

ACCIDENTAL HEMORRHAGE—ABLATIO PLACENTAE

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ABLATIO, partial or complete separation of the normally situated placenta, occurs as a comparatively frequent accident in the last weeks of pregnancy and in the course of labor. It is one of the gravest conditions met with in obstetrics, for it is often attended with alarming hemorrhage, shock, and collapse; and the fetal mortality ranges from 65 to 95 per cent.

Frequency.—Ablatio, according to Holmes, is more common than placenta previa. The frequency has been variously estimated at from 1 in 115 to 1 in 894 labors. Holmes claims that many cases are missed, as the bleeding may be slight and examination of the placenta, casual or careless. He places the incidence at 1 in 200. Study of our records tends to support Holmes' claim, for in this series of 4,878 consecutive labors ablatio occurred 16 times, an incidence of 1 in 305. These figures represent only those cases which were diagnosed as ablatio before or during labor and which required treatment, but do not include many cases in which the separation was so slight that no clinical significance was attached to the vaginal appearance of blood at some time during the labor, but in which on routine examination of the placenta, evidence of premature separation of the placenta was apparent. Furthermore, we are convinced from our studies that this accident accounts for a fair proportion of intrapartal fetal deaths.

Ablatio placentae may be apparent or concealed. In the apparent type the lower margin of the placenta is detached and the blood separates the membranes from the uterine wall and is discharged as a frank hemorrhage through the cervix and the vagina, increasing at the time of uterine contraction. *Even in the apparent type the hemorrhage is primarily concealed*, which fact must not be overlooked, for the classical symptoms of ablatio are evident before vaginal bleeding appears. In the concealed type the effused blood collects within the uterine cavity and any one of the following conditions may obtain:

1. The placenta may become detached at the center and the periphery remain adherent. Such a detachment produces a node or boss on the surface of the uterus over the site of the retroplacental blood clot, with resulting uterine asymmetry. The overlying uterine area is exquisitely sensitive and atonic.

2. The placenta may become detached at one edge, upper or lateral, which allows the effused blood to lift the membranes from their uterine attachment. As the blood accumulates, it further separates the placenta and overdistends the uterus.

3. The placenta may be detached at one edge, partially lifting the membranes beyond the margin when the pressure of the accumulated blood may be such as to cause rupture into the amniotic sac above the placental site and allow the hemorrhage to produce an intraovular distention of the uterus.

4. Finally, separation may take place at the lower edge of the placenta and of the adjacent membranes, but owing to the ball valve action of the fetal head which occludes the lower segment of the uterus, the blood may be prevented from escaping. It is in this type of case that upward displacement of the presenting part confirms the diagnosis by allowing the escape of blood and blood clots.

Causes.—These may be grouped into those which are predisposing and those which may be considered as exciting. The predisposing causes are *toxemia*, *torsion*, and *endometrial* disease.

It is a well-known clinical fact that the placental attachment at or near term is a very loose one due to the fatty changes which are going on in the placenta preparatory to labor. This condition is necessarily exaggerated when certain placental areas are the seat of numerous infarcts. Chronic nephritis and hematogenous infections during pregnancy produce infarcts. Premature separation does not occur in true eclampsia, though the uterus is frequently in tonic spasm. In contrast it is relatively common in the chronic nephritic patient or in the woman who gives a history of antepartum infection. Both Kellogg and Young have called attention to the marked toxic symptoms which are present in many cases of ablatio, and Young has attributed these to the presence of the red infarct and blood resorption.

Uterine torsion is probably the next most common predisposing factor. There is some degree of uterine torsion present in every pregnancy; when this is extreme, there is definite blocking of the return venous circulation which produces minute hemorrhages in the spongy layer of the decidua basalis, which loosens the placenta so that with the occurrence of active uterine contractions, separation takes place. In cases of extreme torsion towards the right, placentas located on the left lateral wall of the uterus are more liable to separate than those having a right-sided attachment. I believe that torsion with the consequent engorgement of the uterine tissues is a factor in the etiology of both abortion and premature separation. This opinion is based upon the clinical fact that since I have taught my patients to take the knee-chest position for ten minutes three times a day throughout pregnancy, the incidence of both of these conditions, in my personal practice, has diminished. As soon as the diagnosis of pregnancy is made, each patient is drilled in the manner of assuming the knee-chest posture and in the method of distending the vagina with air when in this posture. At each revisit my nurse has the woman take this position and corrects any errors in this performance.

We have produced in animals placental separation by excessive torsion of the uterus and by ligation of the uterine and ovarian veins on one side. Similar experiments were done by Morse and reported to the American Gynecological Society.

Endometrial disease is a more common cause of abortion and placenta previa than it is of premature separation, though there can be no doubt that it figures in the etiology of ablatio, and, furthermore, multiparity favors endometrial hyperplasia. Among the exciting causes may be mentioned direct trauma, such as kicks, falls, blows, and violent muscular effort, such as the lifting of heavy weights. The fact that trauma actually figures in the causation of this accident is illustrated in our records of admissions, for among the working class most of our cases were admitted on Saturday or Monday nights, with histories of sexual trauma or of doing a heavy wash or lifting a portable wash tub. Another group occurred in summer during the excursion season when blows upon the abdomen in boarding an open car are relatively common. During the period when it was fashionable to use pituitary extract to expedite the first and second stages of labor, ablatio was more frequent.

