THE IMPROVED CÆSAREAN SECTION.

BY

HENRY J. GARRIGUES, A.M., M.D.,

PROFESSOR OF OBSTETRICS IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING OBSTETRIC SURGEON TO THE NEW YORK MATERNITY HOSPITAL; OBSTETRICIAN TO THE NEW YORK INFANT ASYLUM; GYNECOLOGIST TO THE GERMAN HOSPITAL AND DISPENSARY IN THE CITY OF NEW YORK.

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IMPROVED CÆSAREAN SECTION,

WITH THE REPORT OF A SUCCESSFUL CASE.

By Henry J. Garrigues, A.M., M.D.,

PROFESSOR OF OBSTETRICS IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL, VISITING OBSTETRIC SURGEON TO THE NEW YORK MATERNITY HOSPITAL, ETC.

In two previous papers[1] I have called the attention of the profession to the improvements gradually introduced in the performance of the Cæsarean section. In the first, I reported an operation I had performed on a patient afflicted with numerous chronic and acute diseases, and weakened by an ante-partum hemorrhage, in consequence of which the fœtus died long before the operation was performed. The mother died fifty-two hours after the operation, and the autopsy showed that the peritoneum, which had been folded in over the edge of the incision in the uterus, as well as the outer two-thirds of the muscular wall, was agglutinated by the first intention, and that the line of union on the peritoneal covering was, to a great extent, covered with a fine white film of new-formed tissue or "plastic lymph."

In the second paper, I showed how little ground there is for attaching a single man's name to the operation in its present shape, which is a beautiful outgrowth of general surgical and special gynecological development, an evolution due to the combined efforts of many men working independently of each other, in different countries, especially Lister in Scotland, Spencer Wells in England, Guéniot in France, P. Müller in Switzerland, Leopold in Germany, and last, but not least, Lungren in the United States.[2]

[1] American Journal of Obstetrics, April, May, June, 1883, and October, 1886.

[2] Even in Germany voices have been raised against the ludicrous claim alluded to. At the meeting of the German Gynecological Society in Munich, in 1886, Kaltenbach asked what was left of Sänger's method after the undermining of the peritoneum and the excision of the muscular tissue had been given up, and silk and silver had proved to be about of the same value. All that Sänger, who was present,

This time I have the pleasure to report a case in which I successfully applied most of the improvements discussed critically in the former papers.

CASE.—Minnie St. J., American, twenty-two years old, married, domestic, was admitted to the Maternity Hospital, Blackwell's Island, January 31, 1888. She is the youngest of several children. Her parents died when she was two years old, but she says they were both small of stature. She does not know anything about her mother's confinements, nor about the size of her sisters and brothers. In her childhood she had measles, whooping-cough, and croup, enlarged and suppurating glands on the neck, of which there still remain large scars, and fainting spells during a whole year, when about six years old. After that she enjoyed good health. She menstruated for the first time at fifteen. Her menstruation was regular, and at first painless, later she suffered somewhat from dysmenorrhœa. Two years ago she had a spontaneous miscarriage when she was two months advanced in pregnancy. Her last menstruation occurred on May 20, 1887; quickening at five months. During the first four months of her pregnancy she had morning vomitings, later she was well.

The patient is 55½ inches (141 cm.) high, of slender build, blonde, and pale. The pelvis measured, between the anterior superior spines of the ilium, 7½ inches (19 cm.); greatest distance between the two cristæ ilium, 8½ inches (21.5 cm.); Baudelocque's diameter, 6¼ inches (16 cm.); between the posterior superior spines of the ilium, 2½ inches (6 cm.); between the trochanters, 10 inches (25 cm.). Vaginal examination revealed great narrowness of the transverse diameter of the whole pelvis, a narrow pubic arch, and a true conjugate little more than 3 inches (8 cm.).

