, which pushes the bladder upward, makes it easy for the uterine artery to be located by the finger just above the first ligature that has been passed. A second ligature is passed just above the uterine artery which is sometimes exposed to the eye (Fig. 104) and the end is brought out through the posterior incision, and the ligature tied 1 inch above the first one (Fig. 105); another groove being made in the vaginal mucosa with the scissors to prevent slipping of the ligature. The same procedure is then repeated on the opposite side, after which a pair of scissors cuts between the fastened silk sutures and the lateral borders of the uterus, sticking very close to the cervix (Fig. 106).

The scissors cut up toward the uterine artery. Very short snips should be taken so that the uterine artery may be recognized before it is cut, if it lies deeply within the tissues which are being cut (Fig. 107). Usually it lies close to the surface. In either event, if possi- it should be tied again before being cut through. This step is of value, for if by any chance the uterine artery has not been caught

FIG. 98.—VAGINAL HYSTERECTOMY.

The peritoneum of the cul de sac of Douglas is then grasped with forceps and cut through with scissors, or else the peritoneum is perforated by the left index finger. The latter manipulation is the more simple in those cases where the cervix is not readily brought down near the vulva.

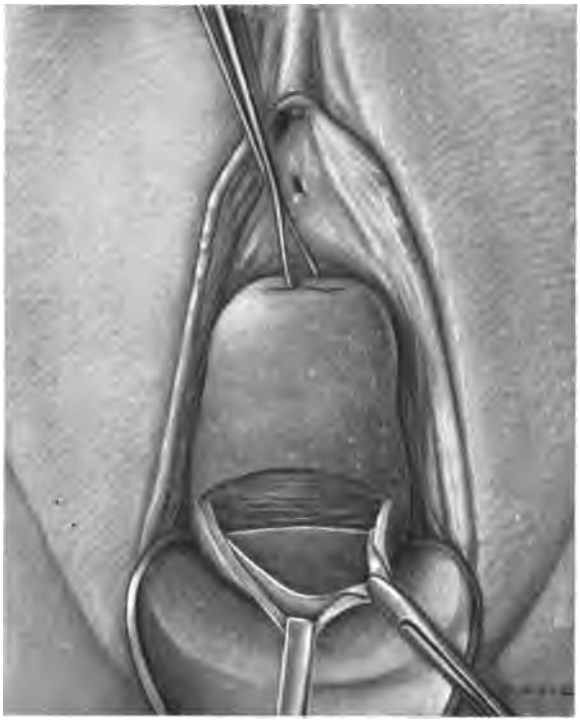

FIG. 99.—VAGINAL HYSTERECTOMY.

With either of the aforesaid manipulations the posterior peritoneal edge is caught with the index finger and brought down into apposition with the incision in the vaginal mucosa and the peritoneum and the vaginal edge are caught and held together by a long artery forceps or clamp applied at the extreme end of the transverse incision. The process is repeated on the other side and, if desired, another forceps or clamp may be applied midway between the two. In some cases it may be advisable to substitute these clamps or forceps by mattress sutures in order to unite the peritoneum with the vaginal edge and thus stop the oozing from this posterior incision which sometimes seems rather profuse.

FIG. 100.—VAGINAL HYSTERECTOMY.

The cervix is then pulled down toward the perineum and the bladder is thoroughly dissected away from the cervix and the uterus and the anterior fornix in the manner described in figures 18 and 27, which finally gives us the picture noted above. The bladder is held up out of the way by the anterior retractor. The vesico-uterine plica is seen beneath it. Laterally, the location of the uterine arteries is clearly portrayed.

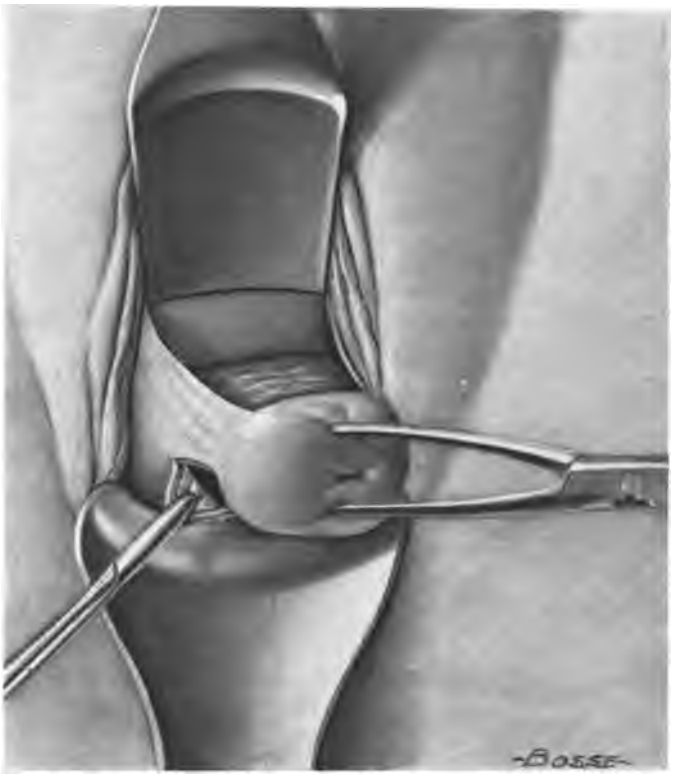

FIG. 101.—VAGINAL HYSTERECTOMY.

After completion of these steps and before the vesico-uterine perineum is opened the ligation of the lower part of the broad ligaments including the uterine arteries is begun. It is possible to make an incision through the vaginal mucosa which bridges the area between the exposed anterior wall of the cervix and uterus and the incised cul de sac of Douglas and peel it back up to the uterine artery. I prefer to ligate this area by a special method in order to keep the uterine artery and its accessory vessels from retracting.

FIG. 102.—VAGINAL HYSTERECTOMY.

A ligature carrier threaded with heavy chromic or heavy braided silk is passed from before backward on the left index finger which has been introduced into the peritoneal cavity through the posterior incision. The bladder if possible is held up and out of the way by a narrow anterior speculum. If no anterior speculum is introduced, care must be taken to see that the ligature carrier passes close to the lateral border of the cervix and does not include the separated bladder.

FIG. 103.—VAGINAL HYSTERECTOMY.

After tension on the cervix is relaxed a superficial cut is made in the lateral border of the vaginal mucosa and in this cut the ligature is to be tied. This prevents slipping of the ligature.

FIG. 104.—VAGINAL HYSTERECTOMY.

The second suture passed by the ligature carrier is introduced an inch or so higher than the first and passes above the uterine artery, which is either seen or felt by the right index finger, or is felt between this finger and the left index finger introduced posteriorly.

FIG. 105.—VAGINAL HYSTERECTOMY.

After this is passed another superficial groove is made in the lateral bridge of the vaginal mucosa and after tension on the cervix has been relaxed this important chromic or silk ligature is tied with the greatest possible force.

FIG. 106.—VAGINAL HYSTERECTOMY.

This procedure having been carried out on one side, is then repeated on the other side before any cutting is done or else the lower part of the broad ligament is cut away from the cervix, after which two sutures are passed on the other side through the base of the broad ligament.

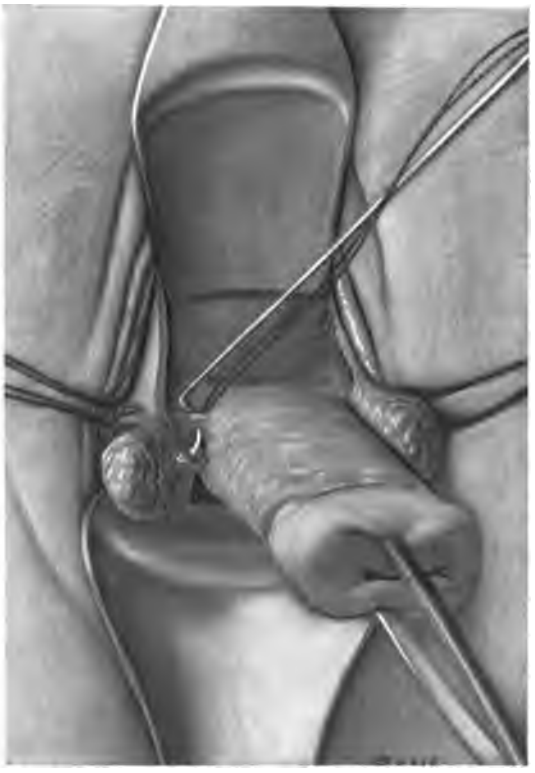

FIG. 107.—VAGINAL HYSTERECTOMY.

The cutting on either side goes very close to the cervix with very short snips upward until the uterine artery, usually very tortuous and twisted, is seen either superficially or somewhat deeper in the structure of the broad ligament itself. As soon as the uterine artery is seen, the bladder being kept up out of the way by an anterior speculum, the ligature carrier threaded with chromic catgut or a small curved needle is passed about the uterine artery and tied in order to firmly control this vessel if by any chance the second silk or chromic ligature has not included it.

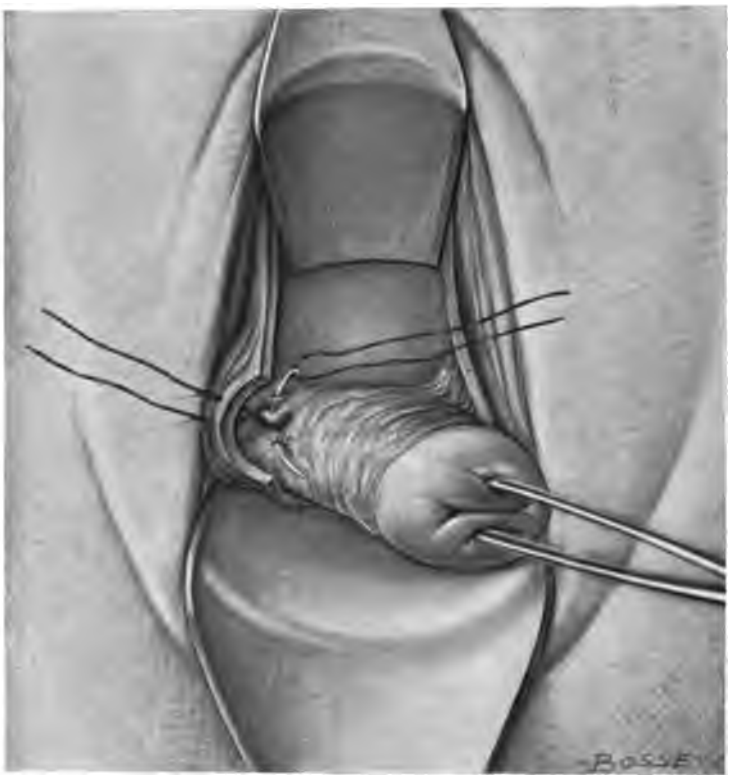

FIG. 108.—VAGINAL HYSTERECTOMY.

After the anterior and posterior vaginal incisions have been made the lateral bridge of vaginal mucosa may be incised with scissors and dissected upward with the gauze-covered thumb or index finger. Then the first chromic suture or ligature is passed about the exposed uterine artery and tied, and the ends are threaded in a needle and passed through the lateral bridge of vaginal mucosa. Another chromic ligature is passed about the uterine artery and tied. After cutting between the uterus and these ligatures, the one passing through the mucosa is knotted.

FIG. 109.—VAGINAL HYSTERECTOMY.

The separation of the ligamentum cardinale from the uterus is carried on with short snips of scissors and the uterine arteries are inspected. This is the most important part of the operation, for if the uterine arteries of both sides have been thus controlled with the aid of sight, that most annoying complication of retraction and bleeding of this vessel has been obviated.

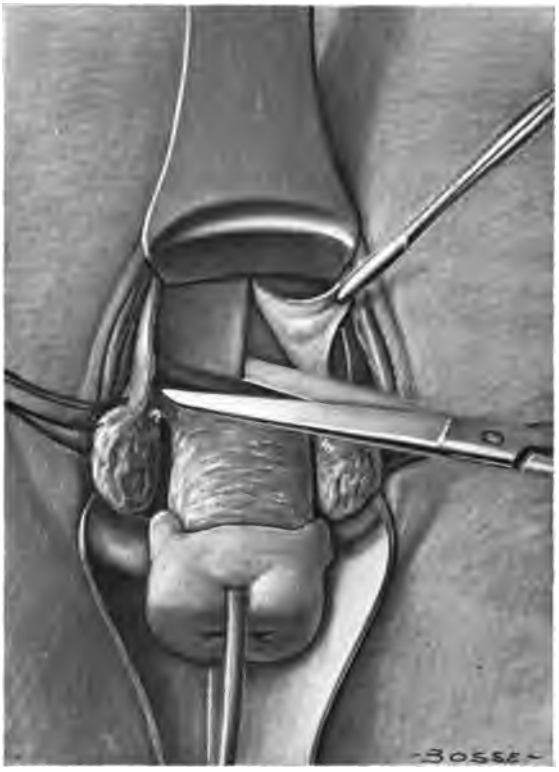

FIG. 110.—VAGINAL HYSTERECTOMY.

The vesico-uterine peritoneum is now incised either by a wide transverse cut or by a combination of transverse and longitudinal incisions.

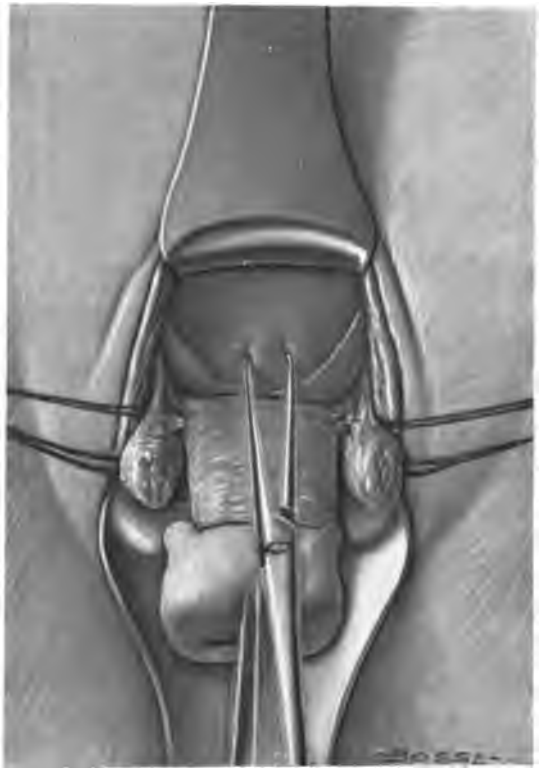

FIG. 111.—VAGINAL HYSTERECTOMY.

The operation is now continued by the delivery of the uterus. The anterior speculum is introduced through the incised peritoneum and the bladder is held up out of the way, a volsellum is applied to the corpus uteri at the highest accessible point. If by any chance it is impossible now to deliver the fundus, the broad ligament can be tied off by successive sutures applied from below upward, for even with the most rigidly fixed uterus of this class the preliminary separation of the ligamentum cardinale brings the cervix down and out close to the vulva.

by the second ligature applied as in figure 105, it is essential that it be ligated separately, and if, as in the vast majority of instances, the uterine artery is caught by the second ligature, the additional tying of the artery doubly insures one against any possible subsequent bleeding (Fig. 107).

The lower part of the broad ligament including the uterine arteries may be ligated by another method (Fig. 108). If the bridge of mucosa which covers the lateral wall of the cervix and which is still uncut is incised with the scissors down to the structure of the cervix, it can be peeled up very readily to the level of the internal os by the gauze-covered thumb without much bleeding or oozing until the region of the uterine arteries is reached. If then this dissected piece of mucosa with its underlying parametritic connective tissue is drawn to one side by an artery forceps, the uterine artery usually lies exposed to the eye; if not, dissection carries us up to it very easily. It is then tied with a chromic catgut suture and then another chromic catgut suture is tied about it. The ends of one are threaded into a needle and are then passed out through this lateral bridge of mucosa, as shown in figure 108. When the uterine artery is then cut between the sutures and the uterus, these two ends are tied and the uterine artery is thus attached firmly to this lateral vaginal flap so that its retraction is impossible. This is an added protection against subsequent bleeding and serves to attach part of the ligamentum cardinale to the vagina.