The experimental observations on animals by Browne at the University College in London, confirms the clinical impressions of the importance of nephritis. Browne showed that if chronic nephritis has been caused by a previous injection of sodium oxalate, accidental hemorrhage can be induced by injection of uranium nitrate followed by an injection of *Bacillus pyocyaneus*. Provided chronic nephritis is present, there is no need to inject uranium, as hemorrhage can be induced by an injection of *Bacillus pyocyaneus* alone. In contrast, he found that in the absence of chronic nephritis, injections of *Bacillus pyocyaneus* are not usually sufficient to cause hemorrhage, even though the injections of the organisms have caused an acute nephritis. On the other hand, in three animals suffering from chronic nephritis, spontaneous antepartum hemorrhage occurred in the second half of pregnancy,—in one of these it occurred twice and in another four times in successive pregnancies. In all of the animals suffering from experimentally produced chronic nephritis the liver function was normal. He concluded that all evidence goes to show that the one important predisposing cause of accidental hemorrhage is chronic nephritis. Clinically, ablatio may be the first sign of a latent chronic nephritis. In further support of chronic nephritis being the chief underlying cause, O'Connor reports 37 cases in which the symptoms of toxemia were present in 33.

Symptoms.—Ablatio commonly occurs in the last weeks of pregnancy or during the first stage of labor. Usually the first symptom is *sudden and severe abdominal pain in the region of the uterus*, at the point of separation; this is always attended with some degree of faintness or collapse. This in turn, may be followed in the apparent type by a

vaginal discharge of blood, or the escape of blood may be the first sign of the accident. In the concealed variety the blood collects between the placenta, adjacent membranes and uterine wall, and causes stretching of the uterine muscle. In the presence of this foreign body, the coagula, the uterus is stimulated to tonic contraction. The board-like ligneous uterus is exquisitely sensitive to touch, which is diagnostic. The pain is constant and very intense; it may be cramp-like, colicky, or bearing down in character with no intervals of cessation as in normal labor. *Some degree of shock always exists* even when there is no great loss of blood, as evidenced by pallor, perspiration about the mouth and forehead, fall in systolic pressure, and change in the rate and character of the pulse. The signs of hemorrhage, whether the bleeding is concealed or apparent, are always progressive. Hourly hemoglobin estimations, repeated red cell counts, and frequent pulse and blood pressure readings give an index of the amount of blood loss and its effect on the woman. Occasionally in the concealed form a node or boss forms on the uterine surface, causing asymmetry; this corresponds to the site of the retroplacental blood collection. This swelling is always excessively tender, the retained massed coagula change the shape of the uterus, and it may rapidly increase in size. In the apoplectic form an effusion of blood may take place into the bundles of uterine muscle fibers, separate them and impair their power of contraction, hence the labor pains are of poor quality but the uterine pain persists. In the presence of this pathologic change the prognosis is most serious for retraction and contraction does not take place and bleeding continues.

The persistent escape of blood serum by the vagina is a symptom of great significance, as it indicates the presence of clots retained within the uterus. The amount of separation is shown by the effect on the uteroplacental circulation; in slight detachments during labor the fetal heart may not be disturbed but as the separation increases the heart tones are feeble, irregular, or absent.

Diagnosis.—An early diagnosis is all important and should be made before alarming symptoms develop. The woman, usually a multipara at or near term or in the first stage of labor, having some evidence of chronic nephritis, such as a high systolic pressure, edema, or albuminuria, is seized without warning with sudden severe abdominal pain. This is referred to the region of the uterus or just above the pubis and is associated with faintness, pallor, or some degree of shock. Or the first sign may be uterine pain and vaginal bleeding. Such a story at once suggests ablatio. Abdominal examination at this time will reveal a sensitive ligneous uterus with no periods of relaxation. By vaginal touch the cervix and lower segment seem pressed down into the vagina, giving prominence to the vaginal part of the uterus, though the presenting part may be above the brim. Upward displacement of

the presenting part may allow the escape of blood and clots. When bleeding occurs in the later months of pregnancy or during labor, it must be differentiated from placenta previa, uterine rupture, and premature labor. Bleeding from low implantation of the placenta may be easily mistaken for accidental hemorrhage, except that in the former the onset is painless and on pelvic examination we find the classical signs of previa. Rupture of the uterus occurs later in labor; the membranes have usually ruptured and there are other signs of protracted labor and disproportion or else there is a history of a previous myomectomy or cesarean wound. It is attended with a cessation of labor pains, *recession of the presenting part, diminution in the size of the uterine tumor, and when complete, with the development of a separate abdominal tumor.* Premature labor may be attended with slight vaginal bleeding but has none of the diagnostic signs of the more serious lesions.

Prognosis in ablatio is always serious, less so in the apparent variety than when the bleeding is concealed, for frank vaginal bleeding always alarms the woman or her family and prompt medical aid is sought. The condition can be readily recognized and proper treatment instituted. In the concealed type the mortality is much higher, as often the accident is not recognized until the woman is in a serious condition. The maternal fatalities result from hemorrhage, trauma, shock, and sepsis, and range, according to available statistics, from 2.6 per cent to 66 per cent. In the study of these figures it is interesting to note that the mortality rate in hospitals having a prenatal clinic, is materially lower than in those institutions with emergency services. For example, Greenhill at the Chicago Lying-In Hospital, had but 3 deaths in 82 cases, and Burgess at the Montreal Maternity Hospital had 6 in 801, while our ratio was 1 in 16. The fetal mortality varies from 60 to 95 per cent chiefly from asphyxia due to interference with the uteroplacental circulation. The chances for both mother and fetus are better in multiparous births than in primiparous labor. Any operative procedure on a patient in shock or in the presence of pronounced anemia is extremely hazardous. The prognosis is also in a degree dependent upon the form of treatment instituted. In the 16 cases of frank separation which are the basis for this paper, but one mother died, and her death can be charged to the manner in which her case was handled.

