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RUPTURE OF THE UTERUS THROUGH THE CESAREAN CICATRIX.

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In November, 1906, the writer had the misfortune to lose a patient by rupture of the uterus through the scar of a Cesarean section which he had performed in December, 1904. In order to ascertain the frequency of this accident, the mortality, etc., the literature has been searched, cases have been recorded and deductions of value have been drawn.

Frequency.—It is wonderful to note the great difference in the frequency of rupture after the old Cesarean section, as compared with the results following the new or modern operation.

Krukenberg,[1] in 1886, stated that, after the old operation, 50 per cent. of all cases resulted in rupture of the uterus during subsequent pregnancies. He reported 20 cases of rupture through the scar, with a mortality of 50 per cent. On the other hand, Olshausen, in speaking of the Prüsmann Henkel case (No. 12)[19] stated that it was the only one of scar rupture in at least 120 Cesarean sections. In the literature of the last five years we have found the records of 18 cases, to which we have added two hitherto unreported cases, making a total of 20. Among these will be found one case (No. 11)[18] where the uterus was not sutured at the time section was performed, and, properly such a case might be excluded from our statistics. When one considers the large number of sections which have been performed, many of which have not been reported, the accident is seen to be of comparatively rare occurrence. In spite of the infrequency, however, the nature of the accident is so grave that one must keep the possibility of the emergency constantly in mind.

Etiology.—Much has been written in regard to the cause of rupture, but briefly, there seem to be two factors in the etiology.

One is the natural weakness of a cicatrix, whether in the uterus, abdominal wall or perineum, and the other is the invasion, so to speak, of the musculature of the uterus by foci of decidual cells. In Prüsmann's case, decidual tissue had invaded the muscular tissue about the incision and had even extended to the serosa. Sinclair[2] believes that if silk were used for suture of the uterine wound, rupture would seldom or never occur; but in at least two of the reported cases, those of Woyer and Everke, the rupture occurred in spite of silk sutures. We believe that if good ap-

proximation of the edges of the wound is secured, and interrupted sutures of chromic catgut are used, the result will be perfect, as far as complete union of the parts is concerned.

Diagnosis of Rupture.—In many cases, especially in the complete variety, there are the typical symptoms of sudden cessation of pain following a severe uterine contraction, with evidences of shock, increase in the pulse rate, vomiting and cold sweat. The fetal parts can be palpated with greater ease, the fetus is more movable, and the contracted uterus may be felt. By vagina, the presenting part has slipped away from the brim, and there may be external hemorrhage. In several of the reported cases, however, the rupture was not suspected until the operation for section was performed, and in one case a diagnosis of appendicitis had been made. Evidently, the condition was not discovered in some cases, for operation was not performed until hours had elapsed since the rupture had taken place. In our opinion, labor after Cesarean section should be anticipated, but if one is called in to see a patient who is having severe uterine or abdominal pain, at or near term, the abdomen should be opened at once.

Repeated Cesarean Section.—Wallace,[3] in his exhaustive monograph on repeated section, collected 96 cases, 43 of which had had two operations, 15 had had three, one had four, and one, the celebrated Frau Rittgen case, had five, the last resulting fatally from general peritonitis. Kriwski,[7] in 1905, reported 88 cases, 72 of which had two sections, 13 had three, and three patients had four. Many other instances have since that time been reported, among them that of Sinclair,[2] in which four sections have been successfully performed on the same patient. The mortality of repeated section is stated by Wallace[3] to be 6.45 per cent. (4 in 62), or including death from repeated fundal incision, 7.93 per cent. This certainly compares favorably with the mortality of primary Cesarean section, which in the hands, of all operators, is between 5 and 10 per cent. In the hands of experts, the mortality of both classes of cases is probably less than 5 per cent.

