RUPTURE OF THE UTERUS IN CESAREANIZED WOMEN, WITH A REVIEW OF THE LITERATURE ON THIS SUBJECT TO DATE.*

BY

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A CASE of this character, occurring in my practice recently, led me to inquire into the frequency and causative factors of this accident. From the literature available in the library of the Wayne County Medical Society and the Medical Library of the University of Michigan, I have been able to find seventy-eight cases recorded, my own case making seventy-nine. This includes the sixty-three cases tabulated in the very exhaustive paper on this subject, in the American Journal of Obstetrics, by our esteemed Fellow, Dr. Palmer Findley. In order to have as much as possible of the literature on the subject available in one place, I have compiled a

*Read before the Twenty-ninth Annual Meeting of the American Association of Obstetricians and Gynecologists at Indianapolis, Ind., September, 1916.

review of forty-two cases more or less in detail, which I would be pleased to furnish on request.

In endeavoring to determine the frequency of this accident, we find that sixteen of these cases occurred prior to the year 1900 and twenty-six since that time. Considering, therefore, the number of abdominal Cesarean sections that have been done all over the world, especially in the last decade, we may safely conclude that this accident is comparatively rare; that its rarity speaks well for the improvement in technic in the operation in recent years; and that the possibility of rupture in subsequent pregnancies should not, we think, be considered as a contraindication where the operation is clearly advisable.

Suture Material Used.—In seventeen cases catgut was used, in two silk, in one silk and catgut. In the remaining twenty-two cases, the kind of suture material (when such was used) is not mentioned. In many of the earlier cases reported, the uterus was not sutured, the abdominal incision being closed with a few sutures, presumably silk.

Mortality.—Twenty-seven of the mothers recovered, while only four of the babes were born alive, giving us a mortality of 60 per cent. and 90 per cent. respectively. Twins were present in one of the cases. The high infant mortality is, undoubtedly, due to the loss of blood incident to the rupture, delay in operating, and prematurity of birth.

Etiology.—When we consider the causative factors in the production of this accident, we can, with a reasonable degree of certainty, conclude that the uterine wall at the site of the scar was defective. This is shown by a review of the cases reported; rupture invariably occurred at that point. Undue tension may be produced by a large fetus, pregnancy or hydramnios.

The most important factor, however, is the condition of the scar in the uterine wall. In but few if the cases reported have microscopic examinations of the ruptured scar edges been made; and this, I confess, was neglected in my own case. Considerable light is thrown on this phase of the subject by the microscopic findings in the case reported by Cocq.

In the case reported by Breitenbach the microscopic findings would seem to indicate that the placenta had been attached to the scar area; in two of the three cases reported by Wall and Shaw this same condition was found.

Further evidence that the faulty scar is the principal cause in the production of rupture, is found especially in the cases reported by Sommer, Convelair, Locher, Brunnings and myself. There can be

little doubt that infection following the operation predisposes to rupture in subsequent pregnancies; attachment of the placenta over the site of the scar has a tendency to render the uterine wall more soft, easy of distention and hence more liable to rupture at that point. This latter is further verified by Palmer Findley in his recent article on the subject. He found that in eighteen out of twenty ruptured uteri, the placenta was attached to the scar area.

It is interesting to note that the great majority of the ruptures occurred during the pregnancy following the section and the sooner the pregnancy occurred after the operation the greater the liability to rupture.

It would seem also, from a review of the literature, that the rupture takes place in the vast majority of cases *in* the scar and not in the musculature near it. An exception to this is noted in the cases of Davis reported by Harrar, who says that microscopic examination showed the rupture to have taken place in apparently healthy muscle tissue, but between two old section scars.

It has occurred to the writer that, in the cases where chromic catgut is used, a faulty scar may result even where no infection existed, because of the destruction of more or less muscular tissue by the formation, around the sutures, of small canals containing a serosanguinous fluid, such as is sometimes observed in the abdominal wall. It is very probable that the intermittent contraction of the uterus, during the first thirty-six hours postpartum, also tends to interfere with a proper healing of the incision. Especially would this seem to be true when we consider the irregular course of the muscle fibers in the uterus. Healing may also be more or less retarded because of the impoverished condition of the blood consequent upon severe hemorrhages. My own case was as follows:

March 19, 1914, Mrs. K; aged twenty-seven; primipara; justominor pelvis; membranes had ruptured before entering the hospital.

Thirty-six hours after admission convulsions developed. Patient was promptly anesthetized and delivered by abdominal Cesarean section. The convulsive seizures recurred postpartum and venesection was twice resorted to, 1400 c.c. being removed the first time, and 1200 c.c. seven hours later.