Treatment.—As soon as a diagnosis of ablatio is made, treatment must be instituted. What plan of procedure is to be adopted will depend upon certain obstetric factors; i.e., (1) the period of gestation; (2) the parity of the woman; (3) whether or not the woman is in labor; (4) the condition of the membranes; (5) the condition and the amount of dilatation of the cervix; (6) the amount of blood loss; (7) the general condition of the patient, and finally, upon the presence or absence of infection. A woman should be considered potentially in-

feeted when she has had vaginal manipulations, through an unprepared vulva. The general indications are to empty the uterus and control the hemorrhage—but how?

General Considerations.—When the accident occurs during pregnancy with a nonviable fetus, the treatment is similar to that of an inevitable miscarriage and depends upon the degree of dilatation and the amount of bleeding. When it occurs in the latter weeks of pregnancy or during labor, the indications are to combat shock and control further bleeding. This is done by a hypodermic of morphine, the application of heat to the body, and the intravenous injection of 50 c.c. of a 50 per cent gum-glucose solution. Before injecting the glucose, the pulse and systolic pressure should be taken and recorded, the hemoglobin and red cell count estimated, and the blood grouped and matched for transfusion. *It should be accepted as a general rule that no operative procedure on a bleeding case be undertaken, before a blood transfusion is given.* Furthermore, it should be remembered that the employment of a general anesthetic immediately after transfusion produces biochemical changes in the blood which may be serious to the patient; hence, operative procedures done under local anesthesia and analgesia have an advantage. The hemorrhage is controlled by emptying the uterus and with the postpartum pack. When this accident occurs in the presence of a living viable child, in a primipara with unprepared soft parts, not in labor or in the first stage of labor, blood transfusion followed by cesarean section under local infiltration anesthesia should be the procedure of choice. Unfortunately, it is but seldom that such conditions obtain, for in the patient in labor with either apparent or concealed bleeding, a ligneous uterus and dilating cervix which is seen soon after the accident has occurred, the conservative plan of treatment has given us the most satisfactory results. For the woman in shock who has sustained any considerable blood loss will not stand trauma or anesthesia.

The conservative plan employed in the management of our cases is as follows: The pain and shock are relieved by a hypodermic injection of $\frac{1}{4}$ or $\frac{1}{2}$ grain of morphine; the vulva is clipped and scrubbed, and the vagina sterilized by the instillation of a 4 per cent mercurochrome solution. The membranes are ruptured and the vagina is firmly packed with soaked gauze; the vagina and fundus are carefully measured, and a Beck abdominal binder to control further uterine distention is firmly applied. If the presenting part is in the pelvis and there is no bony disproportion, 3 minim doses of pituitary extract are given hypodermically at twenty-minute intervals. The pulse, systolic pressure, hemoglobin, and red cell count are watched by half-hour and hourly readings. If the labor is progressing, as shown by the effacement and dilatation of the cervix and the descent of the presenting part and the quality of the pulse, the systolic and hemoglobin readings are maintained, the

patient is allowed to deliver spontaneously or the labor is terminated with low forceps. As the child's head passes the vulvar ring, a hypodermic of $\frac{1}{2}$ an ampoule of pituitary extract is given and the uterus followed down with the hand on the fundus; the placenta is then expressed with the first contraction, or if there is any delay, it is removed manually, and the uterus is emptied of its retained coagula, when it usually contracts and controls further bleeding. We have, however, seen it fail to do this; so it has been our custom to pack it firmly with iodoform gauze, as continued oozing may change the favorable outcome. With the hemorrhage controlled, our attention should next be given to combating the acute anemia and its effects by posture and blood transfusion. When, however, the conservative plan fails to arrest the intrauterine bleeding and the uterus becomes overdilated with blood or the condition of the cervix offers an obstruction to speedy spontaneous delivery, conditions which are quickly recognized by rise in the pulse rate, drop in systolic pressure, fall in the hemoglobin percentage, and increase in the size of the uterine tumor, or the cervix fails to efface and dilate; radical measures must be taken without delay. These predispose that the patient is in a well-equipped hospital where she can have the benefit of modern scientific methods. Under such conditions her blood should be cross matched (it has already been grouped) and a blood transfusion of at least 500 c.c. given by either the Unger or Soresi method. While this is being done, the abdomen is prepared, quickly opened under local infiltration anesthesia, and the child delivered by hysterotomy. When it is possible to eventrate the uterus before incising it, the operation can be shortened and further blood loss absolutely controlled by placing two long Keith clamps on the broad ligaments, thus clamping the uterine and ovarian arteries before opening the uterus and delivering child and placenta. This seems to prevent the shock which is apt to take place when the uterine contents and the mass of accumulated coagula are removed. Theoretical objection is made to this procedure on the grounds that it takes away all chance for the child, necessitates a larger abdominal incision, and sacrifices a uterus which possibly might be saved. These objections do not counterbalance the advantages, for section followed by hysterectomy is only indicated in those few cases where the separation is complete, where hemorrhage into the muscle fibers and hemorrhagic effusion under the peritoneal covering of the uterus has taken place. Such cases demand a rapid hysterectomy.