Mortality of Rupture through the Scar.—Krukenberg,[1] referring to the old operation, quoted a mortality of 50 per cent. Very different has been the death rate in the cases reported and referred to in the literature of the last five years. Of the 20 reported cases, 16 recovered, three died, and the result in one case (No. 4)[11] is unknown. Note must be made of the fact that in

case No. 11,[18] the uterus was not sutured at the time of the section, and we have included in our cases of recovery the case of Lobenstine, for when the patient was ready to sit up on the tenth day pneumonia set in, which terminated fatally on the seventeenth day. This death can certainly not be attributed to the operation. The mortality is, therefore, 15 per cent. In each of three fatal cases the rupture was complete, the child having entered the abdominal cavity, and in one case laparotomy was not performed until two days had elapsed from the onset of labor. In my own case, the patient was dying when the laparotomy was performed, some five hours after pains had commenced, at the end of the eighth month of pregnancy. When one compares the 15 per cent. mortality with the mortality of rupture of the uterus in general one is astonished that the figures are so much lower. In recent years the mortality has decreased, but the figures given below give some idea of the appalling death rate from rupture. Dorland[4] collected from the literature of the three years from 1901 to 1903, 50 cases with a mortality of 24 per cent. Ivanoff[5] stated that, in the Moscow Maternity, from 1877 to 1901 there had been 124 cases of which 98 died, giving a mortality of 79 per cent. The same author quotes Klien, who gives 56 per cent. recovery by operative methods, and Kolomenkin who gives 53 per cent. recovery by operation (but excluding cases of laparotomy and suture, 64 per cent.). Lobenstine[6] quotes 37 cases with a mortality of 73 per cent., but states that in the last six cases the mortality was only 33 per cent. The fact must be considered that in the case of a patient who has had a Cesarean section, the treatment of a subsequent pregnancy and labor is frequently referred to experts, which would naturally account for the smaller mortality. The fetal mortality is very high. Of the 16 cases where the result for the child is known, the child lived in three, giving a mortality of 81 per cent. The child died in every case of complete rupture, and when the child was alive the rupture was small.

Variety of Incision and Character of Rupture.—The incision was longitudinal in thirteen cases, fundal in six and probably fundal in the remaining case of the twenty. Of the three fatal cases, two had had the longitudinal incision, one the fundal. In recent years the anterior incision has been used much more often and, indeed, there is no reason to believe that there is any advantage in the fundal incision. We believe that the greater frequency of rupture with the longitudinal incision is due to the

very much greater frequency of that incision. The rupture was complete (by which we mean that the ovum passed out of the uterus into the abdominal cavity) in fourteen cases, partial in five and in one case unknown. All of the partial and eleven of the complete cases recovered.

Treatment of Rupture.—Hysterectomy was performed in twelve cases, with two deaths. Suture of the wound was the treatment in six cases, all of which recovered, and in my own case the patient died before any treatment could be instituted. In Schütte's case (No. 9),[16] the operation was done some days after the rupture, and the uterus was well involuted. Whether the uterus was sutured or not we do not know. The results where the rupture was sutured were all favorable, and yet many operators perform hysterectomy for the treatment of the condition. In the hands of experts either plan of treatment will in most cases be successful, but in clean, simple cases where the tear is not ragged, there is no reason why the uterus should not be sutured. Certainly in the hands of one who is not expert in abdominal surgery and when the patient is in bad condition the suture offers a quicker and safer method of treatment than hysterectomy. Quoting again from the statistics of Dorland,[4] which refer to rupture of the uterus in general, we find that the uterine wound was sutured in ten cases, only one of which died. Five of the nine women who recovered after suture became pregnant again. In three of these, labor was normal, in one case forceps were used, and the fifth was terminated by induction of labor at the thirty-third week. These figures, which indicate a mortality of only 10 per cent. after suture and the successful termination of pregnancy in five cases, certainly indicate that the plan of treatment by suture is eminently successful and, therefore, should, as a rule, be advocated. According to the statistics of Schultz, Valenta, Klien, Kolomenkin, Dorland and others, the operative treatment of rupture in general offers the best results, and in this opinion, especially where the patient is surrounded by the proper conditions and is under the care of a skilful operator, we must agree. Speaking again of rupture in general, we believe that in the absence of the above conditions, when rupture has occurred, the fetus should be extracted by forceps, version or craniotomy, after which the uterus should be tamponed. If hemorrhage continues, or if the necessary preparations can be made, abdominal section should be performed, and the uterus sutured or removed as the operator may elect.