The third day after labor she developed a temperature; this continued for almost two weeks, fluctuating between 100.2° and 103.8° F., but, eventually, she made a good recovery.

On October 16, 1915, when within about three weeks of term with her second pregnancy, she was seized suddenly with severe pain in the abdomen about 12 noon. Rest in bed and some household reme-

dies administered for the pain, did not improve her condition, and I was called at 1:30 P. M.

Upon my arrival at the house her condition was one of shock, apparently due to internal hemorrhage, although her pulse was still of fairly good quality. The ambulance was ordered. I went to the hospital to prepare for operation. When the ambulance arrived at the patient's house, she had improved so much that the husband would not allow her to be taken to the hospital. Here valuable time was lost. It was 4 P. M. before the operation was performed.

On opening the abdomen, the placenta and dead child were found among the intestines and promptly removed. A few dark clots, but very little fresh blood, was found. The uterus had ruptured through the Cesarean uterine scar and contracted firmly so that there was, practically, no bleeding.

Supravaginal hysterectomy was performed, and we looked for a prompt recovery; but the patient did not rally well from the operation and died at 9:15 that night.

On subsequent examination of the uterus, I was surprised at the thickness of the uterine wall where the rupture had occurred. This is, I think, explained by the microscopic and macroscopic findings in Cocq's case to which reference has been made to. As the placenta was lying completely in the abdominal cavity, I am inclined to believe it had been attached to the scar area.

From the foregoing evidence, it would seem that, if any improvement in our method of closing the uterus is to be made, it should be in the more careful closure of the uterine incision. We should always endeavor to secure a perfect approximation of the uterine musculature without including the mucosa. It has long been understood that care must be exercised in closing the uterine incision, the mucosa should never be included in the sutures because, in a subsequent pregnancy, islands of the mucosa may be transformed into decidual tissue and thus weaken the uterine wall. This we consider an excellent point.

The ten-day chromic catgut, number 3 is, we think, the best material and size for the deep sutures. Plain catgut may absorb more readily and cause less weakening of the walls through formation of canaliculi.

CONCLUSIONS.

1. A Cesareanized woman is always in danger of rupture of the uterus in subsequent pregnancies and should, therefore, be under careful observation during the latter months of the period of gestation.

2. If the puerperium following the first Cesarean section was afebrile, the patient may be permitted to go to term with the next child provided she can spend the last month of gestation in the hospital; if not, labor should be anticipiated at least two weeks prior to term.

3. Implantation of the placenta over the scar area, undoubtedly, increases the danger of rupture of the uterus in a subsequent preg-

nancy; the same may be said of a febrile puerperium following hysterotomy.

In closing, I wish to acknowledge the valuable assistance given me by Dr. C. V. Weller in reviewing the literature.

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RUPTURE OF THE CESAREAN SCAR.*

BY.
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New York.

THE introduction of asepsis and antisepsis in the practice of surgery and the application of these principles to obstetric surgery created a new problem for the obstetrician.

The abdominal method of delivery, once a rare and most feared operation, was very soon applied not only in cases in which absolute contraction of the pelvis existed when the delivery of a viable child was impossible, but also in cases of relative disproportion of fetal head to the pelvis.

Of late Cesarean section is being adopted as the safest method of delivery for the mother in some forms of placenta previa and eclampsia. The operation, which originally was almost always performed in the interest of the child, is now extended to many cases where it is thought the interest of the mother is best conserved.

This broader application of the operation created a new problem in obstetrics, "the care of the Cesareanized woman during subsequent pregnancies." Every obstetrician is confronted with this problem. He must definitely decide as to the proper procedure in such cases. A thorough perusal of the literature discloses the fact that very little thought has been given to this most interesting condition, and that the subject has been hardly investigated. We, therefore, lack the necessary experience upon which to base our opinions and conclusions. The delivery of a child by the abdominal route is now estimated to take place in about one out of two hundred pregnancies. If this is true, we can readily realize the magnitude of this question and how important this discussion is. This problem must not only be approached from its surgical aspect, but also from the standpoint of the patient.

In metropolitan districts the interest of these patients is, to a certain extent, safeguarded by virtue of the fact that competent help is within very easy reach; however, very many of these women are so situated that proper surgical aid cannot promptly be rendered

* Read before the Twenty-ninth Annual Meeting of the American Association of Obstetricians and Gynecologists at Indianapolis, Ind., September, 1916.

should a complication arise during pregnancy or labor. How shall we conserve the interest of such patients?

Shall we, when advising a patient to undergo a Cesarean section, discuss the immediate results of the operation only? Or are we to enter into the question of subsequent pregnancies and their management? I believe the patient has the inherent right to be made acquainted with all the facts, present and future, connected with this operation.