Case 15 of this last series falls into this group: A multipara aged thirty-eight years, mother of eight living children, was admitted to our service in March, 1930, about six hours after the first signs of separation. She was in severe shock with a pulse of 100, a systolic pressure 80/50, and a hemoglobin of 55 per cent. The uterus was tonic and the cervix, which was hard and scarred, admitted two fingers. The resident physician gave her morphine, ruptured the membranes, and applied the Beck binder. Her blood was examined for control, she was grouped,

and donors were called. After cross matching, a blood transfusion of 500 c.c. was given which raised her hemoglobin to 60 per cent and her systolic pressure to 120. The vagina was then tightly plugged and she was watched for two hours, when it was noted that her pressure had fallen to 70 and the hemoglobin to 30. The head did not fill the lower segment and the cervix showed no sign of effacement or further dilatation. She was given another transfusion of 800 c.c., and under an additional dose of morphine and infiltration anesthesia, the abdomen was opened, the child delivered by hysterotomy and the uterus removed. Immediately on clamping the broad ligaments the quality of the pulse began to improve and was of fair quality at the end of the operation. After putting her back to bed, a third transfusion of 500 c.c. of blood was given. Her recovery was afebrile and uncomplicated. Pathologic study of the uterus and adnexa which were removed, showed a deep bluish effusion of blood into all of the cellular tissues under the peritoneum and a wide separation of the folds of the broad ligaments by effused blood. More detailed investigation showed the muscle bundles of the uterine wall separated by masses of red blood cells. This case illustrates the value of frequent pulse, pressure, and hemoglobin readings as an index of what is going on within the uterus, and also of the enormous quantity of blood which has to be replaced in some of these separations, as well as the tolerance of the woman to properly matched new blood in acute hemorrhage.

TABULATION OF SIXTEEN COMPLETE SEPARATION CASES
Incidence 16 in 4,878 Consecutive Labors

<i>Mortality:</i>	
Maternal (age from 20 to 43 years)	1
Primipara	3
Multipara	13
<i>Mortality:</i>	
Fetal	14
<i>Period of Gestation:</i>	
At term	5
After eighth month	6
After seventh month	3
After sixth month	2
<i>Method of Delivery:</i>	
Spontaneous labor	12
Low forceps	2
*Manual dilatation and version	1
Hysterectomy	1
<i>Etiology:</i>	
Nephritic	7
Trauma	3
Syphilis	1
Cause unknown	5
<i>Presentation:</i>	
Vertex	14
Breech	2

*Fatal Case: Ruptured uterus, hysterectomy, after manual dilatation and version.

The one fatal case was the first in this series, death being due to a rupture of the uterus resulting from manual dilatation and version. The patient went into shock following the extraction, reacted on transfusion, but died in a few hours after a hysterectomy (under general anesthesia) to remove the traumatized uterus. A woman can stand the

loss of enormous quantities of blood if there is no tissue trauma. It is anesthesia and trauma that kill.

COMMENTS AND CONCLUSIONS

A review of the literature with a detailed study of the case histories in the two series which I have reported to this Association in 1922 and 1930, bring out certain clinical facts:

(1) That minor degrees of ablatio are relatively frequent accidents and contribute to the uncontrollable part of fetal mortality.

(2) That both clinical and experimental studies show chronic nephritis to be the most constant predisposing cause.

(3) That the diagnosis is apparent from the history and the symptom-complex.

(4) That the prognosis depends largely on an early diagnosis and the prompt establishment of rational treatment.

(5) That trauma, blood loss, and toxemia reduce individual resistance—all three are commonly present in ablatio.

(6) That the conservative plan instituted early with timely and generous transfusion offer the woman the best chance, and, finally, in those rare cases in which the uterine muscle bundles are infiltrated and blood effusion takes place into the subserous connective tissues, hysterectomy, under local anesthesia, after preliminary transfusion, is the procedure of choice.

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Accidental Hemorrhage, DR. J. O. POLAK, Brooklyn, N. Y. (See page 218, February issue.)

DISCUSSION

DR. I. W. POTTER, BUFFALO, N. Y.—I am inclined to doubt that the length of the second stage of labor does not increase the fetal deaths. The first stage of labor, it seems to me, has no effect whatsoever upon the patient.

The thing that impresses me in regard to blood loss in the third stage of labor is the location of the placenta. If the placenta is attached to the fundus of the

uterus, the blood loss is reduced to a minimum. If, however, it is attached to the uterine wall or comes into the group of previas, then the blood loss increases just in that proportion, regardless of whether the patient is treated or not.

Interference with the third stage of labor induces trouble, because it causes a greater blood loss, opens up avenues for infection, and leads one into considerable danger. If, however, immediately upon the separation of the placenta, it is removed from the uterus before it becomes a source of irritation, then the blood loss is again diminished.

In our experience we have not found that the blood loss in the third stage of labor has been increased by the general anesthetic. We use chloroform altogether. Pituitrin given after the birth of the child is routine **treatment**.

It seems to me that the size of the child can very easily increase the blood loss during the third stage. With a large child the tissues are more or less devitalized and the blood loss is greater in that case. The method of delivery has also something to do with the blood loss. I am speaking now from practical experience, but we do know that in a long, tedious second stage the blood loss is greater than when the second stage is shortened by immediate delivery of the child.

Regarding Dr. Bill's paper, there is only one suggestion that I would like to make—I would include placenta previas under one heading and not have three divisions. If it is a placenta previa, it is a placenta previa and is an operative case.

DR. G. D. ROYSTON, ST. LOUIS, MO.—Among 13,182 hospital admissions in the Washington University Clinic, there were 37 cases of placenta previa, 18 undoubted instances of premature separation, and 60 classified under accidental hemorrhage. A study of the history records of this latter group disclosed many with low-seated placenta, cervix eroded or traumatized during previous labors; others who had protracted general narcosis followed by atonic uterine contraction, etc. No doubt there were many instances of premature separation of slight degree that had escaped notice, but only those patients with symptoms resulting from a separation were so classified. I feel that there is too much guesswork in studying the placenta and attached clots with no exact knowledge of the cervix and lower uterine segment, to enable one to make a positive diagnosis.

Among 125 patients with eclampsia or preeclamptic toxemia, no instance of ablatio occurred.