Prophylaxis, Including Sterilization, Time of Operation and Technic of Cesarean Section.—The question has arisen: "should a patient, in the presence of absolute indications for Cesarean section, be sterilized at the time of the first section?" It seems to me that in the absence of any condition, such as carcinoma or fibroids, which in itself would indicate the removal of the uterus, the question of future pregnancy should be answered before the Cesarean is performed. The danger of repeated section and the possibility of rupture of the uterus during pregnancy and labor, should be put before the patient plainly, and, in our opinion, if the woman knowing the facts of the situation elects to undergo repeated Cesarean sections, she should be allowed to do so, and, indeed, she may do so without great risk, if we may judge from the figures which have been already stated. If the patient is opposed to the risk of a second or subsequent section, sterilization should be performed. The simplest way of doing this is to resect a portion of each tube. Ligature alone is not sufficient, as the case of Galabin (No. 6)[13] will prove. Sinclair[2] is violently opposed to sterilization, quoting the small mortality of repeated section and the infrequency of rupture of the uterus. He says: "Sterilization and hysterectomy are rapidly entering the limbo of deplorable episodes in the history of obstetrics and gynecology." Galabin and Green are equally emphatic in their views on the subject.

With reference to the time at which operation should be performed, we believe that it is better to anticipate labor by a week or ten days, in order that the operation may be performed, at a convenient time, with proper surroundings and good assistants. Should labor set in earlier than had been expected, we advise that the Cesarean operation be performed as soon as possible. In many of the recorded cases labor had been in progress for a number of hours, and each hour of labor adds to the danger of rupture. Experience has shown that results are fully as good when the operation is performed before labor commences, and, indeed, there are many advantages to be gained by operating at an elected time and place. Finally, we refer to the technic of the section, as entering into the prophylaxis of the repeated operation and subsequent rupture. My method of performing the section is as follows:

The usual preparations for laparotomy having been made, the bladder is emptied by catheter, and the cervix, if closed, should be dilated to the extent of two fingers. An assistant then makes pres-

sure at either side of the abdomen, thus bringing the abdominal and uterine walls closely together, and forcing the uterus well forward in the median line. An incision is then made, about six inches in length, in the median line of the abdomen, beginning at a point about three inches above the umbilicus. Sterile pads are then placed at either side of the incision, and then we make a median uterine incision of the same length as the abdominal. The child is seized by one or both feet, and quickly extracted. If in making the incision, the placenta is encountered, the hand is quickly forced through it, the child is extracted and the placenta removed at once. An assistant seizes the uterine arteries, and makes digital pressure, sufficient to shut off the uterine circulation. The umbilical cord is then cut, and the child is handed over to an assistant. While this is being done, an assistant brings the uterus up into the abdominal wound, and protects the peritoneal cavity with gauze pads. The placenta and membranes are removed manually, and the uterus is dried with a gauze pad. If the uterus is well contracted no packing is necessary, but if it is soft and shows a tendency to relax, the cavity should be packed with sterile gauze. Interrupted sutures of No. 2–20 day chromicized catgut, are passed through the inner two-thirds of the muscular coat, down to, but *not including* the mucous membrane. Another layer of sutures of the same material is then passed through the peritoneum and the outer portion of the muscular coat, and finally a continuous suture of No. 1 catgut is taken in the peritoneal coat, in order to close in all raw surfaces, and to prevent contamination from the uterine cavity. All blood and clots are then removed from the peritoneal cavity, which is then filled with hot normal salt solution, after which the abdominal incision is closed, layer by layer, in the usual manner.

Wallace[3], in his complete monograph, stated that (1) complete utero-parietal adhesions render repetition of Cesarean section simple and easy; (2) that all sections should be performed with a view to ultimate pregnancy: (3) that this can be done by the adoption of means to ensure complete utero-parietal adhesions. On the other hand, the presence of any marked form of adhesions other than complete utero-parietal, tends to render repeated section more formidable. He said also that to Michaelis (who, in 1836, performed the operation for the fourth time on the same patient, the last three operations being extraperitoneal), Sinclair and Spencer belong the credit of recognizing the truth of the principles just enunciated. Speaking of adhesions, Sin-