What shall be the attitude of the obstetrician? Shall he treat the case in accordance with present indications and entirely eliminate the question of subsequent pregnancies from consideration, or shall he put forth the dictum "once a Cesarean, always a Cesarean?" It is this thought in my mind that prompted me to bring this question to your attention. I earnestly hope that your discussion will help to settle this difficult and most recent obstetrical problem.

As far back as 1886 Krukenberg saw fit to undertake an exhaustive study of rupture of the Cesarean scar. He collected twenty cases from the literature which showed a mortality of 50 per cent. He believed two factors to be responsible for the rupture of the scar: First, the natural weakness of the cicatrix in the uterus. Second, invasion of the musculature of the uterus by foci of decidual cells. He believed that if silk were used in suturing the uterine wound, rupture would seldom, if ever, occur. This contention was soon disproved for, in the cases of Wager and Everke, rupture occurred notwithstanding the silk sutures.

Recently N. R. Mason and J. I. Williams investigated the strength of the Cesarean scar by animal experimentation in guinea-pigs and cats. They tested the comparative strength of the muscle and scar of the uterus by applying weights to a section of the uterine wall containing the scar. They found that in each instance the muscle gave way first. In one case only had the rupture extended into and along the scar. In another it passed through the scar at right angle to it. Two animals were again pregnant and near term when the tests were made with the same results. They thus ruled out any change in the strength of the scar during pregnancy and concluded that a firmly united scar is even stronger than the uterine muscle.

Harrar cites forty-two cases in which repeated section was performed, and the previous scar was either not discernible or was solid with no apparent thinning or stretching. He further states that in sixteen out of forty-two cases there were adhesions of the omentum either to the uterus or to the anterior abdominal wall. He

maintains that these adhesions did not seem to affect the uterine cicatrix.

Personal experience, based on observation of the uterine scar during the performance of repeated section, compels me to differ from the above conclusions. It is hardly possible to maintain that a scar in any part of the body, even if its healing processes were normal, possesses the same strength and vitality as normal tissue. Healing by first intention has its definite inflammatory reaction and, therefore, no scar can possess the same anatomical and physiological characteristics as normal uninjured tissue. Its nutritive powers must be lessened. It is subject to many local disturbances. Its natural life is shorter, as is evidenced by the thinning out of many cicatrices in the abdominal wall of wounds that healed by first intention. The healing process of a uterine wound is unlike that of any other surgical wound in the body. There are many factors which interfere with perfect union; the intermittent contraction of the uterus, and the retained secretion in the uterine cavity tend to disturb the union of the wound. During a subsequent pregnancy the normal growth of the uterus, the waves of contractions which constantly take place during the latter months of pregnancy, and the not infrequent implantation of the placenta, wholly or partly, in the scar area and the trophic changes of the uterus, all cause alteration in the scar tissue, thereby lessening its resistance to any undue strain either during pregnancy or labor. Assuming that the experiments of Mason and Williams are clinically true of all the cicatrices which result from primary union, I scarcely believe that the authors would maintain that cicatrices, the healing process of which is disturbed by infection, possess the same strength. Clinically, there are evidences of infection in and about the uterine scar in at least one-third of patients who are operated for repeated section. This fact is very plainly demonstrated by the signs of degeneration in the scar structure and omental adhesions in and about the cicatrix observed during subsequent operation. Unfortunately, we have no means at our disposal by which we are able to diagnosticate the actual changes which take place in the uterine wound. The infection is very often so insidious and mild that it causes very little, if any, constitutional disturbances. Nevertheless, the local changes in the wound do interfere with the normal regenerative processes.

The laws governing the formation of the Cesarean scar differ in all their essentials from all other scar formation; therefore, in order to safeguard the interest of the woman who has had a Cesarean section performed, we must definitely decide what method of treatment

shall be pursued in the event of subsequent pregnancy. The conclusions of early writers like Lucas Championniere, Sänger, and Leopold, that the strength of the scar depends entirely upon the degree of asepsis and antisepsis practiced, on the use of proper suturing material, and the careful approximation of the united ends cannot, in the light of our present knowledge, be accepted as the only causes for scar weakness and subsequent rupture. Recently cases of rupture were reported from some of the best and most modern clinics, both here and abroad. The technic followed is practically the same in all cases, yet rupture will very often occur before labor actually sets in.