DR. FRED L. ADAIR, CHICAGO, ILL.—The management of these bleeding cases is necessarily complicated by considerations due to the maternal life and health and that of the fetus in utero, except where the offspring is already dead or previable. Even in uterine bleeding in the early months of gestation one is actuated by a desire to preserve the embryonic and fetal life in the management of threatened abortion. The treatment of threatened previable terminations of pregnancy with bleeding is to carry on to the period of viability if it is consistent with the health and life of the mother, by complete rest, with the administration of opium or morphine and belladonna or atropine, all under supervision and control of the patient in appropriate surroundings. When the process becomes inevitable, the uterus should be encouraged to empty itself, but great caution must be used in the employment of artificial means in potentially and actually infected cases. If the bleeding necessitates intrauterine manipulations, they should be carried out with great gentleness in an effort to avoid breaking down the natural barriers to infection. In noninfected cases the uterus may be artificially emptied with relatively little danger, though instrumentation of any pregnant uterus is fraught with the danger of serious trauma.

Under ideal conditions, with a properly equipped maternity hospital and competent personnel, a section is a desirable procedure in properly selected cases of

placenta previa but it is probably not needed in all. In the vast majority of cases such ideal conditions are not at hand and other methods must be used.

The obstetrician must avoid provoking any bleeding by rectal or vaginal examination until everything is ready to proceed in accordance with an outlined plan to control bleeding and secure cervical dilatation. If possible, all of these cases should be adequately hospitalized. Haste in delivery through inadequately prepared passages is to be rigorously avoided.

I will quote a few statistics from the Chicago Lying-In Hospital. There were 144 cases of placenta previa in approximately 15,000 deliveries. The incidence of cesarean section of various types in these cases was 42, or approximately 29 per cent. There were two maternal deaths in the series, which makes the maternal mortality from placenta previa about 0.75. Neither of these deaths occurred in a mother who had a cesarean section.

Among the 15,000 cases at the Chicago Lying-In Hospital mentioned above there were 113 cases of abruptio placentae. There were five maternal deaths which make a maternal mortality of 4.4 per cent. In this series there were 26 cesarean sections of different types, a percentage of 23.

DR. E. D. PLASS, IOWA CITY, IA.—Dr. Calkins was unable to utilize my cases in the determination of the effect of parity upon the amount of postpartum bleeding. These figures have been analyzed and show that, while there is no difference in blood loss in the average patient, multiparity does increase the chance of a postpartum hemorrhage with a blood loss of 600 c.c. or more.

Among 613 primiparous women in my series, there were 38 or 6.2 per cent, who lost 600 c.c. or more of blood, while among 557 multiparas, 64, or 11.2 per cent suffered a postpartum hemorrhage according to the criteria.

I would like also to emphasize that the kind of anesthesia employed has an effect upon the blood loss. Some years ago we reported upon the apparent effect of ether, either alone or in conjunction with another inhalation anesthetic, in promoting bleeding. Further experience has confirmed these observations. Our recent experience with chloroform has been too meager to permit conclusions to be drawn concerning its effect, and the newer agents have not been studied with this in mind.

We have held that the use of transfusions to combat the blood loss and shock in patients with placenta previa is the essential feature of the treatment, believing that if the patient is restored to good general condition, treatment either with the bag or by cesarean section will be satisfactory. My personal objection to the employment of abdominal delivery is that advanced against its use in all incidental indications—the same operation will be done in each succeeding pregnancy even when there is no indication other than the previous operation.

DR. J. C. LITZENBERG, MINNEAPOLIS, MINN.—This is an age of prophylactic thinking. The paper of Dr. Calkins, read this morning, directs itself to the prophylaxis of the loss of blood. We should cease thinking of obstetric cases in terms of mortality, or we might go even further and think in terms of the physiology of the woman, the slight disturbance of her health. It would seem unnecessary to argue before this audience that the conservation of every ounce of blood possible will lead to a more rapid recovery and the more certain return and maintenance of health.

As surgeons we emphasize a delicate handling of tissues. That often is the mark that distinguishes the expert surgeon from the mauler and that has to do with the health of the individual. We no longer operate in a sea of blood, but try to conserve every drop of blood possible.

Dr. Calkins did not tell you that the average loss of blood in his cases was 200 c.c. All of Dr. Plass's cases were privately conducted and the loss of blood

was 290 c.c. Our average loss of blood at the Minnesota Hospital is 450 c.c. I consider 300 c.c. as a postpartum hemorrhage, either that some accident has occurred beyond my control or I have not handled that case properly. I commend the technic which has been spoken of. Perhaps the bleeding in our clinic at the University of Minnesota more nearly approaches the average private case. Our cases are handled either by the resident or an intern. If we call ourselves expert obstetricians, I do not believe we should have a loss of over 300 c.c. of blood, and our figures for postpartum hemorrhage should be lowered, in general, at least from 600 to 500 c.c., and in the hands of experts to 300 c.c., unless the hemorrhage is due to something beyond our control.

In teaching students the Credé method correctly one must insist that the hand be placed behind the uterus as far as possible, with the thumb in front, and the uterus squeezed and not pushed. That eliminates the danger of pushing the cervix down where it may become infected. In this technic it is ever necessary to keep in mind that massage, unusual massage particularly, should not be used.