After this step has been carried out the peritoneal cavity is entered anteriorly by a transverse incision of the vesico-uterine pouch of peritoneum (Fig. 110). An anterior speculum is then introduced within the peritoneum and the anterior wall of the uterus is grasped by a pair of volsellum forceps (Fig. 111). The cervix is now pushed back into the vagina, a wider speculum is introduced into the peritoneal cavity and the fundus is drawn out by successively applied volsellum forceps (Fig. 112) until the fundus, tubes and ovaries lie outside of the vulva. Three heavy ligatures are then applied on either side

to absolutely ligate the broad ligament. The first one is applied near the fundus and takes in about one-third of the width of the broad ligament; the second is applied external to this, taking in two-thirds of the width of the broad ligaments, and the third, external to this one, takes in the entire width of the remaining uncut part of the broad ligament (Figs. 113-116). The scissors then cut close to the body of the uterus till one side of this organ is completely severed from all attachment to the broad ligament (Figs. 114-115). The uterus is then pulled out beyond the vulva and the broad ligament of the other side is ligated (Fig 116). When this is done, the uterus is cut off and removed, the scissors passing close to the uterine structure as in Figs. 114-115. Both uterine arteries have already been thoroughly tied and fastened to the lateral margins of the vaginal wall. The upper part of the broad ligament, including the outer half of the tube, the ligament of the ovary and the ovarian arteries forms a thick, compact band, held on either side by the three sutures. Any small bleeding points anywhere are now caught and tied, and the operation is practically completed.

A long strip of iodoform gauze is now introduced into the peritoneal cavity to hold the intestine and omentum up out of the field of operation. A No. 3 chromic gut suture is now taken, and with the aid of a heavy curved needle is passed as follows: It passes through the lateral margin of the longitudinal vaginal incision almost at its upper end; it then catches the ligament of the ovary and the broad ligament on its median side just near the attachment of the ligamentum ovarii to the ovary and well above the outermost broad ligament ligature. It then passes through the posterior vaginal wall and its attached peritoneum just median to the posterior clamp introduced at the beginning of the operation (Fig. 118). It then passes through the lateral vaginal wall 1/2 inch above the ligature which caught the uterine artery (Fig. 119). The ligatures on the broad ligament are pulled down and then this suture is drawn taut and

FIG. 112.—VAGINAL HYSTERECTOMY.

The volsella are applied in succession to the higher areas of the fundus and at the same time the cervix is pushed back thoroughly into the vagina over the face of the posterior speculum until the cervix disappears in the vagina and the fundus is brought out beyond the vulva.

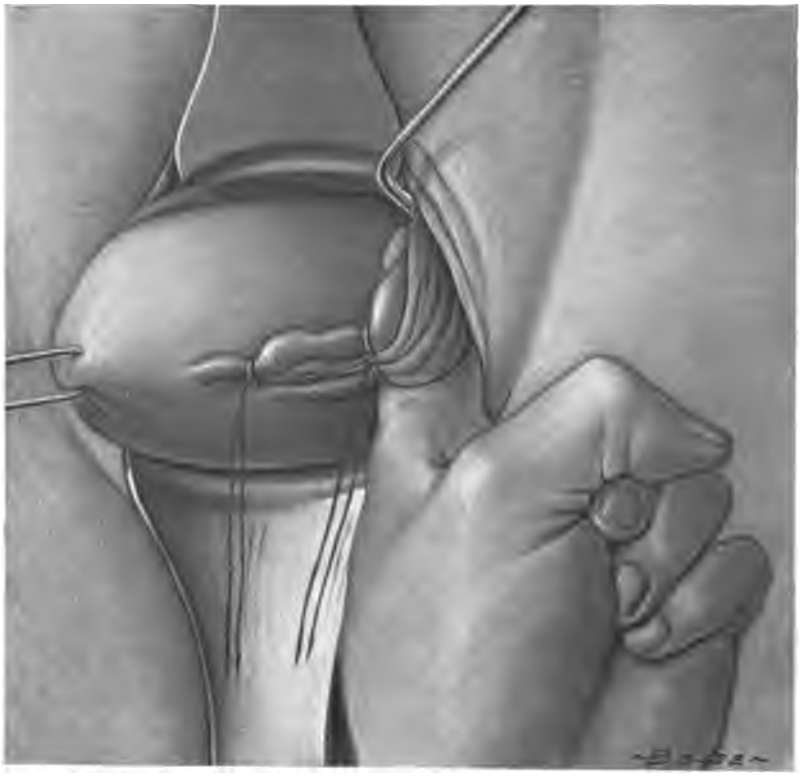

FIG. 113.—VAGINAL HYSTERECTOMY.

The uterus is then pulled over to one side and the broad ligament of the one side including the tube and the ligamentum ovarii and the round ligament is tied off by three heavy chromic or silk sutures. The first one, nearer the cornu, includes one-third of the broad ligament; the second passes one-half inch further out, includes two-thirds of the broad ligament, and the third suture, passed as above, includes the entire broad ligaments above the uterine artery. In passing this third suture the left index finger is passed either over the broad ligament, or under the broad broad ligament, to make sure that no other structure than the broad ligament is included.

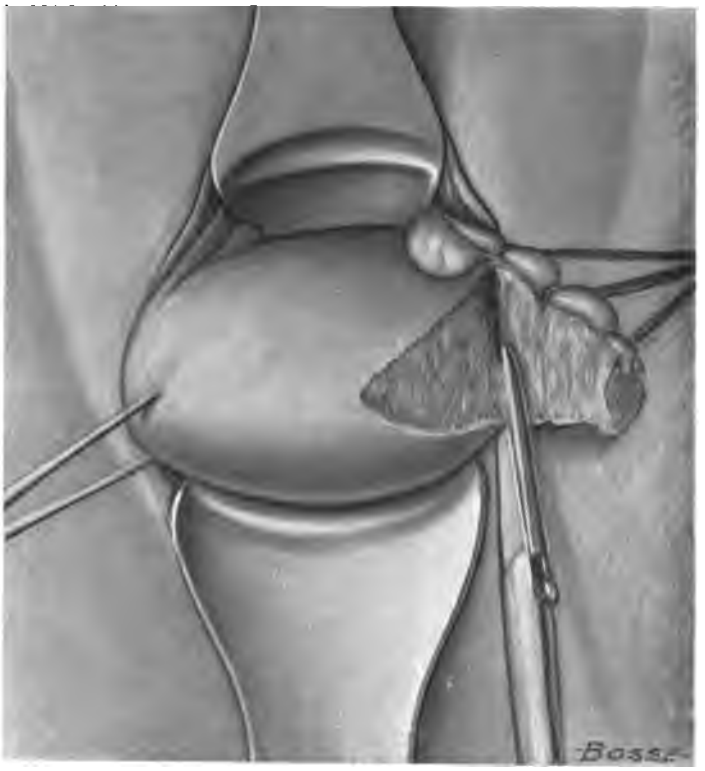

FIG. 114.—VAGINAL HYSTERECTOMY.

The broad ligament ligated with these three silk or chromic sutures is now cut through with the scissors, the line of incision passing close to lateral wall of the uterus.

FIG. 115.—VAGINAL HYSTERECTOMY.

As the scissors cut deeper, it is wise to pass the left index finger over the posterior wall of the uterus and out under the lower part of the broad ligament so that no other structures than the broad ligament will be cut.

FIG. 116.—VAGINAL HYSTERECTOMY.

The uterus is then delivered outside of the vulva and still remains attached by the uncut upper part of the broad ligament of the other side. This is then ligated by three chromic or silk sutures in the same fashion as in figure 113. The uterus is then separated from this broad ligament in the manner as in figure 114 and the hysterectomy is completed.

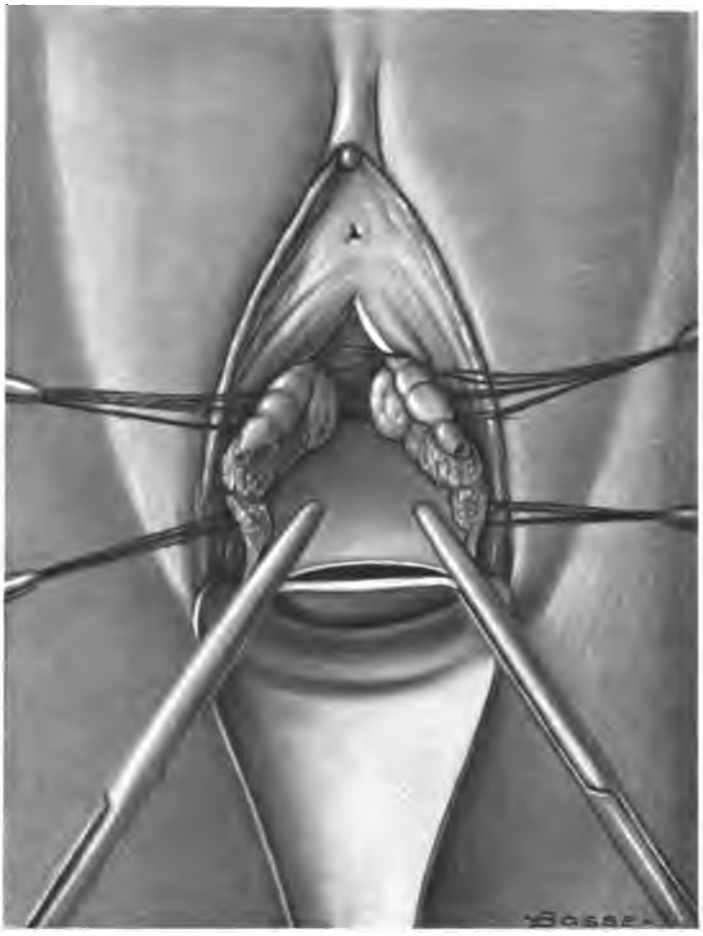

FIG. 117.—VAGINAL HYSTERECTOMY.

The upper chromic or silk ligatures of either side are used to pull the broad ligament stumps into view and spongeholders are passed between them into the peritoneal cavity to dry the field of operation and to locate any possible bleeding. Two clamps are uniting the peritoneum of Douglas to the post-vaginal wall at its highest point, having been applied early in the operation (Fig. 99). External to them are seen the ligatures about the uterine arteries.

FIG. 118.—VAGINAL HYSTERECTOMY.

The stumps are then attached to the antero-lateral vaginal walls; No. 3 chromic suture is used. The suture passes through the lateral margin of one vaginal flap 1 1/2 inches below the upper angle, then through the ligamentum ovarii, then through the united peritoneum and posterior vaginal edge close to the clamp which holds the peritoneum and vaginal edge together.

FIG. 119.—VAGINAL HYSTERECTOMY.

The stump and vaginal flap are then pulled toward the median line and the suture is passed through the lateral vaginal flap, preferably near the area which constituted the uncut bridge of figure 101, but above the ligature passed in either figure 104-105, or in figure 108.

tied firmly well above the end of the stump. As a result, the entire thick upper portion of the broad ligament is attached closely to antero-lateral, lateral and postero-lateral vaginal walls, and is held outside of the peritoneal cavity (Fig 120). The same procedure is then carried out on the other side. The iodoform strip is drawn out and the operation is completed in one of two ways.

(1.) By the first method peritoneal surfaces are united and the edges of the vaginal incision likewise between the exposed stumps of the broad ligaments and no packing is introduced into the pelvis. This procedure is readily accomplished by grasping hold of the peritoneum reflected from the posterior surface of the bladder and uniting it by continued or interrupted suture to the peritoneum forming the posterior wall of the cul de sac of Douglas which was united earlier in the operation (see Fig. 117) to the posterior vaginal incision by two clamps. Then the vaginal mucosa is united in the same fashion, leaving the stumps projecting in the vagina, and the vagina is then packed with gauze. If by any chance oozing takes place, it finds its outlet through the vagina, unless the uterine artery by some chance has retracted and is the cause of the bleeding. There is more or less oozing during the operation, the bleeding points being located on the edge of the posterior vaginal incision, especially at its lateral borders and along the connective tissue lying between this and the peritoneum.

The disadvantage of this method of closure is that the bladder, through the peritoneum over its posterior surface, is held close to the vaginal wound and directly over the apex of the new fornix. Bleeding, if it should occur from a retracted uterine artery, would not be recognized early, if at all. The new cul de sac of Douglas is situated directly over the peritoneo-vaginal wound.

(2.) By the second method a long iodoform strip is introduced into the peritoneal cavity. Over the lower end of this strip which projects into the vagina, the five ligatures of either side are tied across in a double knot and serve to keep this gauze in place and prevent its

slipping out into the vaginal canal (Fig. 121). The vaginal canal is then packed with a wide strip of iodoform gauze, the bladder emptied to make sure that the urine is clear, and the operation is completed.

The operation, when done leisurely, rarely takes more than forty minutes, and the patient suffers scarcely any postoperative annoyance. Owing to the pressure of vaginal gauze on the urethra, it is advisable for the first few days to catheterize the patient. On the fifth day after the operation removal of the vaginal gauze is begun. The sutures which are tied over the intraperitoneal strip of gauze are no obstacle, and from this day on, four to six inches of the wide intraperitoneal strip of iodoform gauze are drawn out daily. Finally, after removal of the gauze, the vaginal fornix shows a cone-shaped denuded area containing the stumps of the broad ligaments. Daily vaginal douches are then given, and in the course of another week or ten days complete healing and retraction has taken place in many cases.

The value of packing iodoform gauze into the peritoneal cavity instead of closing up the edges of the vaginal incision is that because of the introduced gauze an exudation of lymph is thrown out, which eventually forms an artificial cul de sac of Douglas situated several inches higher than the normal one. It also prevents the intestine by any chance becoming adherent to the vaginal wound. In addition to these advantages, it diminishes the risk of the subsequent occurrence of a descent of the vagina, bladder, rectum, or the intestine. The purpose of sewing the lateral stumps of the broad ligament so firmly to the lateral borders of the vagina is that in the course of subsequent retraction of these stumps the lateral vaginal walls and bladder are pulled upward and the occurrence of a cystocele or descent of the intestine or a prolapse of the vaginal walls is reduced to a minimum.

Use of Silk.—A good method involves the use of silk ligatures only, instead of chromic, and the introduction of iodoform gauze into the pelvic cavity. In tying the ligatures about the lower and upper areas of the broad ligament much force is expended and chromic

FIG. 120.—VAGINAL HYSTERECTOMY.

The chromic suture is then tied after the other ligatures on the broad ligament stumps have been pulled down so that when the chromic suture is tied it is firmly closed above all other sutures. The clamp which holds the peritoneum and the posterior vaginal edge together has been meanwhile removed. The same procedure is repeated on the other side. We now have the broad ligament stumps in the vagina and practically extraperitoneal.

FIG. 121.—VAGINAL HYSTERECTOMY.

It is now possible to complete the operation by any one of the several methods, the peritoneum and posterior vaginal edge may be united to the peritoneum and vaginal wall anteriorly by one or more interrupted sutures which close the opening into the peritoneum and leave the stumps of the two sides exposed in the vagina. I prefer to introduce a long wide strip of iodoform gauze into the peritoneal cavity which pushes the intestines up and holds the bladder out of the way. The ligatures of the two stumps are then tied loosely over the protruding end of this strip of iodoform gauze and then the chromic sutures which united the stumps to the antero-lateral vaginal wall are cut. The vagina is then packed with another strip of iodoform gauze which may be removed on the fifth day; on the sixth or seventh day we begin to draw out the intraperitoneal strip of gauze, four or five inches being taken out on each successive day until the whole strip is removed. Douches are then given twice daily. In the course of a few days the silk sutures, if silk has been used, are removed by scissors or else they are pulled out, for these slough away and with them the exposed areas of the broad ligament stumps. After complete removal of the iodoform gauze the vault of the vagina usually heals without further attention. In some cases the granulating fornix is treated with pyroligneous acid or silver until complete healing takes place.

sutures readily break. The exposed stumps of the broad ligament which project into the vagina on the use of these chromic sutures are not always quickly healed, but at times remain as granulating points which require treatment. With the use of silk sutures all the tissue below them sloughs away, so that no projecting ends are left in the vagina after the twelfth to fifteenth day. The disagreeable feature connected with the use of silk ligatures is this very sloughing, for it produces from the seventh to twelfth day (and sometimes longer) an exceedingly disagreeable, malodorous discharge, which, however, has no other unpleasant consequence to the patient. From the twelfth to fourteenth day traction on the silk sutures brings them away or they may be subsequently cut close to their point of application and removed.