Louis Singer (Paris, Thesis, 1908–09, No. 449) undertook to investigate the frequency of rupture of the Cesarean scar. He made an exhaustive study of the literature and also communicated with the surgeons in charge of the cases. His report is based on 155 published and 98 unpublished cases, or 253 women who had 290 gestations and were delivered by section. In this series rupture of the scar occurred in twenty-one cases. He states that this unusually large per cent. of rupture was due to the improper technic of the earlier operators. He, therefore, continued his investigations to more recent times and collected ninety-eight cases who had 113 gestations, and who were delivered by Cesarean section with no subsequent disturbance of the scar.

Judging from various reports, most authors agree that rupture of the scar occurs in about 3 per cent. of cases, and that the mortality in such cases is over 50 per cent., no matter how promptly treatment is instituted. Therefore, nearly 2 per cent. of women who have had a Cesarean section performed, ultimately perish as a result of the operation.

This accident is entirely dismissed from consideration in the various mortality records of the Cesarean operation. In order to have such records complete, the indirect mortality, such as is caused by secondary rupture and the rarer complication of bowel obstruction, must also be included.

We all realize that the primary mortality from Cesarean section is still high, that the mortality would be greatly reduced if it were possible to operate on all cases before exhaustion and infection have already set in. It is the lack of diagnostic ability that increases the mortality in all surgical operations; particularly is this true in obstetrics. Elective surgery now has a very small mortality. There is no reason why we should not educate ourselves, as well as the profession at large, whereby a proper diagnosis can be made early

enough to make the surgical procedure one of election, and not of emergency, as is unfortunately the case in the greatest per cent. of cases. The mortality of elective Cesarean section is at present only about 3 per cent. Rupture of the Cesarean scar occurs, at least, in about 3 per cent. of cases. Theoretically, it would appear that it should be logical to conclude that the dictum, "Once a Cesarean, always a Cesarean," is correct and should be accepted as the standard of practice. The patient who once has an abdominal section is more careful about her condition and, owing to her previous experience, she usually places herself in the care of a competent surgeon. She is watched carefully. She does not question the advice given to her as to the management of her condition. In that way she gains all the benefits which modern obstetrics offers, so that the mortality in repeated elective Cesarean section is practically reduced to a minimum.

I believe that in the very near future it will be proven that the mortality of cases of repeated Cesarean section will hardly compare with the mortality of cases of primary Cesarean section. However, at present these cases are still too few to permit of final deductions.

No matter how correct our decision may be from a theoretical consideration of the subject, or how sound our advice may be from a purely statistical analysis of the condition confronting us, we cannot always carry it out in actual practice. Various circumstances arise which compel us to modify our opinions. Very often we are in doubt as to the proper procedure in a given case. This is particularly true in cases in which labor appears to progress favorably and is expected to be of short duration. To this group of cases belong all patients who have had Cesarean section performed for conditions other than mechanical obstruction due to disproportion between the fetal head and pelvis, as cases of placenta previa, eclampsia and those who have had hysterotomy performed for tumors or adherent placenta. This class of patients reject any suggestion on the part of the obstetrician for any abdominal operation. They think their present labor different and one which to their minds apparently presents no complication. They, unlike the patients who have had dystocia, due to disproportion between the fetal head and pelvis, have experienced no pain during the birth of the previous child and are, therefore, not convinced of the necessity of interference. They as well as the other members of the family have a decided preference for allowing labor to take its natural course. Such patients really tax the ingenuity and the resources of the obstetrician. He is thus compelled in practice to deliver a number of

Cesareanized women by conservative methods not infrequently with disastrous results to both mother and child.

A certain amount of study and investigation has been accorded to rupture of the Cesarean scar during labor and we, therefore, have been taught to watch these patients while labor is progressing. The scar should be carefully watched for any thinning by often repeated abdominal palpation. These patients should not be permitted to pass through a stormy and prolonged labor. Interference should be instituted as soon as any signs or symptoms of impending rupture manifest themselves.

Spontaneous rupture of the scar during pregnancy, especially during the last two months, occurs more frequently than is generally supposed and, therefore, a woman who has been delivered by Cesarean section should be under strict observation during the latter half of the pregnancy. At times, thinning of the scar may be detected early, so that a proper measures to prevent rupture may be applied.

My experience consists of two cases of spontaneous rupture of the uterine scar during pregnancy, and one of threatened rupture during labor.

CASE I.—F. L., patient of Dr. S. J. Scadron, aged twenty-two, para-ii. First child delivered by Cesarean section in one of our large hospitals. Postpartum period normal, remained in hospital eighteen days. Pregnant again January 11, 1913. Was due September 20. Was carefully watched by Dr. Scadron. She was told that induction of labor might be considered about the thirty-sixth week. On July 24 the doctor was summoned to see her. On arrival he found the patient in shock. He made a tentative diagnosis of internal concealed hemorrhage and sent her to the Jewish Maternity Hospital. On admission, it became evident that the fetus was in the free abdominal cavity. She was immediately prepared for operation. On opening the abdomen the fetus was found to have escaped from the uterus through the old scar which gave way entirely. The placenta was in the opening, partly in the uterus, and partly in the abdomen. The patient was in severe shock. Suturing of the rupture was substituted for the more radical operation of hysterectomy. The patient died on the fourth day from septic peritonitis.