clair,[2] in his recent article on repeated section says: "Accumulating experience points to the conclusion that the patient is safest when, during a second or subsequent operation, the adhesions are most carefully preserved from interference." He then reports a case on whom four sections have been made. After the first section the uterus became adherent to the abdominal wall, as after a ventro-fixation. The second and third sections were practically extraperitoneal (the opening into the peritoneum being exceedingly small), and the fourth section was extraperitoneal. Sinclair has had no opportunity during the last five years, of operating a second time in any case where ventro-fixation had been intentionally performed at the time of the first section; but he thinks that the evidence from numerous reported cases points to the conclusion that if adhesions occur, and are respected, the danger is greatly diminished. He has seen no reference to a fatal result in such a case. His method of operating is as follows. After the usual section, the uterine wound is closed with silk. Fine silk sutures, one on each side, are introduced low down in the vesico uterine fold, well beyond the bladder laterally so as to close the fold and prevent intrusion of the intestines at some future time. He then passes a fine silk suture through the parietal peritoneum opposite the lower end of the incision, and then takes hold of a layer of uterus well out from the margin of the uterine wound. The suture is then passed back through the peritoneum and tied. This method of suturing is continued symmetrically on both sides, until the uppermost suture is slightly above the level of the lower margin of the corpus uteri. Then a stronger silk suture is passed through the fascia on one side of the wound, through the peritoneum and across "through a considerable, not very superficial portion of the uterus," then out through peritoneum and fascia and tied as a buried suture. Another suture is passed higher up, so as to include the uterine wound near its upper termination. This secures a wide area of adhesion, and the abdominal wound is then closed. Intestines and omentum are thus excluded from the field of future operations. Sinclair then gives his experience of thirty cases cured of sterility by hysteropexis hypogastria, who have gone through pregnancy and parturition without abnormal symptoms. Further results from this plan of treatment will be awaited with great interest. We have known rupture of the uterus to follow ventro-fixation, and time only can decide as to the value of the method.

Conclusions.—1. Rupture of the uterus through the Cesarean cicatrix is of rare occurrence.

2. With prompt operative methods the mortality is comparatively low.

3. When pregnancy follows Cesarean section, the patient may be safely delivered again by section in a large percentage of cases.

4. In repeating a section, labor should be anticipated by a week or ten days.

5. If section is to be repeated and labor sets in prior to the time elected for operation, the Cesarean should be performed as soon as possible after the onset of labor pains.

6. Sterilization may be done at the time of section, if the patient so desires.

7. Suture of the laceration has proven successful, but in some instances hysterectomy will be the method of choice.

CASE I, reported by Koblanck.[8] In this patient the anterior incision had been made, and rupture occurred through the scar. The intact ovum was found in the abdomen, the laceration was sutured and the patient recovered.

CASE II, reported by Woyer.[9] Cesarean section had been performed by Chrobak in 1893, the anterior incision being made and silk used for suturing. Rupture occurred at the beginning of labor, the abdomen was opened at once and twins were extracted from the abdominal cavity. The patient died the same day. At the time of operation it was found that the wound of the Cesarean section had failed to unite through the entire thickness of the wall. Parts of the muscular wall had never united.

CASE III, reported by Guillaume.[10] This case is of unusual interest, because of the fact that rupture occurred in the eighth month of pregnancy. Cesarean section had been performed three years before the anterior incision had been made and the wound had been sutured in layers. When the patient became pregnant again, she was advised to have labor induced in the eighth month, and the date decided upon was May 25th. On May 20th, at 9 A.M. the patient was seized with severe abdominal pain, especially on the right side. At 3 P.M. the pain was most severe. At 5.30 P.M. the pulse was small and thready and there were vomiting and chills. The abdominal pain was at this time not so intense, and the fetal parts could be distinctly felt, as the child had escaped into the abdomen. Laparotomy was performed a few hours later, the ovum found intact in the peritoneal cavity, the rupture was found to have taken place in the old scar, the uterus was removed and the patient recovered. Guillaume states that similar cases have been seen by Saint Moulin and Kufferath.

CASE IV, reported by Targett.[11] In the Cesarean operation performed two and a half years before, the anterior incision had