DISEASE OF THE ADNEXA.

In diseases and pathological conditions of the tubes and ovaries the choice between abdominal and vaginal routes, for conservative or radical operation on the adnexa, must take into consideration the size and location of the tumors, the element of adhesions, the necessity for haste and the question of mortality and advantages. Abel, comparing the mortality of abdominal and vaginal operations for inflammations of the adnexa, explains some of the deaths by the abdominal method by saying that the operations were performed early in his experience and that some of them were cases which should not have been operated so early. Today he probably uses better judgment in selecting the time for operation and says that vaginal operations are less dangerous than abdominal.

A comparison of the cases operated by him abdominally and vaginally shows this difference: out of sixty-five inflammatory cases, 53 were instances of pyosalpinx; four of ovarian abscess; eight were tubo-ovarian tumors or salpingo-oophoritis. Six died. By the vaginal route he operated on thirty-three cases of inflammatory tumors of the adnexa without removal of the uterus, and on thirty-one cases of inflammatory tumors of the adnexa with the removal of the uterus, with two deaths. A study of the thirty-three cases of inflammatory tumors without removal of the uterus shows that only nine were pyosalpinx, nine were tubo-ovarian tumors, six cases of salpingo-oophoritis, three cases of hematosalpinx, and one case of hydrosalpinx. These certainly represent a much less severe form of disease than those operated by the abdominal route. In the more severe cases of inflammatory diseased adnexa (thirty-one in number), the uterus was removed, a step of great advantage. His statistics concerning vaginal operations

include forty-two cases of retroflexion of the uterus with no mortality, ten cases of ovarian tumors, one ectopic gestation, four hysterectomies for prolapse of the uterus, and sixty-four cases of inflamed adnexa, giving him the very low mortality of 1.66 per cent. for 121 operations, as compared with a mortality of 6.6 per cent. for 121 abdominal operations including sixty-four inflammatory cases. Not only were the reported abdominal operations done early in his surgical experience, but they were of a much more severe nature than those done vaginally, and among them were cases operated on during the stage of acute inflammation, cases which his more mature experience would lead him to operate radically at a much later and safer period. When we take into consideration that the vaginal operations include forty-two cases of retroflexion, that the inflammatory tumors of the adnexa were not of severe grade, that the severe cases of pyosalpinx gave a much better prognosis because the uterus was also removed, we see how unfair the comparison is. As mentioned elsewhere, Schauta, in sixty vaginal complicated ovariotomies, had a mortality of 5 per cent., whereas in forty-one cases of uncomplicated unilateral vaginal ovariotomy his mortality was *nil*.

Dührssen, in the publication of his first 500 cases of vaginal celiotomy, reported fifteen deaths: a mortality of 3 per cent. It must be mentioned, however, that 400 of these cases represented the operation of vaginal fixation, among which in only eighty cases one or both tubes or ovaries were removed. Of these eighty cases only eight were pyosalpinx, five were ectopics, the rest were cystic ovaries, hydrosalpinx, oophoritis, perisalpingitis, and hematosalpinx. Of these 400 cases six died: 1.5 per cent. Seventy-three operations were performed for diseased adnexa, cases of a more severe nature, with the uterus anteflexed: of these five died. Among all his cases, in thirty-three instances, he enucleated myomata from the uterus. The two deaths among these thirty-three were due to operations on the adnexa. Thirteen cases of ectopic gestation showed one death. In addition, sixteen

cases were begun vaginally which had to be completed by a vaginal hysterectomy or by an abdominal laparotomy, with two deaths. If we exclude the 400 cases of vaginal fixation, the vast majority of which, 320, were done primarily for retroflexion alone, we have 104 cases with eight deaths. It can therefore be seen that the severity of these cases and the manner in which the statistics are compiled have a decided bearing on the reported mortality.

INDICATIONS AND LIMITATIONS IN DISEASES OF THE ADNEXA.

In fixing for oneself the indications and limitations for the more extended practice of vaginal celiotomy, it is necessary to make a comparison between the relative advantages and disadvantages of vaginal celiotomy as compared with abdominal laparotomy. The vaginal operation is more difficult, takes longer, but there is less danger from air infection. The vagina, for practical purposes, can be rendered as sterile as the abdominal wall. The operation through the vaginal vault is slower, but involves no manipulation of the intestines and, in consequence, decidedly less shock. Though intestine and omentum present in the wound, nevertheless, by lifting the table or by the use of gauze sponges, they can be kept out of the field of operation. Deep adhesions can be loosened by the sense of touch, but denuded areas of pelvic peritoneum and intestinal peritoneum cannot be observed. Vaginal celiotomy is not an operation performed in the dark, for the uterus is to be brought out into the vagina and whatever is to be removed must also be brought into the vagina, so that all ligation and cutting are accomplished with the aid of sight. If pus is poured out in the course of an operation, it is said that it flows out more readily when the vaginal route is used and that there is less danger of infection. Patients convalesce quickly after a vaginal celiotomy. They do not worry about a scar; there is no danger of hernia. Many patients yield to a vaginal operation who would absolutely refuse an abdominal incision.

The abdominal operation is easier and can be more quickly per-

formed. Adhesions of the intestine and omentum may be freed with the aid of sight. The deeper adhesions of the adnexa, of the uterus or of adherent tumors must of course be freed by the fingers alone, but even here the eye enables us to see rough denuded areas of the peritoneum, to see the exit of pus, and to *note the character of the intestinal wall when freed from adhesions*—a point of greatest importance. It may be said that, with proper protection of the intestines by the abdominal route, and with the careful use of sponges, the danger of infection in these cases should be no greater than when operating through the vagina. In addition, the abdominal route enables us to observe the appendix and to remove it when affected or to remove it as a routine procedure.

Comparing, then, the advantages of the two methods, it may be said that hernia after an abdominal operation is certainly a possibility, even though it happens only after an infection of the wound, a disturbance which may occur in spite of the greatest care. The advantages of the vaginal method are that the patients suffer less from shock, that there is no danger of hernia, and that patients will consent more readily to the operation. Other things being equal, these advantages are of great weight and will hold good in many cases of salpingitis and inflammation of the adnexa, especially in multiparæ in whom extreme conservatism may not be required. If continued observation and the leukocyte count justify the conclusion that the tubal contents are no longer virulent, then the operation may be undertaken.

The vaginal method is certainly allowable if tactile examination gives distinct evidence which excludes adhesions with the intestine. The all-important question is whether the vaginal route should be chosen in cases of tumors and conditions associated with marked adhesions, and whether in these severe cases the mortality rate is lower.

For me, the contraindication is furnished by adhesions. If the tube or ovary or the uterus be fixed we never know the extent of the

adhesions. Many cases present an unexpected extent of union of uterus and adnexa to sigmoid, rectum, etc., which is of so marked a character that when adhesions are separated rough, denuded areas of peritoneum are produced, all of which demand and should receive surgical correction, which is impossible through the vagina.

These are the questions which are of importance from the surgical standpoint. Since no statistics properly compiled definitely prove the vaginal method by theory or results to give a markedly better mortality in severe cases (except, perhaps, hysterectomy), the adoption of this method for extended practice depends on individual reason and experience. Dührssen fixed certain contraindications, and today uses the vaginal method for 80 per cent. of his cases, but a large proportion of these are uterine displacements. For Schauta, many of these contraindications have no weight. He says, as quoted above, "It is natural that every operator should begin with laparotomy and then adopt the vaginal mode of operation."

For Abel, as is seen, there are few contraindications, yet here is a man who, after practising the abdominal method, goes over to the vaginal procedure and uses it almost exclusively. Statistics of operations by the vaginal method when viewed in gross are better, because very many cases are included which are done by some by the Alexander-Adams operation or which are not considered sufficiently severe by others to justify an abdominal operation. The vaginal method is often practised in patients who would refuse an abdominal incision.

TECHNIC.

When the uterus has been drawn into the vagina the space left between its posterior wall and the anterior speculum which holds the bladder up is a very roomy one, provided the longitudinal incision into the vesico-uterine fold (if such has been made) has been a long one, and provided the speculum is fairly wide. It is frequently necessary to have the aid of sponges or holders to keep the intestine and

omentum back, which process is made easier by a slight elevation of the lower end of the operating table. These small gauze sponges are introduced in the median line and are then passed laterally to a position behind and external to the tube and ovary. With the aid of such sponges on long spongeholders nonadherent tubes and ovaries can be rolled and drawn into the vagina. The fingers may then be introduced through this space, may palpate the tubes and ovaries, bring them further into view, loosen cobweb adhesions, and draw out small cysts or tumors or enucleate adherent tumors or pus sacs.

It is evident that a long longitudinal incision in the anterior vaginal wall and a thorough separation of the bladder, especially at the lateral attachments to the cervix, a long incision into the vesico-uterine peritoneum, and the introduction into the peritoneal cavity of a wide speculum, are important factors in bringing the adnexa readily into the vagina. With a large uterus or if the uterus grows larger after delivery on account of congestion, which usually occurs, the space above the uterus can be made more roomy by taking out the posterior speculum and either pulling or pushing the fundus down toward the perineum. If the uterus is rotated so that one horn lies anteriorly and one posteriorly, the adnexa are more clearly seen and the entire width of the broad ligaments, the round ligaments, and the ligamentum ovarii are open to examination or operative procedures.

If adhesions are present these must first be loosened. With mild adhesions of cobweb type, with a freely movable uterus, the delivery of the adnexa is a simple matter. After the uterus is in the vagina gauze sponges or the introduced fingers readily separate such loose stretchable bands.

If more firm adhesions are present two fingers are introduced over the fundus along the posterior wall of the broad ligament, and the tubes and ovaries are freed from their adhesions by the same manipulations as are required in abdominal operations. If the

uterus is adherent, of course it must first be loosened, for on the thorough delivery of the uterus into the vagina depends the ease of delivery of the adnexa. If peritoneal adhesions hold the posterior wall of the uterus, these may, as a rule, be separated with the aid of the eye if the uterus is brought well forward. Sometimes it is necessary to twist the uterus around so that our horn lies anteriorly and in the middle line. This brings the adherent bands and the adnexa more readily into the field of operation.

If extraction of the corpus is difficult through peritoneal adhesions, fixation of adnexa, or very short upper ligamentum latum or sclerosed ligamentum infundibulo-pelvicum, it may be necessary to pull first one and then the other cornu into the opening, ligate the isthmus tubæ and the upper part of the ligamenum latum. This allows the fundus to pass into the vagina and out beyond the vulva, and then with other ligatures and clamps the adnexa may be brought into the vagina. This manipulation is not easy in nulliparæ. Sometimes it is helpful to pass narrow side retractors into the peritoneal cavity, which exposes a much deeper area of the broad ligament and permits of more thorough ligation along the lateral wall of the uterus. Even then it may be necessary to take out all the retractors and specula and enter with two fingers of one hand to loosen adhesions about the tube and ovary. If we take out all the specula and pull the fundus down toward the rectum, the two fingers which loosen the adnexa have more room to pass along the posterior wall of the ligamentum latum.

With this manipulation it is often of great advantage to use the external hand as in a bimanual examination. Care is necessary to avoid tearing the broad ligament, or the mesosalpinx or the ligamentum infundibulo-pelvicum, all of which are frequently thickened, brittle or sclerosed. They retract and bleed freely.

The most difficult operation through the vagina is the removal of adherent adnexa. The peritoneal cavity must be entered, the

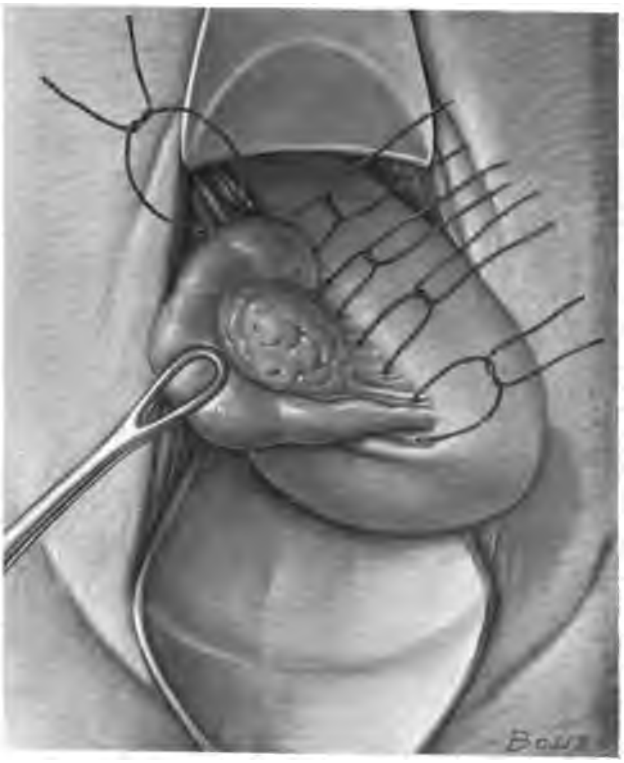

FIG. 122.—In removing inflamed or involved adnexa it is advisable to deliver the uterus and then to separate the tube and ovary from adhesions. Ligation is carried out by mattress sutures applied from the cornu of the uterus through the mesosalpinx and meso-ovarium out to, and including, the ligamentum infundibulo-pelvicum, or in the reverse order. Whenever possible, one or two sutures should be applied to the ligamentum infundibulo-pelvicum before any cutting is done. In the above drawing the mattress sutures are shown a little too far apart.

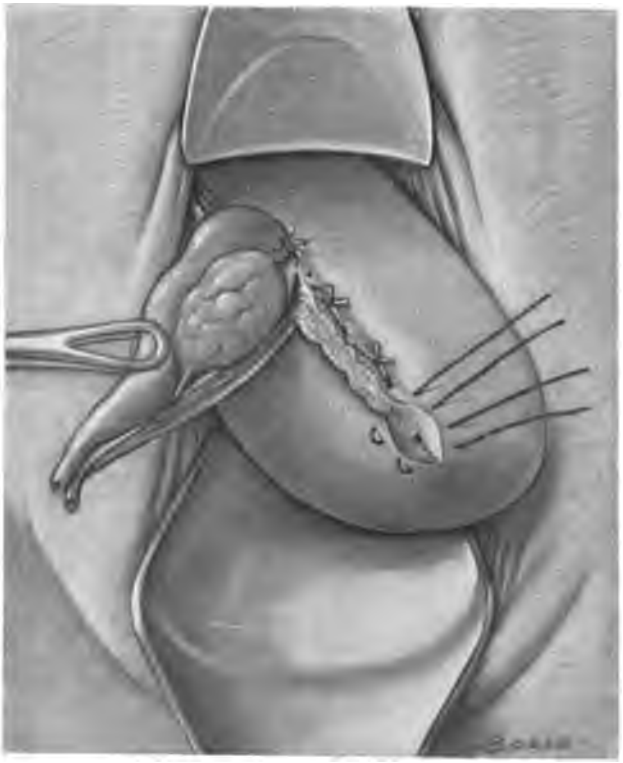

FIG. 123.—If it is not possible to remove the adnexa by first passing mattress sutures from the cornu out to and including the ligamentum infundibulo-pelvicum, ligation and cutting are begun at the cornu of the uterus, passing in this way out to the ligamentum infundibulo-pelvicum. Great care is necessary that the outer area of mesosalpinx and the ligamentum infundibulo-pelvicum are thoroughly ligated and that the tissues in this area do not tear and slip away from the control of the operator. The area of the entrance of the tube into the uterus shows the wedge-shaped excision of the tubal mucosa to be closed by mattress sutures.

adnexa must be loosened and with the uterus brought into the vagina. Ligatures are then applied and the adnexa removed. It is almost essential to get the uterus into the vagina. We may then pull hard on the uterus, and by pulling either to right or left, or by rotating the uterus get the loosened adnexa of the one or other side nearer to the median line and thus make it possible to ligate the tube and ovary enucleated with the introduced finger or fingers. If these tubes and ovaries are not readily drawn into view by the uterus, delivery may be accomplished by the aid of Cleveland forceps applied to the tube or ligamentum ovarii. Sometimes it is necessary to put clamps on in succession and thus bring the tube or ovary out. Sometimes it is essential to put a ligature about the tube near the uterine end, and in this way gradually pull the outer end within reach of the fingers. Often it is necessary to grasp the tube near the uterine end with a forceps and then enter the peritoneal cavity with the fingers. It is often impossible by these manipulations to deliver in a thorough surgical manner closely adherent tubes and ovaries, especially if they are situated far over toward the lateral wall of the pelvis or if they have taken on a pseudo-intraligamentous growth.