CASE II.—Mrs. R. W., aged twenty-eight, para-ii. First baby delivered by Cesarean section performed by Dr. Scadron two years ago. Became pregnant again one year later. July 11, 1916, about 3 A.M., the doctor was summoned to see her, because she did not feel well. On examination the abdomen was found to be distended, very tender and sensitive. The patient presented all the symptoms of shock. The diagnosis of rupture of the uterus was made by Dr. Scadron, who asked me to see the patient with him. The diagnosis was unquestionably correct, and she was taken to the Lebanon

Hospital for immediate operation. On opening the abdomen the placenta was presenting through the opening of the ruptured scar. The placenta and dead fetus were delivered through the opening and the uterus amputated at the internal os. The patient rallied and made an uneventful recovery. She was discharged at the end of sixteen days.

CASE III.—A. S., para-iii. First labor instrumental; baby stillborn. Two year later she was delivered by Cesarean section by a well-known obstetrician. Sept. 12, 1913, she was admitted to the Jewish Maternity Hospital in labor. On examination the cervix

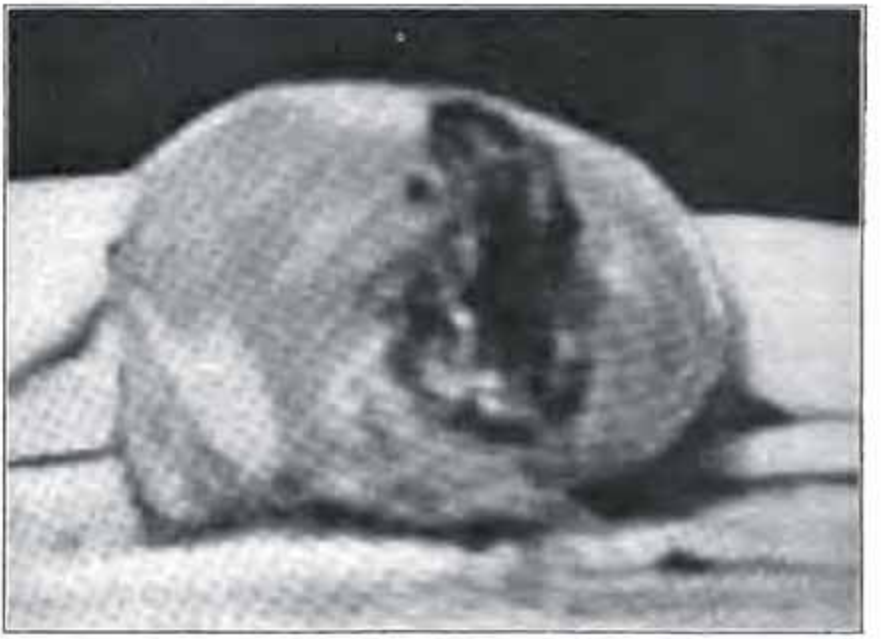

FIG 1.—Rupture of uterine scar.

was found dilated admitting two fingers, patient having strong pains every six to seven minutes. Membranes intact; abdominal palpation disclosed a deep notch in the anterior surface of the uterus corresponding to the line of the Cesarean scar. The findings were telephoned to me. I ordered immediate preparation for operation. My associate, Dr. S. J. Scadron, who arrived at the hospital first, fearing that rupture of the uterus was imminent, put the patient under light anesthesia during the preparation of the operating room. On opening the abdomen the uterine scar was found thinned out as if ready to rupture. The entire scar consisted of the peritoneal covering of the uterus and some strands of tissue underneath it. The uterus was incised through the old scar, which was resected completely. The wound was closed in the usual manner. Patient was discharged from the hospital on seventeenth day.

CONCLUSIONS.

1. Spontaneous rupture of the Cesarean scar occurs in about 3 per cent. of cases. In most instances rupture takes place during labor. It does take place not infrequently during the latter half of pregnancy, especially in the last six weeks.

2. We have no means by which we can judge the strength of the scar. Rupture will occur in cases which run an afebrile course and in which union of the wound is apparently by first intention.

3. One-third of all patients who undergo subsequent Cesarean section show evidence of inflammatory reaction in and about the uterine wound. The result in such cases is a weakened scar.