No. of Case.	Reported by	Date.	Period of Gestation.	Cesarean Incision.	Variety of Rupture.	Treatment.	Result, Mother.	Result, Child.
1	Koblanck.	1895	Full term? labor?	Longitudinal.	Complete.	Suture.	Recovery.	?
2	Woyer.	1896	"Beginning of labor." Term?	"	"	Hysterectomy.	Death.	Twins, both dead.
3	Guillaume.	1896	"In the eighth month."	"	"	"	Recovery.	Dead.
4	Targett.	1900	"Full term? labor?	"	"	"	?	?
5	Everke.	1901	"End of pregnancy."	"	?	"	Recovery.	Dead.
6	Galabin.	1902	"Near term."	"	Complete.	"	"	"
7	L. Meyer.	1903	At term in labor.	Fundal.	Partial.	Suture.	"	?
8	Ekstein.	1904	Full term in labor.	"	Complete.	Hysterectomy.	Death.	Dead.
9	Schütte.	1904	At the eighth month.	Probably fundal.	"	Laparotomy, suture?	Recovery.	"
10	Kerr.	1904	In last month, in labor.	Fundal.	"	Hysterectomy.	"	"
11	Ribemont-Dessaignes and Rudaux	1904	at term in labor (hours)	Longitudinal. (uterus not sutured)	Partial.	"	"	Alive.
12	Prüsmann Henkel.	1905	Full term? labor?	Longitudinal.	Complete.	Suture.	"	?
13	Schink.	1905	At term in labor.	Fundal.	"	"	"	Dead.
14	Werth.	1905	Full term? in labor?	Longitudinal.	"	Hysterectomy.	"	"
15	Wyder.	1905	At term, in labor 20 hrs.	Fundal.	Partial.	"	"	"
16	Paddock.	1906	At term, in labor 24 hrs.	Longitudinal.	Complete.	"	"	"
17	Mabbott.	1906	At term, in labor 20 hrs.	Fundal.	Partial.	Suture.	"	Alive.
18	Schneider.	1907	At term, in labor 7 hrs.	Longitudinal.	"	"	"	"
19	Lobenstine.	1908	At term, in labor 18 hrs.	"	Complete.	Hysterectomy.	Recovered from operation but died of pneumonia on 17th day.	Dead.
20	Brodhead.	1908	36 weeks, in labor 5 hours?	"	"	Laparotomy, death of patient following a few minutes later.	Death.	"

been made. Complete rupture occurred subsequently and hysterectomy was performed. It is not stated whether the patient recovered or not.

CASE V, reported by Everke.[12] In this patient the anterior uterine incision had been made and the uterus sutured with silk. At the end of the succeeding pregnancy there was severe abdominal pain, and the patient was brought to the hospital in collapse. A diagnosis of appendicitis was made, and the abdomen when opened was found to be full of fresh blood. Rupture had taken place in the Cesarean scar; the uterus was removed and the patient recovered.

CASE VI, reported by Galabin.[13] In the Cesarean operation the anterior incision had been made, and attempt had been made to sterilize the patient by ligating the tubes. In spite of this the patient became pregnant again, and the uterus ruptured at about full term along the line of the Cesarean cicatrix. The child and part of the placenta had escaped into the abdominal cavity. Hysterectomy was performed and the patient recovered.

CASE VII, reported by L. Meyer.[14] Two and a half years after Cesarean section for contracted pelvis, rupture of the uterus occurred at term. Laparotomy was performed and there was found a rupture of the former scar, from which the placenta projected, and there had been considerable bleeding. The uterine tissue was very friable. Apparently, rupture had not been diagnosticated, laparotomy having been intended for simple Cesarean section. The operator was certain that the rupture had preceded the operation, the accident having occurred probably during severe pains while the patient was in the bath-tub. The fetus was extracted through the rupture wound and the latter was sutured. Recovery was uneventful. In the opinion of the operator, the original Cesarean wound had not healed thoroughly.

CASE VIII, reported by Ekstein.[15] Age 33; IV-para first seen June 8, 1904. First two labors ended in perforation, the third in Cesarean section. The patient was warned against future pregnancies (rachitic flat pelvis), but the advice was unheeded. At term pains set in and were extremely violent. After a time fetal movements ceased and the patient was removed to a hospital. There were present meteorism, vomiting, hiccough, small pulse, etc., and the fetal heart sounds were inaudible. Sensitiveness to palpation seems to have interfered with diagnosis, as laparotomy was not performed for two days. Incision was made along the old scar, exposing fetus, membranes and placenta. The uterus was found contracted and ruptured exactly in the scar of the old fundal incision. The dead fetus, placenta and blood were removed and a Porro operation performed. Death occurred one and a half hours after operation.

CASE IX, reported by Shütte.[16] Upon this patient Cesarean section had been performed sixteen months before the accident, leaving a fistulous tract from the uterus to the abdominal wall.