After the tube and ovary are loosened from their adhesions, gauze is introduced to catch any pus which may be expelled. If contents of the tube are serous or catarrhal, the tube may be washed out with salt solution. If the outer end of the tube is closed a new ostium is made; this method of opening and forming a new ostium gives the opportunity for complete restoration that makes pregnancy possible. If the contents are of a suspicious nature the tube is excised after the adnexa of the other side are examined. If the ovary is normal, only the tube is removed. If the uterine end appears involved this is excised out of the uterine horn, and bleeding points must be caught and ligated. Frequently, after getting the adnexa loose, we have little room for exsection. Safety demands that ligatures be tied about the outer end of the broad ligaments, around the ligamentum

infundibulo-pelvicum and then at the uterine end of the tube. Mattress sutures are then applied to the intervening area (Fig. 122). If it be impossible to reach the infundibulo-pelvic ligament first, we must begin at the uterine end and work outward with mattress sutures, but the outer part containing the ovarian artery must not be allowed to tear or slip while tying these last and most important sutures about the ovarian artery (Fig. 123). If it is purposed to remove the adnexa of both sides, then the uterus should also be removed. The operation should then consist of a vaginal hysterectomy with median splitting of the uterus.

ECTOPIC GESTATION.

The vaginal operation for ectopic gestation in the early months is the same as for inflammatory adnexa. The structures must be handled gently so that the ligamentum infundibulo-pelvicum does not tear. There is little shock and a thorough removal of the blood is permitted.

With small ectopic tumors an operation through the vagina is preferred by Dührssen, Martin, and Abel. With this method it is easy in favorable cases to remove an ovum not yet expelled from the tube. The uterus is brought out and the tubes become visible and may be reached by the fingers; the corresponding ovary with the tube is loosened from its adhesions and is brought out into the field of operation. If the tube is intact it is split, the egg is removed and the opening is closed, so that the lumen is preserved (Martin). If the tube cannot be preserved, it is removed by tying the mesosalpinx in small sections; the end remaining near the cornu is left open if the mucous membrane looks normal. This retained part of the tube is split and the mucous membrane around the incision is united with the serosa to form an artificial opening. If blood has accumulated in the recto-uterine space, it is removed by sponges, the peritoneal wounds are closed, uterus is replaced and the vaginal incisions are sewed. If the hemato-

cele behind the uterus is large, a posterior vaginal incision is made and the blood is removed. If an hematocele is encapsulated in its upper area this protecting wall is not to be broken through. It is, however, necessary to get the tube out of the hematocele into view. If this is not in good condition, it should be removed. All oozing must be stopped. If the peritoneum is infiltrated with blood, if there is parenchymatous hemorrhage, the space should be filled with sterile gauze, and bleeding points in the edge of the vaginal incision should be caught and ligated.

Personally I believe all ectopic gestations, except old hematoceles which may be drained per vaginam, should be approached by the abdominal route, except such early cases as are not definitely diagnosed, as have no bleeding through tubal abortion or tubal rupture, and such as are operated on vaginally for diagnostic reasons and are then completed vaginally because of ease of execution.

OVARIAN CYSTS.

Schauta early adopted the method of vaginal celiotomy for the performance of ovariotomy. He was the first to use the vaginal route for the removal of large cystic tumors of the adnexa, cysts containing from ten to fifteen quarts of fluid. He said that ovariotomy is easily done through the vagina if the cyst is movable and pedunculated. Even if only a small part of the cyst surface can be reached, it can readily be punctured by a trocar. The cyst wall thus opened is pulled through the vaginal incision, the pedicle is tied and the cyst removed. There is room enough for this procedure even in large cysts in which the lower pole of the tumor does not dip down into the pelvis. In that event, the lower pole can be reached through the peritoneal incision by introducing two fingers into the peritoneal cavity along which the trocar can be pushed into the cyst, which may then be drawn down after being emptied. Schauta in his operations removes dermoid and also multilocular cysts, one cyst after another is emptied by the trocar so

that unilocular cysts are not the only ones adapted to this method. The great claim made for the vaginal method is that it is less dangerous and that the statistics as regards mortality are better. It is a question whether this claim can be substantiated to the degree claimed by its adherents.

According to Bürger, the rate of mortality for abdominal ovariotomy varies between 4 and 10 per cent., though Pean reports mortality of only 2 per cent. Bürger reported from the Clinic of Schauta a mortality of 9.55 per cent. in 394 ovariotomies. Of the thirty-two deaths Bürger takes out twenty-three, which he says are not in direct and immediate connection with the operation, making the mortality figured on this basis 2.68 per cent. Abel, in reviewing these statistics, says that instead of nine deaths twenty-two are in direct connection with the operation. He finds among the cases excluded by Bürger five cases of sepsis in which bacteria were present before the operation, one case of pneumonia, one case of pneumonia after a second operation for intestinal obstruction, one pneumonia after a case of carcinoma, one pneumonia following a twisted pedicle operation, one pneumonia after a purulent cyst, one gangrene of the lung following operation for twisted pedicle; three deaths from weak heart and fatty heart, two deaths from emboli of the lung, one death from intestinal obstruction and hydronephrosis due to ligating a ureter. Abel says that Bürger's report shows the abdominal operation to be dangerous through sepsis, ileus, heart collapse, lung affections, emboli, and internal hemorrhage. Since he considers many lung complications, emboli, and ileus due to intestinal paralysis, as evidence of sepsis, he finds that abdominal operations are not free from danger. It can thus be seen how differently statistics are reviewed according to the bias of the observer.

That the character of the cases operated on is of vast importance is shown by the fact that Schauta in sixty complicated vaginal ovariotomies was compelled in nineteen cases to remove the uterus. His

mortality was 5 per cent. In forty-one uncomplicated vaginal ovariotomies his mortality was nil.

Abel believes that all ovarian tumors should be removed through the vagina, except very large cystic tumors, large solid tumors, and carcinomatous tumors of the ovary. Intraligamentous tumors and tumors with twisted pedicles, which Bürger says should be done through the abdomen, Abel does through the vagina. For Abel, adhesions are no contraindications. They must be extremely extensive, he says, to furnish an obstacle which cannot be overcome by the vaginal route. Size is no obstacle so long as the tumors are cystic, says Abel. He finds the removal of small cystic tumors to be without danger. The vaginal operation for larger and complicated cystic tumors is less dangerous and the same holds good in the case of dermoid cysts. He advises the abdominal method only for exceptionally large cystic tumors, for large solid tumors, and for carcinomatous growths of the ovary.

The vaginal route is to be preferred in multiparæ if the cystic tumors are not large, especially if they are movable and if there are no adhesions. Even large cysts extending above the pelvic brim may be speedily removed in this manner. After opening the peritoneum, if the tumor does not present it may be pushed down by pressing through the abdomen, or by grasping the pedicle, or by grasping the tumor itself. With the latter method it is better to first introduce gauze so that the peritoneum is protected. I use the vaginal method if the fluid tumors are not adherent, and if the uterus is movable, so that it may be delivered into the vagina. If the uterus is extracted by the anterior route we have a roomy opening, and by pulling on the ligamentum ovarii we may bring the lower pole of the tumor into the field. This method works well with small tumors, but it is not wise to use it if the pedicle be twisted, if the tumors be dermoids, or if the tumors be solid.

With the anterior vaginal incision, even if the uterus cannot be

delivered, if the lower pole is brought into the field, the cyst may be punctured with a trocar. In the case of small movable cysts removal is then a ready procedure. With adherent cysts puncture by trocar or dressing forceps brings part of the cyst wall into the field of operation and makes its entrance into the vagina possible, after which deeper adhesions are loosened, some with the fingers and others with the aid of sight. Leaking which may take place in the peritoneal cavity is not always thoroughly removed unless we also make a posterior incision.

I use the posterior vaginal method for small tumors which lie deep behind the uterus and can be felt by the internal examining fingers, or if they lie directly on the posterior fornix. If the tumor lies behind the uterus the posterior incision is made. If the tumor ruptures it drains well through the posterior incision.

HYSTERECTOMY (Continued).

In doing vaginal hysterectomy we must avoid the occurrence of cystocele after taking out the uterus. Hysterectomy may be performed for prolapse, and certainly in that event we must do something to prevent the bladder and vagina from subsequently coming down. Here the value of the inverted ⊥-incision with thorough separation of the bladder becomes apparent. To prevent the descent of the bladder it must first have been separated from all surrounding structures and then a special attachment of the flaps should be made to the broad ligament stumps. Either the wound is closed between the stumps by union of peritoneal surfaces and union of vaginal edges, or at completion of operation the incision is not closed and the lower pelvis is packed with gauze. These methods lift or push a completely separated bladder up and retain it back of the symphysis, so that the risk of its subsequent descent is reduced to a minimum. For complete prolapse of the uterus, however, hysterectomy is most unreliable. The only way to make certain that the bladder will never again descend is to fix the uterus in front of it.

In many cases, except large fibroid uteri, anterior vaginal celiotomy with the inverted ⊥-incision and thorough separation of the bladder from its uterovaginal connections makes vaginal hysterectomy an operation of simplicity and ease, for at no step are we working in the dark. Every bit of tissue which is tied and cut is clearly exposed to the eye. The bladder and ureters are removed from points of danger and the shock, annoyance, and fear associated with abdominal operations are obviated.

Hysterectomy includes the removal of the uterus alone without the adnexa, or first the uterus and then the adnexa, or removal of the uterus plus the attached adnexa. The important points in the removal

of the uterus are: the avoidance of injury to the bladder, ureters or rectum, and the thorough tying of the uterine and ovarian arteries, more especially the uterine arteries, for these are so situated that they readily retract, and that part of the broad ligament in which they run is not easily grasped and pulled into view. In the tying of the ovarian arteries, however, when the uterus alone is to be removed, we have the long and easily manipulated upper area of the broad ligament with the tube and ligamentum ovarii as points easy to hold and tie, and if the uterus plus the adnexa are to be removed, traction on the broad ligament after preliminary removal of the uterus or traction on the uterine horns still attached to the tubes and ligamentum ovarii, especially so if the uterus has been split, enables us to pull the ligamentum infundibulum pelvicum and its contained ovarian artery into the field of operation.

A factor which renders vaginal hysterectomy difficult is the inability in many cases to pull the cervix well down toward the vulva. This is due to the existence of short, inelastic or sclerosed ligaments around the cervix, more especially the ligamenta cardinalia, to perimetritis, or to adherent adnexa, or to irregular fibroid tumors of the uterus.

This immobility renders approach to the lower area of the uterus and to the uterine arteries somewhat difficult, and usually renders the delivery of even a small fundus into the vagina not easy of accomplishment. Mobility of the uterus is readily increased if the cervix and the lower part of the uterus are freed from all their surrounding attachments, more especially so from the ligamenta cardinalia; hence it is advisable in practically all cases to begin the operation by a thorough separation from below. This includes the separation of the bladder anteriorly, separation and penetration into the cul de sac of Douglas posteriorly, and a separation of the lower part of the broad ligament laterally, up to and including the uterine arteries (Fig. 108). Thorough separation of the bladder and tying of the uterine arteries, if done at this stage, aids not only to avoid injury to the ureters, but

the most annoying complication in the operation, bleeding from the uterine arteries, is obviated. Therefore, whether ligation be done from below upward, or from above downward, or by a combination of the two methods, whether this is done by ligatures or clamps, with hemisection or with splitting of the uterus or not, by morcellement or not, preliminary ligation of the ligamenta cardinalia and of the uterine arteries should always be carried out whenever possible.

In many instances the simple act of separation of the bladder from the cervix and uterus causes oozing. The separation of the bladder from the anterior fornix and anterior vaginal wall has the same effect. Any vaginal hysterectomy done with preliminary entrance into the cul de sac of Douglas has likewise this troublesome feature. The most annoying oozing occurs when the posterior fornix is incised and the tissue lying between the incision and the cul de sac of Douglas is penetrated; here the oozing continues almost incessantly, especially at the extreme lateral edges of the incision. This may be controlled by clamps which unite the peritoneum and vaginal edge at the ends of the vaginal incision, or by union of these tissues by interrupted sutures or by the use of mattress sutures. These procedures are sometimes necessary, but they take time and occasionally limit the space through which we are compelled to work. The higher up the posterior fornix, that is, the further from the external os the transverse incision is made for the purpose of entering the cul de sac of Douglas, the less is the oozing.

After preliminary separation of the cervix and lower uterus from its surroundings and after ligation of the uterine arteries, the upper part of the uterus and broad ligament still remain to be considered. If the uterus can then be delivered into the vagina it may be removed with or without its adnexa by ligation from above downward, or by the application of clamps from above downward. If it is impossible to deliver the uterus, because it is held back too firmly by sclerosing broad ligaments, or by adherent adnexa, the upper part of the broad

ligament may be treated by ligation from below upward, or by the application of clamps from below upward, or the anterior wall of the uterus may be split or the uterus may be split completely into halves, and these when drawn out give us a point from which we may pull out or enucleate the adnexa, and in that way ligate or clamp off the broad ligaments from above downward. If the uterus is too large to be delivered, even with hemisection or splitting, as is the case in fibroids of the uterus, splitting of the lower part is carried up as high as possible and then either myomata are enucleated *in toto* or else from the median line outward as much as needed is cut out of the tumor tissue; *nothing of the uterus tissue being cut out*, only many smaller or larger bits of fibromatous tissue, until the uterus is so diminished in size that it may then be delivered into the vagina, with or without complete hemisection or complete splitting. Then, the upper part of the broad ligament may be treated with ligatures or clamps.

There are cases where, on account of the brittleness of the tissue, or because of free, constant oozing, or because of the desire for haste, or because of the inaccessibility of the lower part of the broad ligament, the treatment of the ligamenta cardinalia and of the uterine arteries must be carried out by the use of clamps or by ligation from above downward. Usually one or two good heavy clamps on either side suffice. This much is certain, that so soon as the ligamenta cardinalia are thoroughly tied or clamped, and then cut from the uterus, the mobility of this organ is increased. There are cases where after this preliminary separation of the cervix and the lower segment of the uterus, this part of the uterus is entirely cut off in order to obtain a more ready approach to the remaining part of the uterus. This is the case in fibroids of irregular outline, where it is desirable to approach the full width of the tumor for the purpose of carrying out enucleation or morcellement, especially submucous or interstitial tumors.

FIG. 124.—Semidiagrammatic drawing showing the operation of hemisection, *i.e.*, splitting the anterior wall of the cervix and uterus to any desired height up to and beyond the fundus, by separating the bladder, incising the peritoneum, introducing anterior retractor into the peritoneal cavity and grasping the highest points of the incision in the split uterus as we pass from below upward.

FIG. 125.—Semidiagrammatic drawing of the method of hemisection, *i.e.*, splitting the anterior wall, of a large uterus in order to aid delivery of the fundus. Drawing shows only the anterior wall split, it shows the location of the successive applied volsella.

FIG. 126.—THE FIRST STEP IN BISECTION, I. E., THE COMPLETE SPLITTING OF THE UTERUS.

After the cervix has been released from its attachment to the ligamenta cardinalia, after the bladder has been separated in front, after the cul de sac of Douglas has been entered posteriorly, volsellum forceps are applied to the lateral walls of the cervix and the organ is split in the median line with a pair of scissors.

FIG. 127.—After the splitting is continued upon the anterior and posterior walls for a certain distance (about 2 inches) two pairs of volsella are applied to either side of the split area of the anterior wall of the cervix. Tension is exerted on these. The anterior retractor is pushed up still further and the splitting is continued in the median line up toward the peritoneal plica.