DR. JOSEPH L. BAER, CHICAGO, ILL.—I should like to outline for you the successive procedures tried out in the treatment of the third stage under my observation at the Michael Reese Hospital from 1904 to 1930. I was taught to hold the uterus for one hour after the end of the second stage whether placenta had been delivered or not. For one hour either the intern or the nurse had to hold the uterus, massaging as they saw fit for softening or bleeding. Then that period was cut down to thirty minutes during which no attempt at expression could be made. At the end of the thirty minutes the placenta was to be expressed or delivered by the Credé method if it had not come away spontaneously. Then in 1919, after we had run out of ergot because of the War conditions, we stopped the use of ergot which heretofore had been routine; we found that there was no difference in the third stage bleeding without the administration of ergot, so we permanently omitted the routine use of ergot. Then in 1925, following a presentation by Dr. Danforth on the routine use of pituitrin, we began using that, one-half ampule at the end of the second stage, and one-half ampule after the placenta had been delivered.

During these last years, however, we have completely discontinued holding the uterus. For a period of ten years we placed the hand across the abdomen in diaphragm fashion above the uterus without holding it, merely touching it to give us contact information. That was initiated when we used pituitrin.

In 1918, during the period of holding the uterus and giving ergot routinely, in 1,000 consecutive cases the average length of the third stage of labor was twenty-seven and a half minutes; in 1930, in 1595 cases, without touching the uterus except to determine its consistency, and with the use of pituitrin instead of ergot, the average length of the third stage was nine minutes. In 1918 we

TABULATION OF THIRD STAGE DATA DURING 1918 AND 1929

1918		1929
27.5	<i>Duration of Third Stage</i> Average	9.2 %
97.1%	Less than 30 min.	98.4 %
2.9%	Over 30 min.	1.6 %
	<i>Hemorrhage</i>	
3.0%	Slight and moderate	2.92%
0.3%	Severe	0.26%
3.3%	Total	3.18%
	<i>Placenta</i>	
0.9%	Manual removal	0.94%
0.5%	For hemorrhage	0.5 %
0.4%	Adherent	0.44%

did not do any manipulating to force the placenta out. We simply held the uterus for thirty minutes, whether the placenta appeared at the vulva or not, and at the end of thirty minutes expressed it.

We are almost convinced now that the routine use of pituitrin is superfluous and makes no real difference in the loss of blood in the third stage.

I believe that holding the uterus, likewise is totally unnecessary and frequently harmful, because holding the uterus before the placenta has been separated not infrequently includes massage for the softening of the uterine wall which is really normal relaxation, and results in irregular separation of the placenta with resultant increased bleeding and retention of a partially adherent placenta. Holding the uterus after separation is certainly superfluous because, so far as we can determine, it plays no part in the control of blood loss. Separation is the important consideration in the third stage. This can be determined without holding to the uterus. Frequent palpation is better and safer. Bleeding from the vulva is valuable evidence. We tie a bit of tape on the cord, and the advancement of that mark is another very good index. Again, the alteration of the contour of the fundus is significant. As it rises and becomes conical, it shows that the placenta has moved down into the lower uterine segment.

I believe that in the majority of instances there is no need for expression after the placenta has separated. If the woman is awake and of a cooperative nature, one need merely pull the recti together above the fundus in the upper abdomen, thus reconstructing the intraabdominal pressure at the height of a contraction, and in 90 per cent of our series the patient expels her placenta, using her uterus as the piston to drive the placenta out of the birth canal. I described that procedure eleven years ago. It has won very general recognition on the Continent and is used in Western Europe quite routinely. Its acceptance has been a little slow in this country, perhaps because many of our patients in the third stage are under the influence of a drug or anesthetic.

If I may say one word more in discord, I cannot agree with classifying placenta previa as placenta previa and nothing else. Neither can I agree with the complete omission of vaginal examination on hospital patients. In a long series of vaginal and rectal examinations Dr. Ralph Reis, of our clinic, found that the morbidity at the end of the complete series was identical. We have no fear about doing a vaginal examination on admission to determine the *status presens* of the patient whom we are considering. We do prescribe that a woman who is bleeding when admitted to the hospital shall not be examined by the house staff. A member of the staff is always available to do vaginal examinations, and I cannot agree that in a multipara, in whom the placenta is situated very eccentrically, as revealed by vaginal examination, it would be justifiable to deliver her by an abdominal operation. Simple rupture of the membranes, not to reenumerate the other procedures, has more than once closed the whole chapter of a placenta previa without any further intervention. Why do a section on that type of patient?

DR. ALEXANDER M. CAMPBELL, GRAND RAPIDS, MICH.—We employ a very simple method of preventing excessive hemorrhage by tamponade of the uterus. For the last two years we have been doing routinely immediate repair of the cervix following labor, and in working out this technic it occurred to me what a simple thing it is to pack carefully a bleeding uterus when one uses the DeLee vaginal retractors and proper tenacula. I maintain that if proper care is taken and if this technic is followed, there is practically no danger of infection. We have used this method in a sufficient number of cases without the slightest morbidity. We believe that careful tamponade of the uterus is much preferable to, and much more effective, than the forcible massage which is so often used in an attempt to control excessive postpartum bleeding.

Concerning placenta previa, I want to state that, as a practitioner who has followed the statistics on cesarean section for many years, I am glad that there are other members of this Association who do not take such a radical attitude as to advise cesarean section in every case of placenta previa. I think every such case is a law to itself and I am convinced that some cases will deliver themselves spontaneously and safely and that a number of cases may be successfully delivered by the use of a dilating bag.

I will admit that cesarean section is a procedure of choice in many cases when it can be done by a skillful operator and under favorable circumstances, but I think that the statement that every case of placenta previa should be submitted to cesarean section is a very dangerous one to emanate from this Association.

DR. W. S. BAINBRIDGE, NEW YORK CITY.—I am wondering whether in considering the question of hemorrhage, we have taken into consideration the physiologic chemistry of the blood? Where it has been possible, I have tried for years to get the coagulation time of the blood, and where possible, also the calcium content, although the coagulation time carefully done will give us a general rough view of the physiologic element in relation to coagulation. If the coagulation time is from seven to fifteen minutes, a few days of adequate medication will safeguard the patient and diminish hemorrhage. I question whether we are not often derelict in not paying more attention in our surgical work to blood chemistry.