My colleagues, Drs. R. A. Murray and E. H. Grandin, expressed the opinion that the choice would lie between laparo-elytrotomy and Cæsarean section. Some years ago I took great interest in the former operation, and investigated its history, its anatomical basis, and best mode of execution,[1] but that was at a time when the Cæsarean section either in its old form, or as Porro-Müller's operation, presented a mortality of fifty-four to fifty-eight per cent. In view of the great success obtained of late by the improved Cæsarean section, that, in my opinion, must at present take the lead in the list of operations applicable in a case as the one before us.

had to answer, was that he had recommended the use of numerous sutures, that he had rejected absorbable material for suturing, that the decidua should not be comprised in the suture, and that he laid special stress on an exact sero-serous suture. But every single one of these points has been borrowed from others; numerous sutures and the combination of deep muscular and superficial peritoneal sutures were used in fibroids of the uterus by Spencer Wells and by Kehrer in Cæsarean section; catgut had been rejected. Lungren had avoided the decidua as early as 1875, and published it in 1880. (Archiv für Gynäkologie, vol. xxviii. p. 463.)

[1] Garrigues on Gastro-elytrotomy, New York Medical Journal, October and November, 1878, reprinted as separate pamphlet by D. Appleton & Co. Additional Remarks on Gastro-elytrotomy, with Special Reference to Porro's Operation, American Journal of Obstetrics, January, 1883.

Labor pains began on February 23d, at 8 P. M. I reached the Island, upon which the hospital is situated, at midnight. It took two hours to make the necessary preparations, as the only thing that had been done beforehand was to disinfect the room with bichloride and sulphur.[1] When everything was ready for the operation I examined the patient, but finding the os only sufficiently dilated to admit the tip of the finger, and labor pains weak, I thought it was better to wait. During the night, the pains increased, and the outer os became sufficiently dilated to allow easy simultaneous introduction of the finger and a uterine tube.

Etherization was begun on February 24th at 7.55 A. M. The abdomen and genitals were shaved, washed, and disinfected with bichloride of mercury (1 : 2000). I was assisted by Drs. E. H. Grandin, H. C. Coe, H. Jarecky, K. Ruffin, and A. D. Rockwell. Dr. R. A. Murray, who lives at a great distance from the hospital, and could not be sent for before six o'clock, arrived during the operation. The house staff of Charity Hospital, and many of the members of the Training School for Nurses were likewise present.

The sponges were kept in a weak solution of corrosive sublimate (1 : 5000), the instruments in carbolized water (two and a half per cent.). All participating in the operation disinfected themselves with bichloride (1 : 2000).

The patient's condition was good, pulse and temperature normal. The fundus stood seven inches above the umbilicus. The fœtus was in vertex presentation, left occipito-anterior position. The head was entirely above the brim of the pelvis. The fœtal heart was heard three finger breadths to the left and below the umbilicus. It beat 120 per minute, was regular and of normal strength.

At 8.17 A. M. I made an incision in the median line, from the umbilicus to two and a half inches above the symphysis pubis. A few vessels were clamped with compression forceps. The peritoneum was opened enough to introduce the tip of the index finger and then slit open with scissors to the same extent as the other parts of the abdominal wall. Next the incision through the abdominal wall was extended four inches upward to the left of the umbilicus, just enough to lift the uterus out. Before doing so I inserted four silk sutures through the edges of the wound above the umbilicus, and clamped them at sufficient length to allow the uterus to pass. The incision was extended a little downward so as just to have room for the uterus, when it was tilted out. Next I introduced the left hand into the abdominal cavity and pulled out the uterus, first the right corner, then the fundus, and finally the left corner, when the body followed easily. The uterus was immediately enveloped in hot towels wrung out in bichloride (1 : 10,000). Next I placed a finger-thick rubber tube loosely around the cervix, just below the head. Then I tied the four sutures at the upper end of the abdominal incision. They had become entangled in the omentum, but were easily liberated and closed. Flat sponges were placed behind and in front of the uterus.