At the eighth month of the pregnancy which followed the section, the patient fell out of bed, and three days later pain, vomiting, etc., set in, but subsided shortly to reappear in two weeks with evidences of uterine rupture. Laparotomy revealed a macerated fetus among intestinal loops. The uterus was contracted to the size of a fist. The laceration at the fundus was only 3 to 4 cm. long, and several intestinal fistulæ formed afterward and were eventually healed by operation.

The laparotomy wound was not closed outright, but with drainage. The uterus was strongly adherent to the intestines. No mention of closure of the small laceration in the uterus is made.

CASE X, reported by Kerr.[17] The patient, a IV-para had undergone Cesarean section two years before for flat pelvis. Labor had been allowed to proceed until the cervix was fully dilated; then the fundal incision of Fritsch was made, and an 8 lb. living child extracted. Recovery was perfect. On admission to the hospital for a second Cesarean operation, in the thirty-seventh week of pregnancy, the patient stated that she had felt no discomfort since the beginning of pregnancy. She was well nourished and in good condition. After an enema, there was abdominal discomfort, slight pain in the epigastrium, extending upward to the right. The patient fell asleep and slept four and a half hours. Then a bloody vaginal discharge appeared and the patient complained of slight pain in the right iliac region. Nine hours later the temperature was 97.6° F., the pulse 80, and there was pain all over the abdomen, but it was not very severe; there was no nausea or vomiting. Nine hours later there was considerable abdominal tenderness, but the pulse was good. One hour later the temperature was subnormal, respiration more rapid and tenderness more marked. The patient lay with legs drawn up, and there was exquisite tenderness over the entire abdomen, more marked to the right and below the navel. The fetal parts could be readily palpated, and the presenting part could not be felt through the cervix. The abdomen was opened along the line of the previous scar; a large amount of dark clots was found and the intact fetal sac was lying free in the abdominal cavity, the contracted uterus lying behind and below. The full term fetus was dead. The uterus showed a transverse rupture through the cicatrix of the previous section. The uterus was removed and the patient recovered. The interesting point was that there was slight alteration of pulse tension and rate and no collapse, although complete rupture had occurred.

CASE XI, reported by Ribemont-Dessaignes and Rudaux.[18] The patient, age 29, had had a difficult labor in 1899, which was terminated by Cesarean section. The woman's condition was so serious that the uterus was not sutured. The peritoneum was sutured with catgut, and the patient recovered. In January, 1904, the woman went into labor again at term. After labor had been in progress for some hours, the patient suffered from very

severe pain, and the pulse was accelerated. The fetal parts could now be easily palpated, and the diagnosis of rupture of the uterus was made. Laparotomy was performed several hours later. The uterus was found to be ruptured in the scar of the former section, and a living child was extracted through the rent. The Porro operation was performed, and the patient recovered.

CASE XII, reported by Prüsmann-Henkel.[19] Age 40; III-para; seen January 21, 1905. First Cesarean in 1894, second in 1902. Admitted to the clinic shortly before term with symptoms of complete rupture of the uterus. Laparotomy was performed, and the fetus, membranes and placenta were found outside of the uterus, which was moderately contracted. The rupture was found in the old scar, which was sagittal over the fundus and anterior wall. The edges of the rupture were freshened and ten muscular sutures were placed. This case was also complicated with a history of hernia of the abdominal scar, which had been operated on in 1904. The scar of this wound was excised for a finger's breadth. Recovery was smooth.

Commenting on this case, Olshausen states that he has seen but one such rupture in at least 120 Cesarean sections.

CASE XIII, reported by Schink.[20] Age 28. First seen, July 8, 1902. On Feb. 16, 1899, the patient had undergone Cesarean section for contracted pelvis. The fundal incision was closed by sutures in two planes; (1) a deep suture embracing the peritoneum and musculature; (2) superficial, peritoneum only. The woman became pregnant one year later. At term labor set in, but the child, found to be lifeless, was perforated and extracted. One year later another (the present) pregnancy for which she was admitted at term at the clinic. Strong pains were followed by collapse, necessitating removal to the hospital. There were marked anemia, cyanosis, chills, pulse small, 150–160. Rupture of the uterus was evident on palpation. Laparotomy, July 8, 1902. Incision in the region of the original abdominal scar. The ovum was found intact in the abdominal cavity and, together with a large amount of blood, was removed. The uterus was found to have been ruptured exactly in the site of the old fundal scar; at this point the uterine wall consisted wholly of serosa and a narrow strip of muscle. The edges of the wound were freshened in the entire thickness of the musculature, and catgut was used for the mucosa and adjacent musculature. Over these silk sutures were placed, grasping the entire musculature and serosa. The fetus was dead, but the mother made a good recovery, and has not been pregnant since.