DR. C. R. HANNAH, DALLAS, TEXAS.—I was particularly impressed with the discussion of Dr. Baer. Whenever we think of labor, we think of uterine contractions and these contractions are present through the first, second, and third stages of labor. I have observed often that a patient will complain of painful contractions during the third stage of labor almost equal to those of the first stage. These contractions of the third stage are of such severity at times that an anesthetic is necessary for relief. These painful contractions may mislead us, and cause the attending obstetrician to attempt to express the placenta before separation. The third stage of labor should be thought of as of two stages: first, separation; second, expulsion. An attempt should not be made to express the placenta until it is separated, which is recognized by the ascension of the fundus of the uterus near the diaphragm, inasmuch as this maneuver will increase the loss of blood. Rough manipulation of the uterus produces bleeding. Unless pathologic, the third stage should not be hurried if we desire to prevent the loss of blood. After separation of the placenta, and during a contraction, place the palms of the hands over the recti muscles, which act as a support, and have the patient bear down; thus the placenta is expelled without an unusual loss of blood. Pituitary extract is not indicated in a normal third stage of labor; but, if given, it should follow the expulsion of the placenta in normally conducted cases of labor.

DR. ALONZO K. PAINE, BOSTON, MASS.—For a number of years the Section of Obstetrics and Gynecology of the Massachusetts Medical Society has been studying maternal mortality in Massachusetts; the statistics indicate that next to sepsis, hemorrhage is responsible for the largest number of maternal deaths, and that in these hemorrhage cases the placenta previas play a conspicuous part. I am especially interested, from the standpoint of teaching, in the adoption of a more or less standardized treatment for these placenta previa cases. I was glad to hear Dr. Bill minimize the importance of the variety in a given case. Dr. Potter puts it strongly when he says there is only one variety of placenta previa. It also seems to me that the wisdom of vaginal examination in these cases before the onset of labor is open to question. The existence of placenta previa can usually be established without such an examination, and the additional knowledge secured is of doubtful value in many cases; valuable time may be lost and hemorrhage increased by the procedure.

For a number of years in teaching I have emphasized two things as important in determining procedure; the symptom itself, bleeding, and the time of its occurrence. In a general way, if definite bleeding occurs before the onset of labor, the case is a potential cesarean. If this symptom appears in the seventh or eighth month, is slight in amount and ceases quickly one is justified, with the patient in a hospital bed, in waiting from day to day until the baby is reasonably viable. Recurrent flow indicates the unwisdom of further delay and a cesarean should be done. Procedure, when bleeding begins after the onset of labor, depends on the degree of dilatation of the os. If there is slight or no dilatation, cesarean section still is the procedure of choice. If the os is sufficiently dilated to permit the easy introduction of a bag, it seems the conservative procedure. If a considerable degree of dilatation is present, simple rupture of the membranes will often suffice to control bleeding. In cases where complete dilatation is easily secured, its completion manually, followed by immediate extraction, is good treatment.

DR. D. L. JACKSON, BOSTON, MASS.—Whether or not we believe in the routine use of pituitrin in the third stage, whether or not we believe in holding the fundus of the uterus, it is true that some uteri do not contract well after the placenta is delivered. In these cases where relaxation is present and bleeding is alarming, I have found that the use of pituitrin intravenously, in two or three minim doses, acts miraculously, clamping the uterus down tightly, almost before the administering syringe can be laid down and the hand returned to the fundus.

The second point I wish to emphasize is the value of getting the patient's legs out of the stirrups and getting her flat as soon as possible after delivery. This simple maneuver accomplishes the very thing Dr. Calkin mentioned; viz., it causes the uterus to come out of the pelvis up into the abdominal cavity.

DR. A. J. RONGY, NEW YORK CITY.—Bleeding toward the end of gestation must be considered in the light of a displaced pregnancy and ought to be treated as such. A misplaced nidation during the early period of gestation leads to an ectopic pregnancy. A misplaced nidation in the last six weeks results in a placenta previa. In either instance occasionally the patient may be able to get along without surgical intervention, for tubal abortion may take place and the patient gets well; the same happens in a large number of cases of placenta previa: labor sets in, the presenting part presses on the abnormally situated placenta, bleeding is controlled in that way, the child is born, and the placenta delivered with very little complication. However, placenta previa causing bleeding before the woman is in labor, before there is any dilatation, the cervix still rigid, and no presenting part to press upon the placenta, must be viewed in the same light as an unruptured ectopic pregnancy. In these cases the safest method of delivery for both mother and child is cesarean section.

During the third stage of labor, the variation in the quantity of blood lost depends to a large degree upon the coagulability of the blood of the particular patient, for in addition to the closure of the sinuses of the uterine surface at the placental site, it is also necessary that coagulation take place at the opening of those sinuses, and the sooner that takes place the sooner will bleeding or oozing cease.

DR. FOSTER S. KELLOGG, BOSTON, MASS.—It seems to me we should be slow to accept chronic nephritis as the etiologic factor in ablatio in as high a percentage as Dr. Polak suggests. Williams states in the new edition of his textbook that he saw but two cases in his series of 57. In our series we have been unable so far to establish a single case of certain chronic nephritis by interval study. Autopsy material carefully studied in relation to the kidney is very scant. We have finally in one instance found a kidney with infarct formation with desquamation of the tubular epithelium beyond. This is the picture of the characteristic

pathology of the liver in eclampsia. It also accounts for the characteristic picture of the detritus-filled tubules with attempts at epithelial regeneration described by Couvelaire and seen by us, and called by Mallory "late tubular nephritis." In contradistinction to Williams we have found in one autopsy in a patient who did not have convulsions, typical eclamptic liver lesions. We have reported eight cases (now ten) in which separation occurred on or about the time of the disappearance of albumin and elevated blood pressure in patients with noneconvulsive toxemia. Further, we reported five cases of ablatio associated with convulsive toxemia and called attention to the fact that each had one or more convulsions prior to placental separation.