4. Proper suturing of the uterine wound and exact approximation of the edges will not always prevent subsequent rupture of the scar.

5. The mortality rate of repeated section is smaller than that of primary Cesarean section, because these patients are more carefully watched.

6. A patient who has once had a Cesarean section should not be allowed to go through a tedious or severe labor. If labor does not progress rapidly, Cesarean section should be performed.

7. When advising a patient to have a Cesarean section, the management of subsequent pregnancies should be taken into consideration and discussed with one of the members of the family.

8. As a general rule, it may be stated that fully 75 per cent. of women who have had a Cesarean section are delivered by repeated section during their subsequent labors.

9. The obstetrician should always bear in mind that Cesarean section creates a new problem for the woman, and therefore he should carefully weigh the indications before he decides upon the abdominal route. He should remember that the dictum, "Once a Cesarean, always a Cesarean," holds true in fully 75 per cent. of cases.

Finally, it is my firm belief that Cesarean section is very frequently resorted to in cases which should be delivered by other methods. Abdominal section is a major obstetrical operation. Surgeons and gynecologists, who have no obstetrical knowledge, are not competent to make a proper diagnosis and should not perform it. Obstetrics, in order to gain the respect of both the community and the medical profession, should be practised only by those who have had a proper training. The interest of the pregnant woman will then be properly safeguarded.

62 WEST EIGHTY-NINTH STREET.

DISCUSSION OF PAPERS BY DRS. BELL AND RONGY.

DR. PALMER FINDLEY, Omaha.—We have had two very interesting and instructive papers on a subject which has interested me very much of late. My interest in the subject was awakened by a case which I saw in the Charité Hospital of Berlin shortly before the war began.

A woman, twenty-three years of age, who had been Cesareanized eighteen months before for a contracted pelvis was pregnant in the seventh month of gestation and was losing a moderate amount of blood from a marginal placenta previa. She bore a wide abdominal scar which suggested probable infection following the Cesarean section. Prof. Franz, in charge of the clinic, directed that a bag should be inserted into the cervix and after dilatation of the cervix by the bag, that the head of the child should be perforated and the child extracted. The bag was inserted, pituitrin was administered and with the second pain the patient went into collapse. The abdomen was opened within twenty minutes and the uterus removed. There was found a complete rupture of the uterus and a dead fetus within the free peritoneal cavity. The patient died in collapse two hours later.

The following day Prof. Franz commented upon the case in his clinic and said, that henceforth he would always make his incisions high in the body of the uterus where the musculature is best developed and he would advise a Cesarean section on every pregnant woman who bore a Cesarean scar. Not long after this experience in Berlin, I had observations in three cases in Glasgow which called for a similar expression from Prof. Jardine and Prof. Cameron.

I found much the same sentiment in England and in the United States and I was inclined to adopt the slogan—"Once a Cesarean, always a Cesarean." However, a careful review of the literature has convinced me of the unreasonableness of such a conclusion.

I fail to agree with Dr. Rongy in his conclusions. I do not think any 3 per cent. should lead us to adopt a general course of action. I would rather be guided by the other 97 per cent. If as Dr. Rongy says, only 3 per cent. rupture in subsequent pregnancies would it not be more rational to persue the policy of watchful wating; to place all such cases in the hospital and allow them to deliver themselves if this can be done without serious embarrassment. If, on the other hand, there is a history of the patient having run a fever course after her previous section, or if there exists an evident cause for prolonged and difficult labor, such as a contracted pelvis, a malposition of the fetus or delayed labor from any cause whatsoever, then proceed with Cesarean section.

I would not favor high forceps, version, pituitrin or hydrostatic bags in the presence of a Cesarean scar. The uterine scar is always an unknown factor and as such we must avoid undue strain upon it. I would therefore conclude that once a Cesarean section always a hospital case in event of a subsequent labor.

Dr. J. HENRY CARSTENS, Detroit, Michigan.—As I see it, this question is a rather difficult one to solve, and I agree in the main

with what Dr. Findley has said. I do not know how many cases I have had, but I should say fifteen where I have performed Cesarean section a second time, and in one or two instances I have performed it a third and more times on the same patients. I have asked practitioners to see whether they could find the scar of the previous operation in the uterus, and not a single one has been able to do so. Not one was able to find where the scar was, so that there was good union throughout. In all these cases, however, there was a pelvic deformity. Whenever these women have a pelvic deformity they all require a second Cesarean section. There was not one of these women that required a second operation who was operated for a placenta previa or eclampsia.