CASE XIV, reported by Werth.[21] This patient had a pelvis which was rachitic to a high degree. The first labor resulted in a dead child. The second pregnancy (1893) was terminated by Cesarean section with good recovery, the child surviving. The longitudinal incision was made a little to the left of the median line. The third gravidity ended in abortion at the fifth month.

The fourth, in 1905, ended in sudden rupture soon after admission to the clinic. Laparotomy was performed the following day, and the ovum was found intact in the abdominal cavity. The uterus was firmly contracted. The rupture had taken place at the site of the old longitudinal scar. The Porro operation was performed and the patient recovered.

CASE XV, reported by Wyder.[22] IV-para, age 29, entered the clinic October 4, 1904, in labor. The first labor ended in premature labor at the seventh month; the second labor, with transverse position and prolapsed arm, lasted three days. Cesarean section was then performed. Healing was complicated by suppuration, through the abdominal wound. The third labor was premature at the seventh month. None of the children survived. The present pregnancy went to term. A generally narrowed pelvis was found and adhesion of the uterus to the abdominal wall and symphysis. Cesarean section was decided upon. About twenty hours after the onset of labor palpation revealed danger of rupture, for the fetal parts were easily to be felt. There was a difference of opinion between the woman's relatives as to the course to be pursued, necessitating telephoning, etc., and during the delay the patient experienced a severe pain, followed by prominence of the fetal parts, but with no signs of collapse. Immediately afterward laparotomy was performed. The tear measuring 3 cm. by 1 cm., was located in the fundus, and the ovum had not yet escaped. The adhesions between the uterus and the abdominal walls were separated, as well as intestinal loops, which adhered to the site of the old scar. The tear was then enlarged to permit extraction of the child (now dead), and a Porro operation was performed. The patient made a good recovery.

CASE XVI, reported by Paddock.[23] Age 36, with history of four protracted labors, three resulting in still-birth, the child in the fourth labor being born alive, but dying a few weeks later of injuries received at birth. At the fortieth week of the fifth pregnancy, Cesarean section was performed for contracted pelvis, at the onset of labor. A large living child was extracted, and the uterus sutured with three layers of catgut. The patient presented herself again in the fourth month of pregnancy, and was advised to undergo the section again. At full term the patient had severe pain, vomited and the abdomen was very tense and tender. Seventeen hours after the onset of labor the extreme abdominal distension made palpation impossible; the fetal heart could not be heard, the pulse was 90, the temperature 100° F., respiration labored. Seven hours later (twenty-four hours after rupture) the abdomen was opened; the intact ovum and blood clots were found in the peritoneal cavity and the uterus was well contracted, bleeding having ceased. The child weighed 9½ lbs. It was thought that the rupture had taken place twenty-four hours before operation, at the onset of labor, as the fetal movements which had been pronounced,

ceased at that time. During the last month of pregnancy the uterus had increased greatly in size, with hydramnion. Supravaginal amputation was done, and the patient made a good recovery.

CASE XVII, reported by Mabbott.[24] Negress, age, 23 years, Cesarean section having been performed for contracted pelvis. The fundal incision was used. The uterus had been closed with three layers of sutures, but the endometrium had not been included. The patient was seen for the first time when labor had been in progress for twenty hours. The pulse was 102, respirations 24, temperature 99.4° F. The cervix admitted two fingers, and the vertex presented above the brim. The diagnosis of rupture was not made, but when the abdominal incision was made for Cesarean section, blood and clots were found in the peritoneal cavity and the rupture was discovered. There was a laceration 7 cm. in length in the cicatrix of the fundal incision, and from this the fetal sac, about as large as the fist, protruded. A longitudinal incision, starting from the middle of the laceration, was made and a living child weighing 6¼ lbs. was removed. The ovaries and part of the tubes were removed, and the wounds in the uterus were closed with heavy chromicized catgut, the endometrium not included.