FIG. 128.—As the splitting is extended higher up, the vesico-uterine fold of perineum is reached and if this has not been incised before, it is now split in a transverse direction and the anterior speculum is introduced into the peritoneal cavity. Successive volsella are applied higher until the fundus is drawn out. By oversight, the incision in the posterior wall of the cervix is not shown.

FIG. 129.—In pulling out the fundus, the manipulation is aided by the act of pushing the cervix back into the upper part of the vagina. The splitting is simply continued through the fundus and down the posterior wall.

FIG. 130.—After the fundus has been delivered the cervix, if possible, is again pulled down; the index finger of the left hand is introduced back of the uterus, behind the bridge still uniting the two halves, and on the palmar surface of this finger a pair of scissors cuts upward and bisects the uterus into two complete halves. This latter manipulation of the finger protects the omentum and intestine from injury.

Splitting of the uterus is either incomplete and confined to the one wall, usually the anterior, and is then known as hemisection (Figs. 124, 125), or as complete, the uterus being divided entirely into two halves (Figs. 126--130). Neither of these procedures is a difficult one, unless the adhesions to the posterior wall of the uterus are exceedingly dense; or unless the presence of pyosalpinges makes opening of the anterior cul de sac somewhat difficult; or unless there are fibroids in the uterus which must be enucleated or removed by morcellement before the hemisection or complete splitting can be carried out. After the uterus is split into two complete halves and delivered, we have, by pushing one half back into the peritoneal cavity, abundant room for carrying out the desired manipulation on the broad ligament or adnexa of the one half remaining outside the vulva. We are able to pull on the uterus, to bring the ligamentum infundibulo-pelvicum nearer into the field; we are able to pass along the posterior wall of the broad ligament and enucleate the adherent tubes and ovaries; we have a better view of the intestinal adhesions to the inflamed adnexa. In those cases where the uterine arteries have not been tied early in the operation, complete splitting enables us, by ligating from above downward, to find these vessels in such a position that the ureter is in little or no danger.

Splitting of the uterus is always advisable if delivery of the fundus is difficult because of short broad ligaments or adherent adnexa; if the uterus is large; if the uterus contains fibroids; if we are dealing with a double pyosalpinx and are going to do a hysterectomy, or if the clamps are to be used. The advantages gained by splitting the uterus in case of fibroids are: that it makes the delivery of the uterus easier; permits of making the uterus smaller by enucleation or morcellement of tumors; that we have a better approach to the upper parametrium and the adnexa, and that it makes temporary or permanent clamping safe, since it is done outside of the vulva from above downward without the risk of injuring the intestines.

The advantages of splitting the uterus in hysterectomy for double pyosalpinx are: to loosen it and the broad ligaments from adhesions, because we have good hold on either half of the uterus for exerting traction on the adnexa; that each half with its connected ligamentum latum permits exposure of the posterior wall of this ligament and allows the fingers to follow it or slip along it to enucleate pus tubes or ovaries. The posterior wall of the ligamentum latum is the important landmark.

The advantages of splitting the uterus where clamps are to be used temporarily or permanently are: that it enables us in many cases to get along with a small number of clamps (Fig. 131); that they can be applied from above downward when each half of the uterus is outside of the vulva; that they can thus be more readily clamped external to tube and ovary; that injury to the bladder is avoided and intestine is out of the way, and that the ends of the clamps can be seen (Fig. 132). The clamps may be applied entirely from above downward, or else one or more are first applied to the lower part of the broad ligament and the uterine arteries, and then one or more from above downward after delivery of the hemisected or entirely split uterus.

A great advantage in applying one or more clamps to the broad ligament from below upward and one or more from above downward (Fig. 133) is that the handle of these clamps, after the two halves of the uterus with the adnexa have been removed, are allowed to sink down. This doubles the broad ligament on itself, so that the points of the clamps applied from below upward and the ones applied from above downward are close together parallel. This enables us to close the peritoneum and to unite the edges of the vaginal incision if desired or to pack the lower pelvis with gauze and still have the points of these clamps outside of the peritoneum in the vagina and away from contact with the bladder and intestine.

So far as the use of clamps is concerned, it may be necessary to

FIG. 131.—After the uterus has been split in two, each half in turn is drawn out beyond the vulva, the index and middle fingers of the left hand pass over the broad ligament including the Fallopian tube and ovary between them, and then, if possible, one long broad ligament clamp is applied from above downward beginning above external to the Fallopian tube at the ligamentum infundibulo-pelvicum and ending below very close to the cervix above the ligated uterine artery.

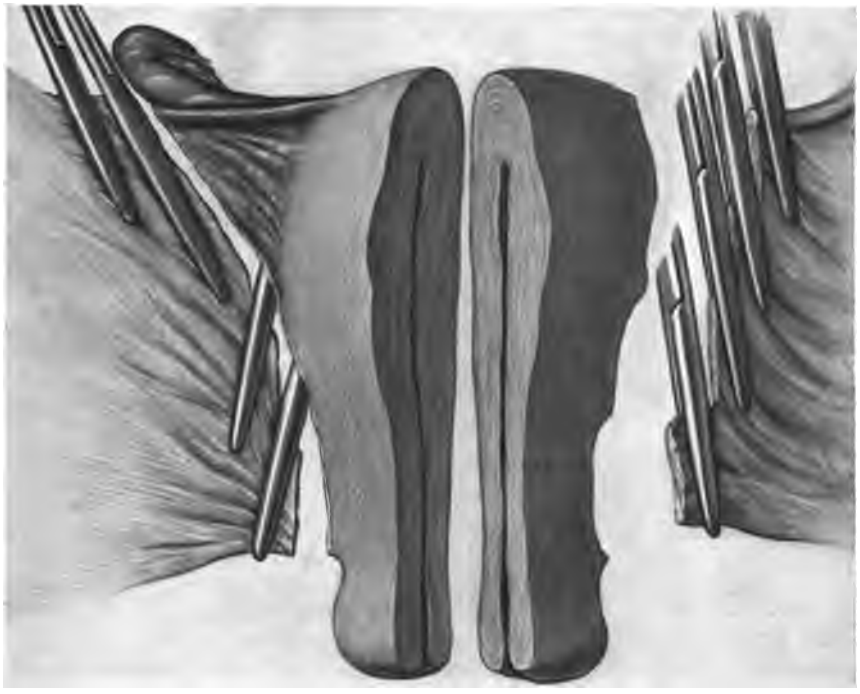

FIG. 132.—Semidiagrammatic drawing of the clamping from above downward of the bisected uterus after delivery of the fundus. On the right side of the drawing the clamps are applied just external to the uterine horn and do not include the ovary and only a small area of the tube. On the left side of the drawing they are applied external to the tube and ovary.

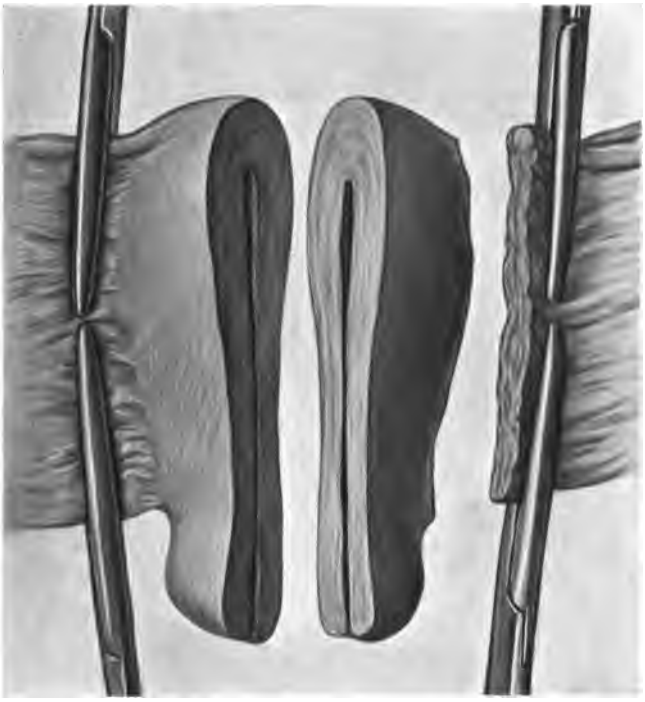

FIG. 133.—Semidiagrammatic sketch of the clamping of the broad ligament of the delivered bisected uterus by two clamps instead of one. One clamp is applied from below upward before delivery of the split uterus. The clamp applied to the upper half of the broad ligament is then allowed to drop down so that it lies parallel to the clamp applied from below, the broad ligament in this way being doubled upon itself and the tips of the clamps being protected so that they do not by any possibility press upon the bladder or any intra-abdominal structures.

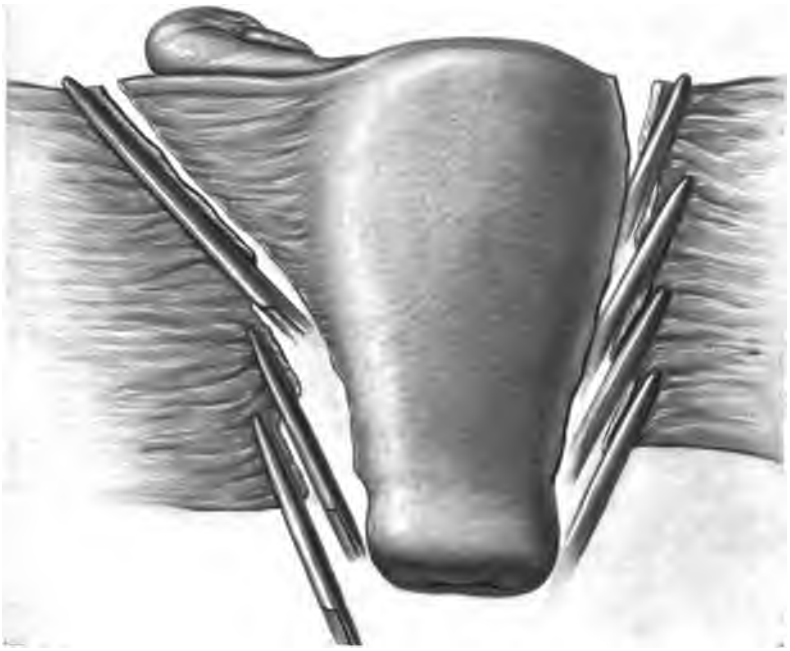

FIG. 134.—Semidiagrammatic drawing of the clamping of the uterus without splitting, the clamping being entirely done from below upward. On the right side the clamping is done close to the uterus and does not include the tube and ovary. On the left side it includes the tube and ovary running out into the ligamenta infundibulo-pelvicum. The last applied clamp to the upper part of the broad ligament must receive the utmost care to avoid catching omentum and intestine.

open the peritoneum anteriorly and posteriorly, to put on the clamps from below upward, to cut between the clamp and the cervix and uterus after each clamp is applied, and thus put the clamps on in succession while passing upward to the top. This method may be used where great haste is necessary, where it is not desirable to deliver the fundus, or to split the uterus partially or completely. This may be the case where rapid work is required for the removal of the uterus to stop uncontrollable hemorrhage or where a septic uterus or ruptured uterus is removed (Fig. 134).

As a rule, it is advisable to deliver the uterus anteriorly and then clamp the ligaments *in toto*, or in part, from above, or from above and below. If the uterus is not too large and if the broad ligaments are not too thick, one should try to get the whole ligament with one clamp (Fig. 131), using a second if one does not suffice. If it is not possible at first to deliver the uterus, we should tie the uterine artery from below and then separate the lower part of the parametrium from the cervix and uterus, and should then attempt to deliver the fundus either through the cul de sac of Douglas or anteriorly. If this is not possible, the uterus should be split or made smaller, either by splitting the anterior wall alone as it is brought down by successively applied volsella or else, as described above, by complete splitting of the uterus according to the method of Müller.

MYOMECTOMY.

Myomectomy is the term used to define the removal of fibromyomatous tumor or tumors from the uterus by enucleation or by morcellement with retention of the uterus and the sewing of the bed of the enucleated tumor in layers. Myomectomy is also part of the operation of hysteromyomectomy, in which the tumor or tumors are removed by enucleation or morcellement with the direct purpose of so diminishing the size of the uterus that it may be bisected, delivered, and removed.

Cervical myomata, if situated on the anterior wall in the supravaginal area, are reached by a transverse incision in the anterior fornix associated with a long longitudinal incision and followed by upward separation of the bladder. This brings the tumor within the operative field of vision and permits of its removal with or without the splitting of the cervix.

If situated on the posterior wall of the cervix, a longitudinal incision in the posterior fornix or a transverse incision or a combination of the two permits of approach to the fibroid if situated beneath the cul de sac of Douglas.

For fibromyomata situated above the plica or above the fold of Douglas, that is, intraperitoneal fibroids, the peritoneal cavity must be entered from below.

The performance of myomectomy by the vaginal route depends much on the size and form of the uterus. If we are dealing with the capacious vagina and fornix of a multipara, a fairly large-sized uterus containing one or more myomata may be brought through anterior celiotomy before the vulva. It goes without saying that in any such instance myomata, whatever their position, may be readily removed; if situated subperitoneally, by simply incising longitudinally

or transversely over the projecting tumors and enucleating them; if interstitial, by same form of incision, the enucleation, however, extending deeper down even to the mucosa; if submucous, the myomata may be removed by still deeper incision, even to the extent of splitting the fundus or the entire anterior uterine wall.

Even though the uterus be movable and not greatly enlarged, irregular fibromyomata, particularly those attached to the fundus and to anterior wall of the corpus, may render extraction of the uterus difficult, because the tumors impinge above the anterior speculum under the symphysis, and this obstructs their delivery. Pressure through the abdomen may be of aid in the delivery of the tumors and the uterus in such cases.

The essential point is to manipulate the tumor into the operative field, either by delivering the uterus into the vagina or by so manipulating the uterus that the tumor comes into the field of vision and can be grasped.

The two methods include, then, the delivery of the uterus with its contained myomata and the delivery of the uterus after removing one or more of the tumors. When the uterus cannot be delivered into the vagina, the operation is a more difficult procedure, unless the tumor or tumors are situated in the lower segment of the uterus or cervix or unless the tumors can be projected into the peritoneal opening, enucleated, and then the uterus delivered. The longer the uterus and the higher the tumor, the more difficult it is to reach the fibroid.

In some cases it is necessary to ligate and cut the lower part of the broad ligaments, often including the uterine arteries. Cutting the attachments of the ligamenta cardinalia to the uterus enables us to draw the uterus down and brings the tumors lying higher up more readily into the operative field.

If situated on the posterior wall of the uterus and not too large, the peritoneal cavity is entered by posterior celiotomy, the cervix is

pulled upward toward the urethra, and volsella applied in succession, bringing the tumor or tumors through the vagina or at least down into the field of vision.

A uterus containing one or more large fibromyomata situated in the corpus, making the uterus too large to permit of delivery by anterior or posterior methods, may be reached by the method of splitting the cervix anteriorly (Fig. 135) or posteriorly or by both incisions, after previously entering the peritoneal cavity anteriorly and posteriorly. The tumors as they come into view may be enucleated *in toto*, or by excision of pieces designed to so diminish them in size that the beds in which they lie are brought more closely into view. Through the splitting of the anterior wall of the uterus aided by tying off the lower parametrium high lying tumors may be reached. Then it is hard to know if the remnant of the uterus is worth saving. The vaginal operation is not so bad when we are dealing with one large tumor, but it is more severe if we are dealing with several, for until the delivery of uterus into the vagina it is not possible to sew up the base of enucleated myomata, and these bases continue to bleed and ooze after the uterus is replaced until this is done.

With the uterus extensively filled with several myomata, especially such as are deep, there is often no value in attempting to retain this organ of generation as a useful structure, and its removal is then carried out.

PORTIO MYOMATA.

Split the capsule, grasp the tumor, enucleate with fingers, scissors, or knife.

CERVICAL INTERSTITIAL MYOMATA.