I make it a point to have these patients go to the hospital early, and, if possible, I operate on them two weeks before the expected time of labor. Sometimes they would neglect going to the hospital as requested, and I would see them after they had been in labor ten or twelve hours. I consider I have been very lucky in not having a rupture of the uterus in any of them.

There is a great deal in the way in which we sew up the wound. Some practitioners have a rather slip-shod way of doing this. In sewing up the uterine wound I am very particular not to include in my ligature any of the mucous membrane. I take plain ordinary catgut, not chromicized or anything else, that will be absorbed quickly, and I take a big bite through the uterine muscle up to the mucous membrane, and then on the other side just above the mucous membrane, making a running suture and bringing it together not too tightly.

I think a great deal of trouble which arises in these cases is due to the sutures being *tied too tightly* and hence they strangulate the tissues. It is these minor points that make the difference between success and nonsuccess in these cases. By running the suture right up it stops all hemorrhage and I am enabled to bring the muscular walls together, and then I run back the other way, running the same suture back to where I started and tie it. While I am doing the latter I make a kind of secondary Lembert suture. I make it a point to have the serous membrane lightly pressed in so that it comes absolutely together.

I agree with Dr. Findley that these cases ought to be watched, at least, even though they may not need an operation. I do not think one needs to fear rupture of the uterus in many of these cases. However, to be on the safe side, it is better to watch them in case operation should be needed.

Again, these women should be told something about future pregnancy. I regard this as an important point. A great many women will say to us, "I do not want any more children; I want one." But these women do not know whether that child is going to live or not; they do not know but what it will die, and what then? She may want a child in the future, and if you sterilize her in the meantime so that she cannot become pregnant again she may worry a good deal over it. If a woman has had one or two children, I

would not have any compunctions of conscience about sterilizing her, but if she has no children, or has only one child, and that child may die then I will not sterilize her for the reason that some twenty-five years ago I operated on a woman on whom I did a Porro-Cesarean section, which was the operation we did in those days, and she told me she wanted it done. Six months or two years afterward, when I met that woman, she cried and exclaimed, "Doctor, if I only knew as much as I do now I would not have allowed you to remove my uterus." So when I think of that poor woman, I hesitate twice now before sterilizing a woman who has no children.

DR. HENRY SCHWARZ, St. Louis, Missouri.—I wish to endorse every word that Dr. Findley has said. He expresses my standpoint exactly.

I wish to relate briefly two cases I have delivered within the last year through the natural passages. One was a woman on whom Dr. Webster, of Chicago, had done a Cesarean section some years before on account of obstruction to delivery by an ovarian tumor.

In the other case I did a Cesarean section three years ago. The woman was brought into the hospital with a temperature of 104°; she was very sapremic, with an offensive discharge from the uterus. There was a dead fetus in the uterus, which was macerated. We took it out. She was a young woman, and it was her first pregnancy. After emptying the uterus and removing a subserous fibroid coming out on the left side of the uterus close to the external os and plugging the pelvis, and also after removing a smaller fibroid near the fundus, I closed the uterus because the woman was young and had had no children. I delivered this woman about seven months ago through the natural passages. In both cases I used scopolamin and narcophin during the first stage, and delivered the women just as soon as the first stage was completed.

These cases show that it is possible to deliver these women safely through the natural passages where these passages are not obstructed.

I have been very fortunate in not having many cases come to Cesarean section as emergency cases. I think we have nearer 75 per cent. of elective cases than 3 per cent. The fact that there is early rupture of the uterus during pregnancy in many cases induces me in my service to recommend hysterectomy at the time of the third Cesarean section. I think after a woman has gone through three Cesarean sections we should at least recommend removal of the uterus. Of course, if she objects, that is her business, but it is this early rupture of the uterus during pregnancy which we cannot control.

DR. JAMES E. DAVIS, Detroit, Michigan.—These two papers bring before us a most interesting phase of "preventive obstetrics." I think the advantages of this prevention should be viewed from a consideration of the pathology that prevails in these cases. Anticipating the pathology, it seems to me there should be added to what has already been said a few further considerations. In the first place, we should, in a general way, consider bad risks those women who have a thin musculature, and also those who have within the