DR. E. L. CORNELL, CHICAGO, ILL.—I want to emphasize the fact that we so seldom treat these hemorrhage cases prophylactically. We should give the pregnant woman, as part of her prenatal care, calcium in some form during the latter months of her pregnancy. Today most women are delivered under some form of anesthesia, either ethylene, nitrous oxide or ether; therefore the uterus at the last end of the second stage does not contract as readily as it would without any anesthetic.

A third factor, which plays an important part is the rapid delivery of the body, after the head is born. The uterus loses its opportunity to contract and retract.

Another detail in the management of the third stage is that the patient should have from $7\frac{1}{2}$ to 20 minims of pituitrin as soon as the head is born and before the shoulders are delivered. During the war we were unable to obtain packing material, so we instituted the use of pituitrin in the beginning of the third stage or at the end of the second stage of labor and since then postpartum hemorrhages have markedly increased.

I know of no way to predetermine the amount of blood any one individual will lose in any type of placenta previa; therefore, I agree with Dr. Bill that until we are able to predetermine the amount of bleeding in any patient, the cesarean section in cases with a closed cervix offers the best results.

DR. ALBERT MATHIEU, PORTLAND, ORE.—The completion of the third stage of labor does not preclude the possibility of hemorrhage. I think the patient should be left in the delivery room one hour following delivery; that the uterus should be watched, not by the one who is cleaning up the delivery room, but by one designated for that purpose; and that the doctor should stay in the hospital for one hour following delivery. I know of two deaths that might have been prevented had the patients been watched in this way, and I think I have on two occasions saved the life of a patient by being in the hospital when the hemorrhage began.

DR. JAMES K. QUIGLEY, ROCHESTER, N. Y.—There would seem to be one other reason for not packing the uterus; namely, the development of a chronic endometritis and separation of the placenta in these cases in subsequent pregnancy. I believe in packing the uterus rarely and we should pack through the large Harper tube whereby the gauze at no time comes in contact with anything except the uterus.

DR. CALKINS (closing).—I would say to Dr. Bainbridge that we have routinely taken the coagulation time for several hundred cases and so far it has been found to have no effect on the blood loss. We have not routinely made blood calcium determinations but we do routinely give calcium to all of our patients.

Dr. Hannah called attention to the manner of giving pituitary extract. We never give it until after the placenta is delivered; therefore, we do not give it in the third stage but at the completion of the third stage.

I am very glad that Dr. Baer sounded a discordant note. He pointed out that the alteration in contour of the uterus is an important sign of the separation of the placenta from the uterus. I should like to ask whether he can *see* that contour, or does he *feel* it with his hands? Ahlfeld, years ago, called our attention to the fact that only 14 per cent of all women would spontaneously express their own placentas. He had a series of several thousand cases. Williams has repeatedly called attention to that fact in each edition of his textbook.

In justification of the technic recommended for the management of the third stage of labor I would like to call attention to the fact that our figures are based on *measurement* (not estimation) of blood loss, 210 c.c. being the average blood loss, including all cases. For example, we had one patient with 2500 c.c. of blood loss in the uterus, in a case of *ablatio placentae*. That case is included in the average. The average is little more than one-half of the smallest previously published average. The smallest was that of Williams in the Hopkins clinic, 343 c.c. in 1000 cases. The other averages have been 500 c.c. or more.

It is a fact that too much anesthesia will produce more blood loss, regardless of the agent used. It is also true that ether will produce more bleeding than nitrous oxide, and that ethylene will produce more bleeding than nitrous oxide. Lacerations or operative procedures of any sort will increase the amount of bleeding. Hydramnios, twins, placenta previa, etc., increase the bleeding. I was considering the variation in blood loss in normal labor primarily.

DR. BILL (closing).—By way of general discussion, fifteen years ago, in a paper prepared for the Ohio State Medical Society, I advocated the routine use of pituitary extract in the third stage of labor. We have used this routinely ever since, in probably more than 40,000 cases. We have had no trouble from it whatever. Our feeling is that there is no single thing that has done as much in preventing postpartum hemorrhage as the routine use of pituitary extract as soon as a child has been born. We give a full cubic centimeter at this time.

In regard to my own paper, let me again emphasize that of first importance is the examination of the patient's condition by careful blood examination and blood pressure reading, to determine whether she is a fit subject for delivery. If she is not, a sufficient blood transfusion should be given her to make her a fit subject. We have given as high as 2200 c.c. in a single case.

As to the examination, I believe that absolutely nothing can be gained by vaginal examination. One discussant said it was radical to do a cesarean in a "supposed" case of placenta previa. It is possible to make a diagnosis of placenta previa without examination. Our comparatively low incidence of placenta previa, one in 330 cases, is proof enough that none but real cases of placenta previa have been treated in this way. Further, you must realize that vaginal examinations only add to the danger of infection and that manipulation often causes serious hemorrhage which means an unnecessary loss of blood to the patient.

As to the method of delivery where forcible dilatation of the os is accomplished, no matter how gently, there will always be cases of postpartum hemorrhage, and I believe that the only cases in which we can be absolutely sure that there will not be postpartum hemorrhage are the ones in which we leave the placental site untouched; that is, cases treated by abdominal cesarean section.