Separate the bladder. If the tumor is lower than the plica, it is not necessary to open the plica. If the tumor is higher than the plica, the peritoneum must be opened, the capsule of the tumor is

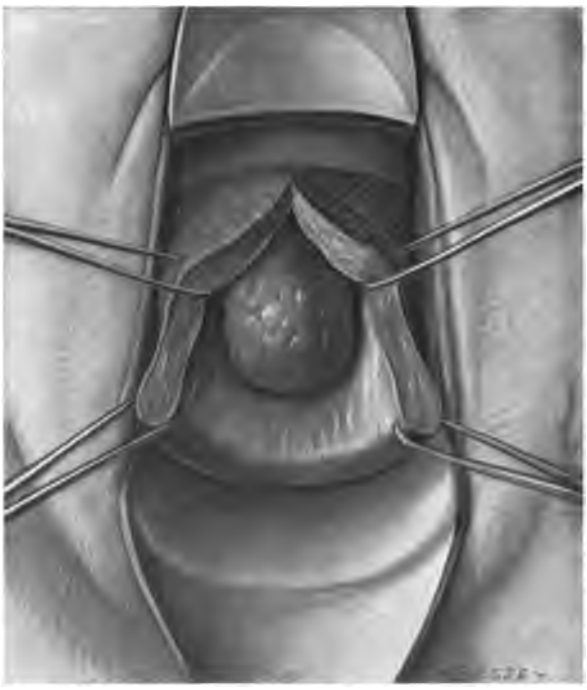

FIG. 135.—Splitting of the anterior wall of the cervix without entering the peritoneal cavity in order to expose the inner surface of the lower part of the uterus for the removal, with the aid of sight, of polypi, etc., through the internal os. If the peritoneum is entered the uterus may be split up to the fundus for the same purpose.

incised, and the tumor is enucleated. It may be necessary to pass up to the tumor by splitting the cervix.

If the myomata are very large, use the myoma knife of Segond to make the tumor smaller by exsecting pieces. Then the tumor may be enucleated.

If the cavity of the uterus is entered, one should be careful in closing the openings and cuts to have no knots on the inner surface of the uterus.

SUBSEROUS MYOMATA IN DOUGLAS.

If they project into the fornix, they may be attacked from below. If the tumor is *on* the posterior wall, it may be necessary to enter the peritoneal cavity and then grasp the cervix or corpus and enucleate. If situated deeper *in* the wall, it may be necessary to split the posterior wall of the cervix up to the tumor.

CORPUS PEDICLED MYOMATA.

If not in the cul de sac of Douglas they may be reached by anterior celiotomy and are to be removed *in toto* or by morcellement.

CORPUS SUBSEROUS MYOMATA.

If situated above the plica, are to be reached by entering the peritoneum. If the uterus can be delivered into the vagina, the fibroids may be readily removed. If not, the tumor itself is delivered or else the tumor is removed by morcellement, even if the tumor has to be reached by splitting the uterus from the cervix up.

SUBMUCOUS AND DEEP INTERSTITIAL TUMORS.

These are reached by splitting of the anterior wall of the cervix and of the uterus up to the tumor. If necessary, we split the posterior wall also, even if the peritoneum there is also opened.

INTRALIGAMENTOUS TUMORS.

If they project into the fornix they may be attacked from below. The bladder is separated, the cervix is incised on the affected side,

and the ligamentum cardinale with the uterine artery is tied and cut, and we then pass through this created space by blunt dissection up to the tumor. Approach to the myomatous areas of the uterus is rendered more easy or possible if we first ligate and then cut the cardinal ligaments and the uterine arteries. When this is done, it is not so easy to save the uterus. If the patient is young, desires children, and sufficient uterine tissue is left behind, one may be conservative.

VAGINAL MYOMECTOMY CONCLUSIONS.

With small fibroids the size of the fist, especially if single, vaginal hysterectomy is a simple operation.

With multiple tumors, there is the risk of so destroying the uterus as to leave too little normal tissue behind. The same risk occurs with the abdominal method.

A few safe rules with all vaginal operations on myomata follow: If enough of the tumor is cut out, the remainder of the tumor with the uterus may then be delivered into the vagina. Always try to get the tumor into the field of vision before attempting exsection. Attempts at enucleation and exsection should be confined to the tumor mass itself.

The lateral borders of the uterus should be avoided in delivering the uterus or in exsecting pieces, for here are blood vessels, venous plexuses, and the ureters. Avoid grasping the adnexa or pulling them.

HYSTEROMYOMECTOMY.

In cases where conservative action is not intended and where hysterectomy is desired, the same general principles of enucleation of the tumors and delivery of the uterus hold good as in myomectomy.

Successful removal of the myomatous uterus per vaginam depends, first, on the ease of approach to the tumor and the size of the vagina and, second, on the size of the tumor itself. If necessary, Schuchard's incision gives easy approach to the fornix. This incision begins at the border of the middle and lower third of the left side of the introitus. The incision goes externally 5 cm. through the skin. Internally, the cut goes through the vaginal wall avoiding the rectum and passes through the fascia and the musculature, especially the levator ani, up to the fornix. Spurting vessels are caught, but the bleeding stops, as a rule, through the pressure of the introduced posterior speculum.

The ability to diminish the size of the tumor with the aid of eye and finger make size no obstacle, so that it is not so much the size of the tumor as the element of adhesion to surrounding structures which determines the value or success of the vaginal operation. If the tumors are not too large and if there are not many adhesions, the vaginal operation may be indicated, even if the uterus reaches up to the navel. If the tumors, however, are very large or incarcerated or if there be many adhesions, the abdominal route is indicated. Either the relatively small uterus is delivered anteriorly or posteriorly, after preliminary ligation of the ligamenta cardinalia and the uterine arteries, or else the uterus is made smaller by enucleation, evidement or morcellement, so that finally the uterus may be split into two halves and brought out before the vulva and removed.

It is often impossible to enter the peritoneal cavity anteriorly or posteriorly in the earliest stage of the operation. After separation of

the bladder the anterior cervix wall is incised longitudinally as far as possible, or the posterior wall, or both. Clamps or ligatures are applied laterally to the lower parametrium to permit the uterus when freed here to be pulled down so that the body of the uterus is within easy reach, after which the anterior and posterior peritoneum is opened. The cervix is pulled toward the urethra when the tumor is in the posterior wall; if the tumor is in the anterior wall, the cervix is pulled down toward the rectum. The uterine wall is split up to the fibroid, the capsule is split and retracted to the sides, and the fibroid is taken hold of with Muzeux. The tumor is enucleated by cutting pieces out of it, always grasping the higher areas before cutting off the lower pieces.

Constant attention should be paid to the bladder and the rectum. The area to be excised should be grasped with tenacula and cut. Heavy tenacula should be constantly applied to pull the uterus down. After a while the fibroid is enucleated or numerous fibroids are removed, so that eventually only the shell of the uterus is left, and its removal is aided by complete splitting.

In general it is advisable, whenever possible, to make an opening first into the cul de sac of Douglas by a transverse incision and to separate the bladder by a combined transverse and longitudinal fornix incision, and then ligate the ligamenta cardinalia and the uterine arteries. Then the cervix is split anteriorly and posteriorly and volsella are applied to the two halves of the cervix until the lowest pole of the tumor is brought into the field of operation, either through the anterior or through the posterior incision, and the tumor mass is grasped by volsella. When the anterior wall of the uterus is split and the tenacula are put on higher and higher, it may be possible to pull the fundus uteri so far forward that the broad ligaments can be ligated from above downward. If this is not possible, the anterior wall is made smaller through central exsection, the so-called evidement of Doyen (Fig. 136), so that the fundus may finally be extracted. Pieces are cut out with the knife of Segond or with curved scissors. The

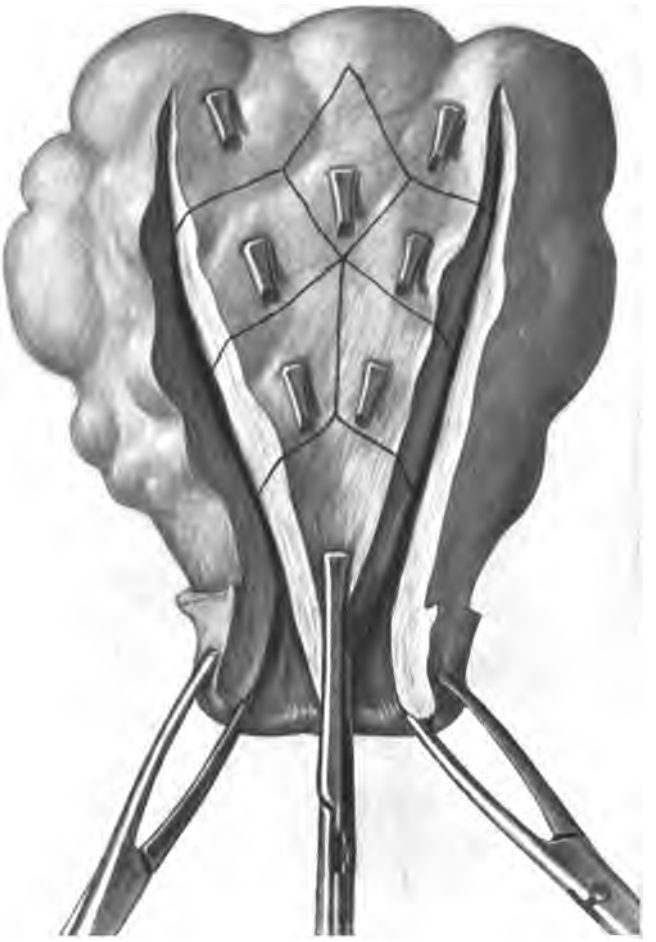

FIG. 136.—Semidiagrammatic drawing of the process known as central evidement in the operation of hysteromyomectomy. After the cervix has been freed from its attachment to the ligamenta cardinalia, separated from the bladder in front, after the cul de sac of Douglas has been entered posteriorly, the cervix is grasped latterly by two heavy volsella and two diverging incisions are made along the anterior wall of the uterus through the fibroid structures, pieces being resected, as shown above, from the central area, which so reduces the uterus in size that delivery beyond the vulva is possible.

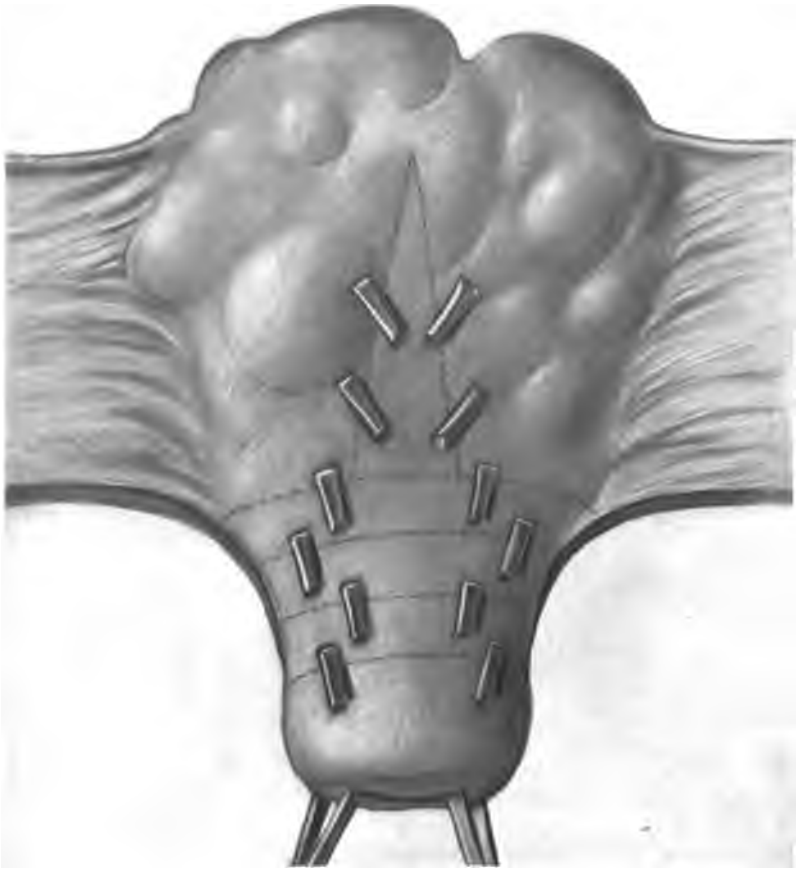

FIG. 137.—Semidiagrammatic drawing of the process known as morcellement in vaginal hysteromyomectomy. After the cervix has been ligated from the ligamenta cardinalia and after the bladder has been separated in front and the cul de sac of Douglas entered behind (if possible), the cervix is grasped by a heavy volsella and by transverse incisions the cervix is cut away up to the highest accessible point of the body of the uterus, after which an incision is made through the anterior wall of the uterus in the median line, and pieces are exsected to the right and left of the median line until the uterus is reduced in size sufficiently to admit of delivery before the vulva.

next area of tumor or uterus is always firmly grasped with a volsellum before the preceding piece is completely cut off. Either we continue this original splitting in the median line and proceed to exsect pieces from either side of the median line or else we make two diverging incisions with resection of the area lying between them (Fig. 136), exerting constant care to keep the bladder out of the field of operation and with constant avoidance of the lateral margin of the uterus itself, so that we may not increase the bleeding or grasp or tear the broad ligaments. Sufficient space is finally gained to enucleate the tumor or tumors and eventually to leave only the shell of the uterus. This organ is then split completely into two halves and is drawn before the vulva, and the operation is then to be completed by clamps or ligatures. If there are several tumors, these are attacked in succession until the uterus is small enough to permit of ligation of the broad ligaments from below or from above. If this method is not possible, the method of morcellement of Pean is attempted (Fig. 137).

The cutting should always be done close to the middle line to avoid the ureters and the vessels. The uterine arteries should be tied or clamped. The cervix is separated bilaterally from the lower parametrium to an area above the uterine arteries. By transverse cuts, the anterior and posterior walls of the cervix are removed, always grasping an area above the place being exsected before this exsected piece is entirely cut off. After removing the cervix the uterus is attacked by bringing it down, and if this is not possible, we continue cutting pieces away from the center and thus pass upward to the peritoneum. Central exsection is continued until the fundus can be pulled down and the ligaments clamped, which latter step is made easier by the complete splitting of the uterus after which the clamps are applied. The adnexa may be clamped later or together with the two halves of the uterus.

Abel says: "He who can control the vaginal method to the greatest possible degree can by *morcellement* vaginally remove fibroid tumors

which are scarcely considered possible. It is not right to say that only myomata which extend to the umbilicus should be attacked vaginally and that larger tumors should be removed abdominally. This depends on the size of the vagina, the motility of the tumor, and the skill of the operator. There is no doubt that the vaginal operation, even if it lasts longer because of a protracted *morcellement*, constitutes a much less dangerous attack than the abdominal operation."

In case of large *fibromyomata*, the practice of *morcellement* often permits of the removal of extremely large fibroid tumors and is a method which can often be used to advantage, unless we are dealing with fibroids which are particularly intraligamentous. For those who practise supravaginal hysterectomy, the abdominal route, of course, furnishes a ready means for the removal of large fibroid uteri. I believe, however, that the removal of the cervix is often indicated in these cases. Abdominal hysterectomy is then often a difficult operation. The cervix is very long and the danger of injury to the bladder, and especially to the ureters, is very great. For that reason, in doing a complete hysterectomy in the severer cases, I think it is sometimes advisable to begin the operation vaginally, separating the bladder, opening the cul de sac of Douglas, and ligating laterally to the cervix, up to and including the uterine arteries. The remainder of the operation is then completed with much greater ease through the abdomen. This same procedure I believe to be the ideal one in early operations for carcinoma of the fundus uteri, in which cases infiltration of the ligamentum cardinale is absent.

VAGINAL CESAREAN SECTION.

"Obstetrics has in recent years followed more and more a surgical direction. In place of a trusting reliance on the action of natural forces, there is the tendency to active interference, to rapid and sure completion of the complications by operative measures. We no longer care to watch and wait, when in one sitting and with one narcosis everything can be rectified in the manner of a surgical operation. This is proven by the increasing preference for active measures in abortus, placentia previa, and eclampsia; the fondness for prophylactic version in narrow pelvis and the increase in Cesarean sections for relative indications; above all, however, by the range which the attempts toward artifical dilatation or widening of the cervix have taken (Bumm)."

For those cases where a rapid emptying of the uterus was necessary, with the entire cervix preserved, Dührssen recommended the use of the metreurynter and made this method popular in Germany.