The uterus was opened in the median line, beginning at the most prominent point, with small, repeated cuts. The wall was nearly an inch thick. As soon as the index finger could be introduced I dilated the incision upward and downward with a probe-pointed bistoury, just

[1] Garrigues: Practical Guide in Antiseptic Midwifery in Hospital and Private Practice. Detroit, 1886. Pp. 23 and 24.

enough that my hand could pass, about to the length of five inches (13 cm.). At the same moment the incision was begun, the tube around the cervix was tightened. Very little blood flowed out from the cut surfaces and was easily wiped off with sponges. The edges separated and the intact ovum appeared at the bottom as a greenish-gray vesicle, in the interior of which the fœtus was discernible. I tore the membranes near the lower end of the incision, introduced the left hand, grasped the occiput of the child and lifted the head out. The body followed. I tied and cut the cord, and left the child to the care of Dr. Manges and Miss Marion Murphy, the head nurse. The child was removed at 8.35, eighteen minutes after the beginning of the operation, but only a minute after the tightening of the constrictor. It gasped and grunted already on the table and soon cried lustily.

The placenta had been inserted on the posterior wall, but had been cast off. I grasped it and peeled the membranes off from the uterus in one piece, together with the placenta. At the lower end the membranes were caught in the constricting tube, but I could introduce one finger and liberate them. The removal of the after-birth was finished at 8.37.

I passed six deep silk sutures through the wall of the uterus, except the endometrium, entering about three-eighths of an inch from the edge on the outer surface. The ends of each of them were provisionally clamped. The uterine cavity was not sponged, washed, or dusted. In closing the deep sutures the peritoneum was folded in between the edges by means of a tenaculum. Next, eight superficial fine silk sutures were inserted through the peritoneum alone, between and at the ends of the deep sutures, going in and out on the same side before crossing the line of incision, so as to obtain a broad apposition. While they were being tied the assistant took off the strain by means of two tenacula. At the lower end it was found that a small piece of peritoneum had been torn off on the right side, in some unaccountable way. The edge being too far away from the line of incision to be united with the edge of the peritoneum of the opposite side, I passed the suture through the sub-peritoneal connective tissue on this side and connected it with the peritoneum on the other side of the incision.

When the last suture had been passed, the tube was loosened slowly without removing it. When the blood-current returned to the uterus, some hemorrhage appeared between the fifth and sixth deep suture, near the lower end of the incision, which had gone a little beyond the line of demarcation between the thick and the thin part of the uterine wall. Very large veins were observed below the peritoneum in this place. Two additional sutures were passed under them, when the hemorrhage stopped. At the other sutures there was slight oozing, which was checked by mere compression with sponges. Twenty minutes were occupied in watching and controlling this hemorrhage. A couple of sponges, introduced on sponge-holders to the bottom of the pelvis, came out entirely clean, showing that neither blood nor liquor amnii had entered the peritoneal cavity. The tube was removed, and the uterus replaced. The omentum was left at its top. The abdominal wall was closed with eleven deep silk sutures comprising the whole wall, special care being taken to include the aponeurosis of the abdominal muscles. Five superficial silk sutures were inserted where they were needed to accomplish perfect apposition of the edges of the skin. The abdominal sutures were passed from 9.18 to 9.35.

When I was through closing the abdominal cavity, it was noticed that the uterus had enlarged somewhat, and when I squeezed it, some clots and fluid blood came out from the vagina. I, therefore, at 9.40, gave a hot intrauterine douche of six pints of a solution of bichloride (1 : 4000). The external os admitted the tube and one finger easily, but I had some little trouble in passing the glass tube[1] through the internal os. Several small clots were washed out with the intrauterine douche, and all hemorrhage stopped.

The wound was dusted with iodoform, covered with a piece of gutta-percha tissue, half a dozen layers of iodoform gauze, a thick pad of salicylated cotton (five per cent.), five broad strips of rubber adhesive plaster, muslin belly binder, and my usual antiseptic perineal occlusion dressing.[2] Two grains of ergotin were injected hypodermatically on the back of the right forearm.

Duration of operation, from beginning of incision until the last suture was tied, one hour and eighteen minutes.

The child, a boy, weighed six pounds nine ounces; the diameters of his head measured, occipito-mental, five and one-quarter inches (13.5 cm.); occipito-frontal, four and three-quarters inches (12 cm.); fronto-mental, three inches (7.5 cm.); suboccipito-bregmatic, three and three-quarters inches (9.5 cm.); biparietal, three and three-quarters inches; bitemporal, three and one-half inches (9 cm.); bimalar, three inches (7.5 cm.). At the hour of proof-reading, five weeks after the operation, he is in excellent condition. The after-birth weighed fifteen ounces. The cord was twenty inches long.