CASE XVIII, reported by Schneider.[25] The patient, a V-para, with a history of difficult labors, caused by contracted pelvis, was delivered successfully by the classical Cesarean section in 1904. Two years later she was admitted to the hospital in the first stage of labor, stating that she had suffered from severe pains for seven hours. The cervix was dilated about three fingers. During the bath the membranes ruptured, and meconium-stained fluid escaped. The abdominal incision was made in the old scar, and considerable blood was found in the peritoneal cavity. The lower two-thirds of the uterine scar was perfect, but in the upper third there was a rupture about the size of a button hole, through which a portion of placenta the size of a hen's egg protruded, having been gradually forced out by strong uterine contractions. The entire scar was then incised and the child extracted in a state of deep asphyxia, from which it was revived. The patient collapsed at this juncture, and, instead of performing a Porro, as the operator had planned, he quickly sutured the wound and sterilized the patient by resecting the tubes. Later, there was a postpartum hemorrhage, but the patient recovered and left the hospital with her child on the twenty-second day after operation.

CASE XIX, reported by Lobenstine, to whom the thanks of the writer are due for the history of this hitherto unreported case. First Cesarean section in 1904. Longitudinal incision in the anterior uterine wall, extending lower than the incision of the second section and not so far back in the fundus. Low abdominal incision. Second Cesarean in 1906. Short abdominal

incision, entirely above umbilicus; longitudinal incision through the fundus.

When the uterus was sutured, the line of incision went over the fundus well to the posterior aspect of the uterus.

The uterus was sutured in three continuous layers:

1. First layer through muscle, No. 2 catgut;
2. Second layer through peritoneum and muscle, No. 3 catgut;
3. Third, a Lembert suture, No. 2 catgut.

The recovery was uneventful. In January, 1908, the patient when about to be confined, refused to come into the hospital. She went into labor, at term, about 6 P. M. one night and went into moderate collapse (after hard pains) at about 11 P. M. A physician saw her about 2 A. M. of the same night, but did not diagnosticate the condition, and left her after giving a hypodermic of morphine. She was brought to my service in the hospital in the evening of this day, *i.e.*, about 18 hours after she had been first seen by a physician. There was extreme shock and all the signs of rupture of the uterus, especially *marked* abdominal tenderness. Laparotomy was performed at once; child and placenta were found in the belly with a moderate number of clots. The uterus was ruptured from the internal os up to the fundus in the median line, in one of the two previous scars. There is still some doubt as to which scar gave away. A supravaginal hysterectomy was done. The patient did finely after she had recovered from the shock and was to sit up on the tenth day, when she unfortunately developed a pneumonia and died on the seventeenth day.

CASE XX.—This patient was referred to me at the Post-Graduate Hospital by Dr. Brothers, and the following history was obtained: Age 35; nativity, Russia; now pregnant for the fifth time. All previous labors had been long and difficult, with still-birth in each instance, although fetal movements were observed up to the very last days. The pelvis was flat, the internal conjugate measuring 8 cm. Cesarean section was advised, and, on December 31, 1904, was performed at about full term. The usual longitudinal incision was made, and the wound was sutured in layers with chromicized catgut. The patient made a good recovery and left the hospital with her baby in good condition.

Early in August, 1906, the patient was again seen for the first time in her sixth pregnancy. She gave April 1 as the date of her last menstruation, and she appeared to be, as she herself thought, about four months pregnant. Life had not yet been felt, and the uterus appeared to be of four months size. The patient was anxious to have another child, and she was advised to have a second Cesarean operation in the latter part of December, when full term had been reached. On November 26, at 8 P. M., a physician living near the patient was called in to see her, and he reported that the patient was having "false pains," with a slight bloody vaginal discharge. She was advised to come into

the hospital at once, and was admitted about 11 P. M. The patient was very restless and thirsty; the skin was cold; the pulse was 104, of poor quality; the respirations 44, and the cervix admitted one finger only. The abdomen was distended with fluid and the fetus could easily be palpated under the abdominal wall. Her condition grew steadily worse, and laparotomy was performed within an hour after her admission to the hospital. The fetus and placenta had passed into the abdominal cavity, which was filled with blood and clots. The child, weighing $7\frac{5}{16}$ lb. was stillborn, and the patient died a few minutes after the incision was made. The rupture had occurred at the site of the old scar, but it is impossible to state when the laceration took place. There is, of course, the possibility that the patient had already reached full term one month before the estimated time, but the cervix admitted one finger only, and, if in labor at all, the accident must have occurred at the very onset.

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