If immediate delivery was indicated, through danger to the mother or child, Dührssen used the metreurynter when possible, and attempted to draw quickly through the cervix the bag filled to the size of a child's head.

Cases exist where with "erhalten" cervix, however, it is impossible to introduce the intrauterine bag or where with it no sufficient dilatation results or where, on account of the great danger to the mother, an immediate emptying of the uterus is indicated. If it is not possible in these cases to introduce the bag through the cervix or if it is not possible to pull the filled metreurynter through the cervix within a reasonable time, then valuable time is lost when the cervix is not dilated in its supravaginal area.

To avoid such delay, Dührssen advised the splitting of the entire cervix and of the lower uterine segment, without opening the perit-

oneum, without greater danger of bleeding, and obtained in that manner an opening sufficiently large to admit of extraction of a full-term child without difficulty.

In the development of these ideas he was assisted by the experience gained in gynecological operations known as anterior vaginal celiotomy.

In order to permit of ready version and of ready completion of the extraction through a narrow vagina, a perineo-vaginal incision may be made and spurting vessels are tied. The important element in the vagino-perineal incision consists in cutting not only the vagina, but the levator ani and the constrictor cunni. The cervix is then brought into view by introducing two large specula of Doyen. Two lateral guiding sutures are passed through the cervix, and the posterior cervix is split longitudinally, including a 2 cm. area of the posterior fornix. The loose connective tissue is separated from the posterior uterine wall by means of the finger introduced into the opened fornix. Then the anterior lip of the cervix is split longitudinally including a 5 cm. area of the anterior fornix, which by a few snips of the scissors toward the sides is somewhat separated from the bladder. The loose connective tissue is separated from the anterior uterine wall in the same manner as on the posterior wall, and then both uterine walls are split up to the peritoneum. Then the hand enters freely into the uterus and readily carries out version.

We are able with the aid of vaginal Cesarean section in all normal pelves and in such pelves whose conjugata is not less than 7 1/2 to 8 cm., at any period of pregnancy or labor, even without pains and with a completely closed cervix, to empty the uterus of its contents *within a few minutes*, and thereby to obtain a living child in case the child is viable. (Dührssen.)

This result is obtained per vaginam and, as a rule, without opening the peritoneal cavity, by making an opening in the fornix and in the lower uterine segment, so that further resistance of the soft parts to rapid version and extraction disappears.

Since 1887, Dührssen has concerned himself with rapidly completing dilatation of the cervix by four deep cervical incisions and with overcoming the resistance of the lower third of the vagina by the aid of the vagino-perineal incision. In this manner it was possible to deliver a living child in primiparæ with undilated cervix in case the supravaginal part of the cervix had disappeared. He recommended this method especially for rapidly emptying the uterus in eclampsia.

These cervix incisions extend up to the attachment of the vagina, and the vagino-perineal incision passes through the levator ani. In making cervical incisions he makes the posterior incision first and then two lateral. The incisions are made after introduction of the specula and always between two applied clamps and not too deep. The four deep cervix incisions are made only in cases where there is *complete dilatation of the supravaginal part of the cervix*. Now, however, in these cases, too, vaginal Cesarean section is indicated when there is danger for mother or child, when the rapid completion of the labor is necessary, and when the use of a metreurynter does not seem to be indicated, especially if one wished to limit himself to one or two longitudinal incisions.

Vaginal Cesarean section in these latter cases is very easily done, since the incisions do not have to cut much of the supravaginal part of the cervix and since the dilated supravaginal part of the cervix presents after sagittal division of only a little of the anterior and posterior fornices and without the necessity of first separating the bladder or Douglas' peritoneum.

TECHNIC.

After the precaution of emptying the bladder and the rectum, an ergotin injection is given. In primiparæ a vagino-perineal incision is made which cuts the levator ani and the constrictor cunni and renders it possible to pass a man's fist into the upper vagina. The introduction of specula usually stops the bleeding by pressure.

Two lateral volsella and two strong guiding ligatures are applied to the cervix, the latter to be used when the volsella are taken off. The posterior lip of the cervix is split longitudinally up to the beginning of the vagina (Fig. 138). In lengthening this incision posteriorly, the fornix is split about 4 cm. and the speculum is introduced into this opening to push off the peritoneum of Douglas bluntly from the posterior cervix and the uterine wall. In the same way the anterior lip and the anterior fornix are split and the bladder and the plica are pushed off from the anterior cervix and the uterine wall (Fig. 139). Passing out from this longitudinal incision a few lateral snips of the scissors separate the anterior vaginal wall over the bladder.

To make this method more easy the vaginal wall may be separated from the portio by a 2 cm. transverse incision. In this manner the anterior and the posterior uterine walls are exposed for the length of 6 cm. First the posterior and subsequently the anterior uterine wall are split rapidly by a few scissor strokes. The resulting opening into which the amniotic sac now presents (Fig. 140), or descends, must be large enough to admit a large man's first. The hand is introduced, grasps a foot, performs version, and extracts the child. If the uterus contracts we may wait for the spontaneous expulsion of the placenta. If the uterus is atonic, separation of the placenta is done and the uterus is thoroughly packed. The posterior wall and then the anterior wall incisions are united and a tiny drain is introduced anteriorly and posteriorly into the anteuterine and retrouterine spaces. Only if there are abnormal conditions of the cervix, as for instance scar induration or unusual character of the subperitoneal connective tissue, does one occasionally open the posterior and also the anterior peritoneum.

Bleeding from the perineo-vaginal wound is not great. Bleeding from the uterine incisions may be fairly severe, but is stopped by the compression of version and extraction. After-bleeding is slight from these wounds, but from the uterus may be severe, if there is atony.

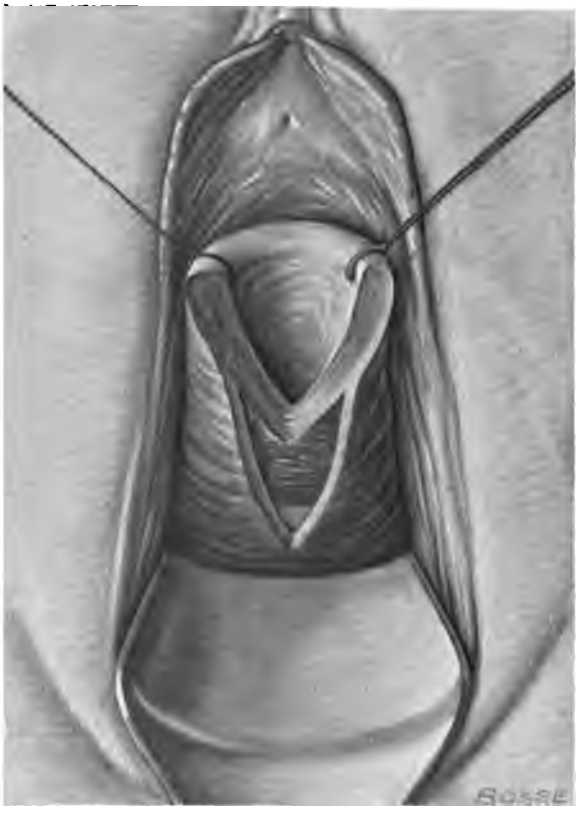

FIG. 138.—VAGINAL CESAREAN SECTION.

A longitudinal incision is made through the posterior lip of the cervix. The subperitoneal space is entered with the finger and the peritoneum dissected upward. The incision in the posterior fornix is then lengthened and splitting up of the posterior lip of the cervix may be continued up to the peritoneal fold of Douglas shown near the lower angle of the longitudinal fornix incision. (*Method of Dührssen.*)

FIG. 139.—VAGINAL CESAREAN SECTION.

A longitudinal incision is made through the anterior lip of the cervix and the anterior fornix. The introduced finger separates the bladder from the anterior wall of the cervix and, with or without the aid of two small transverse incisions, the bladder is also dissected away somewhat from the anterior wall of the vagina. A posterior speculum introduced into the posterior incision of figure 138, and an anterior speculum introduced in the anterior incision of figure 139 is shown in figure 140. (*Method of Dührssen.*)

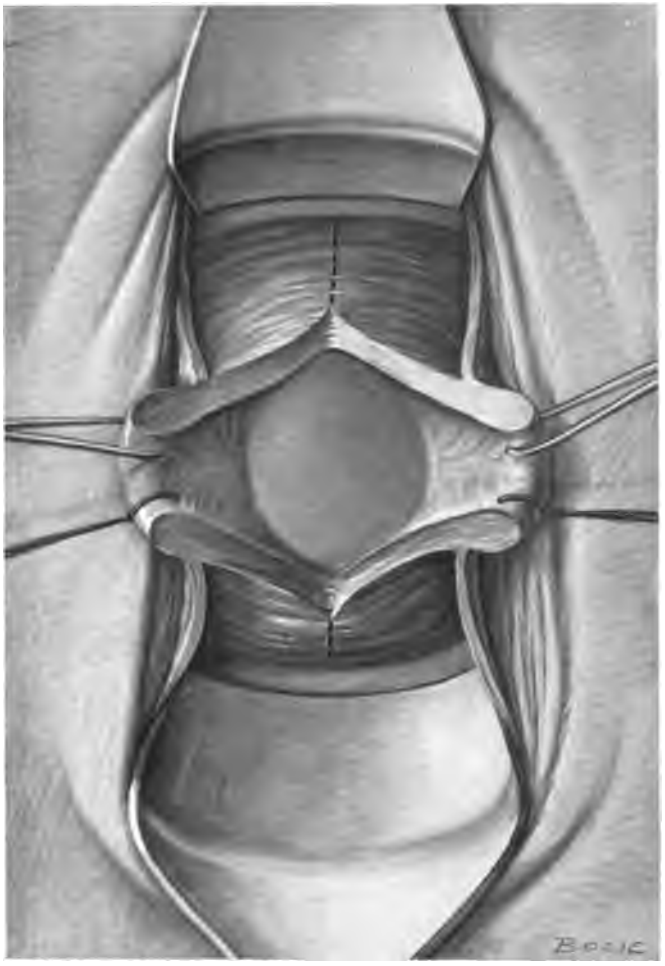

FIG. 140.—VAGINAL CESAREAN SECTION.

An anterior and posterior speculum being introduced into the longitudinal incision of Dührssen after the preliminary splitting of the anterior and posterior walls of the cervix shows the bulging fetal sac and discloses the area of the anterior and posterior walls of the cervix and uterus, which are still to be split without entering either the anterior or posterior peritoneal cul de sac. The peritoneal reflection of the anterior uterine plica and of the posterior Douglas are shown in the drawing. The lips of the cervix are held apart by volsella or provisional sutures or both.

If the uterus is septic, the danger of infection is slight, even if the peritoneum is opened. The splitting is carried, as a rule, as little as possible above the internal os, and it should include both walls to avoid further tearing of the incision and to avoid rupture.

Zweifel does the operation through a transverse anterior incision in the vagina. Then the anterior lip of the cervix is grasped and the bladder is pushed up from the uterus, the anterior lip is split, so that the child may be brought out by forceps or by version.

Bumm advises, in general, the splitting of the anterior wall only.

Kronig, in a series of cases, split only the posterior wall and purposely opened the peritoneal cavity.

Dührssen lays stress on two points:

1. For the extraction of a large child we must use the vagino-perineal incision.
2. Cervix must be split longitudinally up to peritoneal reflexion, both anteriorly and posteriorly, to avoid the danger of transverse tears of the uterus which may occur through deep tearing of a single longitudinal incision.

INDICATIONS.

1. Myoma—Rigidity—Stenosis of cervix.
   Scar degenerations of cervix and fornix.
   Cervix stenosis after amputation of cervix.
   Rigidity of cervix causing tenesmus uteri.
   When the cervix is rigid or has not the necessary elasticity to permit of use of metreurynter or of combined version.
2. Danger stage of the mother which may be overcome or helped by emptying uterus when cervix is closed and not dilated.
   Diseases of lung, heart, kidney, nephritis.
   Early loosening of the placenta.
   Severe bleedings.

Pernicious vomiting.
Chorea gravidarum.
Retroversion of gravid uterus with incarceration.
Torpid uterus in narrow pelvis.

3. Impending death of mother, to extract living child.
4. Placenta previa. Bumm advises vaginal hysterotomy because it may save life in women who at the beginning of cervix dilatation have bled profusely. At any rate, he believes it superior to classical Cesarean section in view of the small amount of injury done; superior to all methods of dilatation because of the certainty in stopping bleeding.
5. In the interest of the child, even if mother is in no danger. In cases where the supravaginal area of cervix is dilated, but the portio is still an obstacle, where metreurynter or deep cervix incisions do not promise success. If head is low and specula show only an edge of the portio, use simple cervix incisions. If head is high, it is better to do vaginal Cesarean section and then version.
6. Septic edema of the collum with fever.
7. Eclampsia. Immediate conservative vaginal Cesarean section is advised.
8. Sepsis after abortion, especially criminal; empty uterus and then remove it.

In eclampsia Dührssen advises immediate emptying of the uterus, after the first seizure, with any of the various methods of delivery, each adapted to the suitable case, and says that he gets better results for mother and child than with the more conservative treatment. With narrow pelvis and conjugata less than 7 1/2 to 8 cm. he advises the classic Cesarean section. On the other hand, with all severe obstacles to delivery limited to soft parts and with danger to life of mother or child, when occurring with closed undilatable cervix, use vaginal Cesarean section, which is done extraperitoneally.

Zweifel says that eclampsia in his clinic had been treated for years with narcotics, some with chloroform, some with repeated doses of morphine as recommended by G. Veit, also with packs and sweat baths and then delivered as soon as possible, though never by forcible opening of the cervix, so that of forty-nine cases, sixteen died—a mortality of 32 per cent. After a change to active therapy, through limitation of the narcotics to the period of delivery by operation (Dührssen), through earliest delivery after the first attack (Dührssen), and through the reintroduction of vein bleeding, out of eighty cases only twelve were lost—a mortality of 15 per cent.

8. Carcinoma. If carcinoma is limited to the uterus in pregnancy the operation is done solely in the interest of the mother immediately after making the diagnosis, and radical vaginal Cesarean section should be undertaken at any period of pregnancy or labor.

Radical vaginal Cesarean section includes only those cases in which the uterus, immediately after its emptying, is removed vaginally, as in the case of carcinoma uteri or in septic uteri.

The carcinoma should be removed with the curette and the exposed surface should be treated with the Paquelin. If the vagina is small, the vagino-perineal section is made. After the cervix has been grasped laterally by two volsella and by two ligatures, the vagina is loosened circularly from the portio and, in addition, a longitudinal incision is made in the anterior vaginal wall. Posteriorly the Douglas peritoneum is pushed up and anteriorly the bladder and plica are pushed off from the uterus by inserted specula. Then the anterior and posterior uterine walls are split. The volsella are taken off and the uterus is emptied of child and placenta. Splitting of the anterior and posterior walls is then continued, which opens the plica and Douglas peritoneum, and the splitting is continued until the uterus is divided into two halves and then removed. This constitutes the Peter Müller method of vaginal uterine extirpation.

This vaginal method is indicated only if carcinoma is still limited to the cervix and if the parametria are not deeply involved.

Dührssen says that in hysterectomy for carcinoma the uterus should be split and delivered and then the ligaments should be ligated, as death from bleeding may result if time is taken to tie off the ligamentum cardinalia before splitting the uterus.

On April 1, 1898, Dührssen proposed, in severe eclampsia in the first seven months, to empty the uterus quickly by opening the anterior fornix and splitting the anterior wall of the cervix and of the lower uterine segment.

On April 24, 1896, Dührssen made his first vaginal Cesarean section, successful as to mother and child.

In July, 1896, appeared Dührssen's monograph entitled "Der vaginale Kaiserschnitt."

In October, 1896, Acconci published the history of a case of a IX-para, twenty-eight weeks pregnant with a carcinoma of the anterior lip of the cervix.

In July, 1895, he removed this carcinoma with Paquelin, made a circular incision about the portio, opened the plica and Douglas peritoneum, and tied off the base of the parametrium. He then made a longitudinal splitting of the posterior and anterior uterine wall until the amniotic sac was visible. The opening was not large enough for extraction and he tried mechanical dilatation with the dilator of Mauri, and then did version with extraction of the living child. He continued the splitting in the anterior wall, loosened the placenta manually, extirpated and removed the uterus after complete ligation of the ligaments, and sewed the upper parts of the ligamenta lata to the vaginal wound edges. The patient died in collapse after an error in diet associated with profuse diarrhea. He reported this case sixteen months later without any critical observations, but with the claim for priority in the matter of vaginal Cesarean section.