uterus at the time of pregnancy a large quantity of amniotic fluid. It has already been mentioned that care should be taken against the introduction of a bag and the use of forceps. The problem, presenting, from a pathological standpoint is this: first, we have a reduction of muscle tissue, of connective tissue, a degradation of the normal tissue; then we have a degradation of the connective tissue by the interposition within the connective-tissue cells of syncytial cells. The connective tissue, while it may in certain instances be as strong as the muscle tissue, yet it is not as resistant to the syncytiolysins which are formed from the syncytial cells, and in the syncytial cells, we have a tissue of a very low resistance so far as its ability to withstand pressure is concerned. That might be illustrated in this way: we will consider the muscular wall. We have in the normal muscular wall connective-tissue elements which in multiple pregnancies are increased, so that we see an increase of this connective tissue everywhere in the muscular wall, but when we have only a connective-tissue wall, we have a considerable thinning of that wall which may have, and we will take it for granted, the same bursting quality as the muscle wall, but when we have interposed in the muscular wall syncytial cells which almost never occur singly but in groups, then the resisting power of the connective-tissue wall is markedly lowered. The syncytial cells may be shown diagrammatically interposed in this manner in the connective-tissue wall, and wherever these cells are interposed there we have a point of very low resistance so far as it relates to bursting pressure. Besides, we have a constant throwing off of the syncytiolysins which have a digestive effect upon the connective tissue.

Dr. Maurice I. Rosenthal, Fort Wayne, Indiana.—Durable suture of the uterus postpartum is a difficult thing. While the uterine wall is thick at first in a few days it is much thinner as a result of beginning involution so that primary suture, as mentioned by Dr. Carstens, will stop hemorrhage and that is about all we can expect it to do. Suturing the peritoneal surface, however, I believe is very important. In making suture of the belly wall if you will bring the skin together and there is no blood interposed, the fatty tissues will lie together and heal perfectly. Just so if you will bring the surfaces together, the peritoneal surface carefully, and there is no intrauterine pressure, the uterine wall will lie together very nicely. If you suture this wall ever so carefully, in forty-eight hours, more or less, the sutures are necessarily loose. I imagine they hang there like hoops on a line, yet they are necessary to prevent hemorrhage and leakage for the first twenty-four hours. The important thing after all is infection and that infection is predisposed by intrauterine pressure. The complete cervical dilatation of normal labor promotes a more free drainage of the uterus than frequently obtains after Cesarean section.

Dr. Irving W. Potter, Buffalo, New York.—I would like to report a case of rupture of the uterus that occurred in Buffalo because it is the only one we have heard anything about. The patient was a young woman, twenty-three years of age, upon whom I operated

two and one-half years ago for a contracted pelvis, delivering a child 9 pounds in weight. It was a midwife's case, and she had been in labor for a considerable time when I saw her, I took her to the hospital and did a Cesarean section, she made a good recovery. She subsequently became pregnant, and fell into the hands of a practitioner who did not believe in operating and who said he could deliver her without any trouble. She had a test of labor for forty-eight hours. The scar in her abdomen indicated that a Cesarean section had been done on a previous occasion, yet she was allowed to go forty-eight hours as a test of labor, which was followed by rupture of the uterus. A surgeon was called in and removed the uterus. The child was dead.

I have operated on a number of cases a second time without any trouble, and you cannot see the scar in the majority of these cases from the outside, but if you feel from below up you will find a thinning in the majority of cases, although it is not enough to make any special difference.

DR. HAYD.—I would like to ask Dr. Bell why he did not sew the uterus together instead of taking it out?

DR. BELL.—I must confess, I was afraid she might die. In order to sew the uterus together I would have been obliged to freshen both edges entirely because, as I tried to tell you in my paper, there was a scar, and except for the fibromuscular bands across, I would have been obliged to remove the surface of the whole scar. I thought I could do the other operation more quickly.

DR. RONGY (closing).—With reference to the dictum, "Once a Cesarean, always a Cesarean," I would like to say that I brought this question up from an academic standpoint. We know what we have to contend with in actual practice; we cannot always choose our cases, neither do we always want to deliver these women by Cesarean section. I think it is very essential for us to come to a thorough and clear understanding of this question because the general medical profession look to us for a final judgment on these questions. It is very necessary for us to make ourselves clear as to what should be done in certain cases and this largely was my object in bringing up this question.

Dr. Carstens brought out a very important point with reference to tying of the sutures in the uterine wound too tightly. When these sutures are tied tightly there is always a reaction around the wound and therefore infection is more likely to take place. Great care must be exercised in suturing the uterine wound.

I never sterilize a woman unless she has had two children, and I only do it at the request of the patient. I do not perform an hysterectomy but resect the tubes on either side. I feel that after resecting and embedding the cut ends of the tube in the wall of the uterus pregnancy will not ensue. It is unnecessary to do an hysterectomy. I feel sure that our knowledge about the uterine scar is very incomplete. It seems to me that no matter how perfectly the wound united the uterus will not infrequently rupture. In performing repeated section the old scar is very often not observed

for the reason that the uterus is in a different angle, it is somewhat twisted so that the old scar is at the side of the uterus out of the line of vision and therefore not easily seen. In a great many cases however, the old scar can be readily seen.