In his monograph Dührssen mentioned two methods:

1. The vaginal opening, emptying, and sewing of the uterus without entering the peritoneal cavity through the vaginal opening.
2. Emptying and extirpation of the uterus.

The first is analogous to Sänger's Cesarean section and the second to the Porro operation.

Acconci, according to Dührssen, could only claim priority as regards method "2," since vaginal Cesarean section means the getting of a living child at the end of pregnancy with preservation of the uterus.

THE METREURYNTER INCISION.

Vaginal Cesarean section is greatly simplified when the cervix incision is done with the aid of a metreurynter introduced into the uterus and then filled.

A metreurynter is introduced into the uterus and is filled with antiseptic solution. Strong manual traction is exerted on the tube. In favorable cases the collum becomes so dilated that the bag may be extracted, and then delivery of the child takes place by any desired method. If manual traction on the tube of the metreurynter does not produce dilatation of the collum, but merely serves to draw the cervix down toward the introitus, then further traction is carried out by an assistant. The anterior fornix is exposed by a Doyen retractor, and the operator, with the aid of only a mouse-toothed forceps and one pair of scissors, splits the anterior lip longitudinally through the anterior fornix, which, with an added transverse incision, forms two flaps which are separated from the bladder. The bladder is then separated from the anterior wall of the cervix, and this is split still further until the metreurynter is almost ready to make its exit through the artificial opening.

It is generally advisable, so far as the anterior lip of the cervix is concerned, to use the inverted ⊥-incision instead of the wide transverse incision. This exposes the bladder and makes its separation easy, and no difficulty whatever is experienced on introducing the speculum between the bladder and the uterus and then splitting the cervix from the external os up. The incision in the vagina retracts to such an extent after labor that it does not even require sewing. If the metreurynter cannot be extracted after the splitting of the anterior lip has extended up to the peritoneal reflection, then the posterior wall and the posterior fornix are incised longitudinally.

FIG. 141.—METREURYNTER INCISION.

The metreurynter has been introduced into the cervix and is filled with lysol solution. By pulling on the tube of the metreurynter the cervix is brought well down toward the vulva so that the anterior speculum discloses the entire anterior fornix. The dotted line shows the somewhat curved transverse vaginal incision which is to be made. The upper lip of the transverse incision is picked up with artery forceps and the bladder is dissected away from the anterior wall of the cervix with the gauze-covered index finger.

FIG. 142.—METREURYNTER INCISION.

After the wide transverse incision has been made and the bladder has been dissected away from the anterior wall of the cervix up to the peritoneal plica, the anterior speculum is introduced to hold the bladder up and the cervix is split longitudinally. Constant traction is exerted on the metreurynter and the upper areas of the cervix come more into view. Upward pressure of the anterior speculum not alone lifts the bladder up, but dissects the peritoneal plica away from the anterior wall of the uterus so that the incision may be extended up for a considerable distance. In many cases the anterior incision suffices, and this part of the operation is completed when the metreurynter makes its exit.

FIG. 143.—METREURYNTER INCISION.

If the metreurynter in figure 142, does not make its exit through the anterior longitudinal incision, the tube is pulled toward the urethra and the posterior wall of the cervix is incised in a longitudinal manner along the dotted line. Before the posterior splitting is done, a transverse incision may be made in the posterior fornix with dissection up to the cul de sac of Douglas, or else the longitudinal splitting is carried out with separation and dissection up to the cul de sac of Douglas, as in figure 138, of Vaginal Cesarean Section.

Concerning the question as to whether the anterior or both anterior and posterior walls should be incised, there still exists uncertainty in many minds. At full term the splitting of both the anterior and posterior walls makes extraction of the child more easy and guards the mother from further tearing of the incision, which may occur if only the anterior splitting is done. The metreurynter incision has an additional advantage, inasmuch as it permits of each case being treated according to the individual conditions as they develop. If the large bag cannot be readily extracted after the anterior incision is made, then the posterior lip also is incised. As soon as this posterior incision enters 1 cm. into the posterior fornix, the Douglas' peritoneum is pushed upward from the posterior wall by the fingers and the posterior lip is split further until the balloon comes readily out. This method reduces the danger of injury to the uterus to a minimum.

The metreurynter incision has the following advantages:

1. It is done immediately after a trial of metreurynter has proven this rubber bag alone to be insufficient to accomplish dilatation. Hence the use of the metreurynter is at the same time the first step of this operation.

2. Traction on the tube of the metreurynter brings the portio near to the introitus. One speculum suffices to bring the portio and both fornices into easy reach. Traction on the metreurynter and the holding of the speculum can be done by one assistant.

3. With the splitting of the anterior and perhaps also of the posterior wall, traction on the metreurynter brings the higher areas of the collum successively within reach of the scissors.

4. Traction on the metreurynter makes the parts of the cervix and uterine wall to be incised so anæmic that the operation is almost bloodless. This is of special advantage in placenta previa, so that the metreurynter incision constitutes an ideal therapy in those cases of placenta previa in which it is of special importance to obtain a living child.

5. On account of the absence of bleeding, it is possible to operate without haste and with the greatest clearness. One can make the subsequent sewing of the incision easier by passing one or two sutures through the uterine wall at the upper end of incision. With the aid of these sutures after the uterus is emptied, the area to be sewn can be drawn down so far that it can be readily sewn.

6. The metreurynter incision changes vaginal Cesarean section from a major heroic operation into an easy procedure. It is only necessary to place the patient in proper position with the leg-holders, and with the aid of one assistant the operation is done with one speculum, one bag, one pair of scissors, and one mouse-tooth forceps.

The metreurynter incision is indicated particularly in eclampsia, early loosing of the placenta, placenta previa, danger to the child through protracted labor or through prolapse of the cord, and anomalies of the cervix which make its dilatation impossible.

This operation, because of its simplicity, when combined with the extraperitoneal inguinal Cesarean section of Solms, is of great value in narrow pelvis. In addition it permits of thorough drainage through the vagina.

MINOR VAGINAL CESAREAN SECTION.

We may apply the term minor vaginal Cesarean section to the splitting of the anterior and posterior lips of the cervix up to the internal os, after preliminary separation of the bladder from the cervix and of the Douglas peritoneum from the posterior wall of the cervix, for the purpose of accomplishing a rapid and relatively bloodless emptying of the uterus in the early months of pregnancy or in impending unavoidable abortion in the third, fourth, and fifth months of pregnancy.

There are cases where, with elongatio colli or with rigid cervix, the ordinary methods of dilatation are long and tedious. There are other cases where, through severe cervical rigidity, haste is ncessary to avoid continued loss of blood. There are other cases where, on account of the patient's general state, a rapid emptying of the uterus is desired. In cases of pernicious vomiting, where haste is imperative, this method offers a rapid means of accomplishing the therapeutic procedure, the emptying of the uterus. In some cases of tuberculosis where the advance of pregnancy is contraindicated, this method, too, finds an indication.

Döderlein calls laminaria, bougies, metreurynter, iodoform gauze packing, etc., breeding spots of infection.

These are the means at our hands for dilating the cervix in the cases above mentioned, an additional method being the dilatation with any of the various forms of cervical dilator.

Experience has taught me to avoid this last method as much as possible, and I have reached the conclusion that vaginal Cesarean section, while filling a most desirable place at the normal end of pregnancy and with a living child, is, as Wertheim says, often indicated in any period of gestation. I have used this method many

times with very happy results. A transverse incision is made in the posterior fornix and the peritoneum of Douglas is pushed up and dissected away from the posterior wall of the uterus. A transverse incision is made on the anterior wall of the cervix and the bladder is pushed up from the anterior wall of the uterus as far as possible. It is of great help to add a longitudinal incision to the transverse, for the plica is more readily brought into view and the point to which the splitting of the anterior lip may be carried is in evidence, and later on it is easier to reach the upper end of this incision in the cervix when closing with continued or interrupted suture. After the preliminary separation of the bladder and the dissection upward of the Douglas peritoneum, the cervix is grasped by volsella applied laterally and each lip of the cervix is split up to the internal os. The second finger of either hand is then introduced into the uterus and the other hand is applied to the fundus of the uterus through the abdominal wall, and the entire ovum can safely and rapidly be separated from its contact with the uterine wall and then extracted after rupture of the amniotic sac. If removal *in toto* is not possible, we have a large opening through which placental forceps can empty the uterus of its contents.

A hypodermic of ergotole usually produces a firm contraction of the uterus (this is usually given before the finger or hand is introduced into the uterus). The uterine cavity is then packed with iodoform gauze and a narrow strip is allowed to pass out through the cervix. This strip is kept in place during the sewing of the split cervix, so that we may be certain, especially when dealing with an elongatio colli, that the lumen is not obliterated by any suture. The posterior incision is closed first.

I use interrupted No. 3 chromic sutures, the first one not being cut until the second one is tied; the second one not being cut until the third is tied. In this way we are able to bring the upper areas of the longitudinal cervix incision into ready contact with the needle.

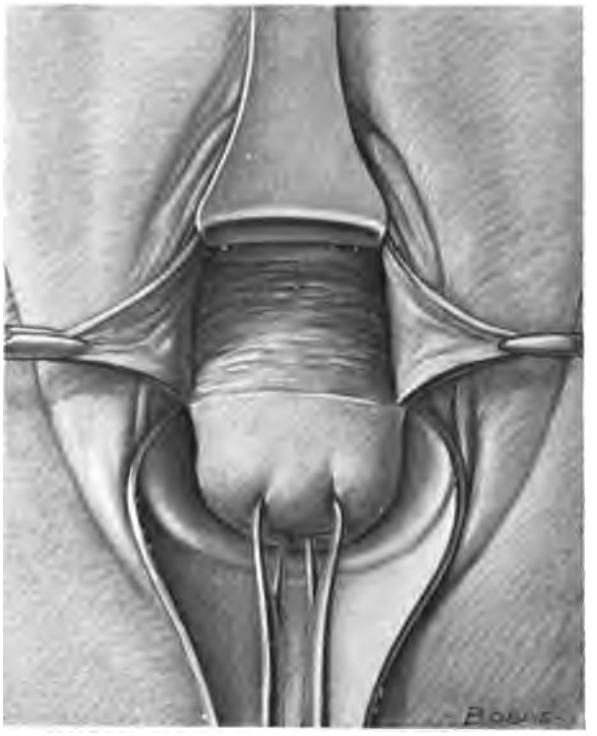

FIG. 144.—MINOR VAGINAL CESAREAN SECTION.

With the aid of a transverse and longitudinal fornix incision the bladder is separated from the anterior wall of the cervix and from the anterior wall of the vagina and is lifted up by an anterior speculum so that the anterior wall of the cervix is disclosed up to the peritoneal fold.

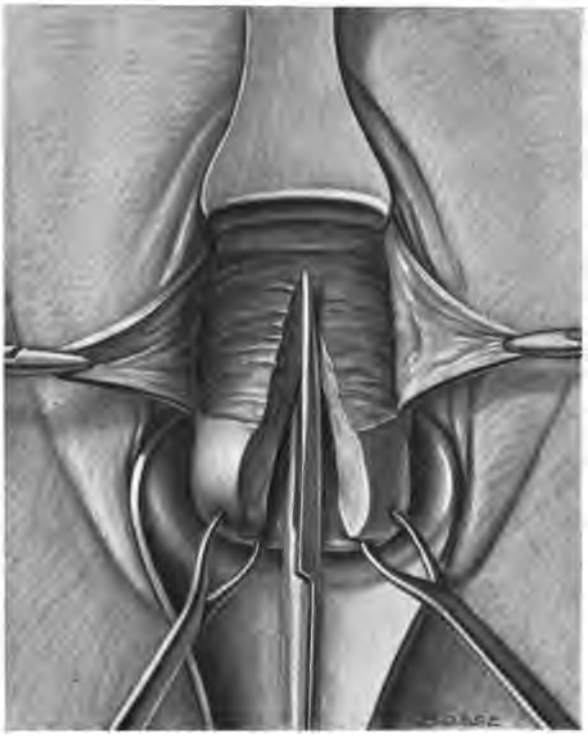

FIG. 145.—MINOR VAGINAL CESAREAN SECTION.

The anterior lip of the cervix is split along the median line up to the reflection of the peritoneal plica.

FIG. 146.—MINOR VAGINAL CESAREAN SECTION.

A transverse incision has been made in the posterior lip of the cervix, and the posterior fornix has been separated from the posterior wall of the uterus, and the fold of Douglas has been pushed upward. The posterior lip of cervix is now incised along the median line up to, but not through, the Douglas peritoneum.

FIG. 147.—MINOR VAGINAL CESAREAN SECTION

The cervix is lifted upward and the incision in the posterior lip of the cervix, which extended up to the Douglas peritoneum, is closed by interrupted chromic sutures.

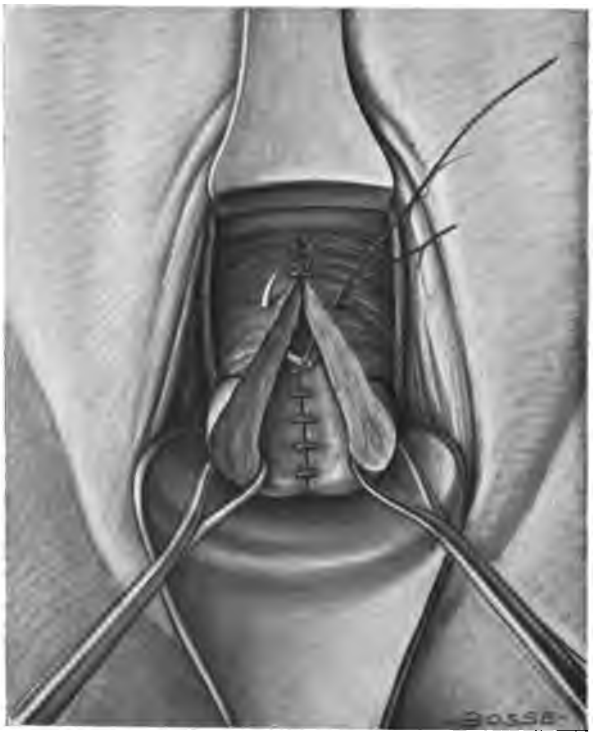

FIG. 148.—MINOR CESAREAN VAGINAL SECTION.

The cervix is pulled down sharply, the anterior speculum holds the bladder out of the way, and the incision in the anterior lip of the cervix is closed from above downward by interrupted chromic catgut sutures. During this step, a strip of gauze which has been passed into the uterus almost fills the lumen of the cervix. Care must be exercised that this should not be caught by any of the sutures. On completion of the sewing this gauze is removed and another strip is passed up into the uterus.

The incision in the anterior lip is then closed in the same manner, the cervix being well pulled down and the bladder being retracted so that the upper end of the incision may be closed with certainty. In addition, we obtain by this manipulation a clear view of the plica, so that if through stretching of the opening during any of the previous manipulations the plica has been opened, it may be closed.

Here also the first ligature is not cut until the second has been tied and the second not cut until the third has been tied, for the reasons above mentioned.

After the cervical slits have thus been united the transverse incision in the posterior fornix is closed by interrupted sutures, and the transverse and longitudinal incisions in the anterior fornix are closed in the same manner. The intrauterine packing, the lower end of which extends through the cervix, may be retained if desired, or it may be drawn out and a small wick of iodoform gauze introduced through the cervix into the uterine cavity. A tiny wick is, as a rule, introduced into the antecervical and retrocervical areas through a space between any two interrupted sutures closing the transverse posterior and anterior vaginal incision. The vagina is then packed with gauze and ergotole is administered at three-hour intervals for the succeeding few days. The wicks in the antecervical and retrocervical areas (the ends of which have been brought out to the vulva) are removed without distrubing the vaginal packing at the end or twenty-four hours. The intracervical strip of gauze and the vaginal packing are removed at the end of five or six days, after which vaginal douches may be given daily.

INDEX