The patient was placed in a bed with bottles filled with hot water She rallied well from the anæsthesia, but complained of nausea, which was much relieved by repeated doses of ℥ss to ℥j of strong black coffee. Later, she was given milk, brandy, and water. The perineal dressing was, as usual, changed every six hours. The urine was drawn with catheter until she could pass it herself. The lochial discharge was bright red, without fetor, normal in quantity. The pulse was more frequent than usual, temperature and respiration normal. Off and on, during the first few days, she complained of pain in the abdomen, which was easily relieved by one-eighth of a grain of morphine. From the third day, when she felt a desire to have her bowels move, they were kept open by a daily enema of soapsuds. Three times a day she was given ʒss of fluid extract of ergot, but, as it caused vomiting, we left it out after the second day.

On account of the ether she was not allowed to nurse the baby for twenty-four hours, but after that she did so regularly, the child received no other nourishment for three weeks and throve.

The mother lived on coffee and milk for four days. Then wine jelly, farina gruel, beef-tea, and eggs were added. From the ninth day she ate beefsteak, turkey, potatoes, and cake.

On March 2d, a week after the operation, the abdominal dressing was changed for the first time. All sutures were removed. The wound was found healed by the first intention, the upper two inches and one inch at the lower end through the whole thickness of the wall. On a space of two and one-half inches, just below the umbilicus, the deeper parts were united, but not the skin. There was no trace of pus anywhere. The

[1] Antiseptic Midwifery, p. 94.

[2] Ibid., p. 27.

fundus uteri was felt just below the umbilicus. There was no tenderness on pressure. The abdomen was cleansed with bichloride (1:2000), the wound dusted with iodoform, the tension taken off by means of rubber adhesive plaster strips, one finger-breadth wide and nine inches long, and a similar dressing put on as the first time.

On March 8th the temperature, which had been normal all the time, rose to 103¾° F. The patient complained of pain in the right breast, where there was found a hard and tender nodule in the mammary gland and an excoriated nipple. On March 1st, the nipple had become sore, and had been treated with tannin, but this time we did not succeed in avoiding mastitis.

The abdominal dressing was removed. The wound was healed throughout by the first intention. The fundus stood yet four inches above the symphysis pubis, but there was no trace of tenderness either on abdominal palpation or by vaginal examination, and the lochial discharge consisted of normal, thick, sweet, slightly pink, odorless mucus.

The uterus was found fastened to the abdominal wall to the right of the line of incision. The fundus stood four inches above the right pubic bone. Only four narrow plaster strips were put over the abdomen, and the dressing renewed.

The following table shows the state of the temperature, pulse, and respiration during the first two weeks before the breast became inflamed.

Date.	Temperature.		Pulse.		Respiration.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
February 24	.....	100 4°	.....	106	.....	24
" 25	99.3°	99.3	100	106	20	20
" 26	99.6	99.8	90	94	20	20
" 27	99 1	99.2	86	76	19	18
" 28	98.5	99.5	70	86	20	22
" 29	99 3	98.4	88	70	21	20
March 1	98.1	98.8	76	67	20	20
" 2	98.7	98.0	84	60	20	16
" 3	98.9	98 4	66	64	20	18
" 4	98.3	99 1	66	66	20	22
" 5	98.5	99.0	62	62	22	18
" 6	98.3	98.8	60	64	18	18
" 7	98.6	99.5	56	54	19	18
" 8	98.5	.....	60	.....	22	.....

Apart from the breast trouble, she continued in excellent health, got out of bed March 16th, and is well now, five weeks after the operation. The fundus stands as mentioned, the os is drawn upward and forward, and is felt a little above the symphysis pubis, near the anterior wall of the abdomen, three and three-quarters inches below the fundus.

Anatomical and physiological observations.—A short description of the organs as they appeared during the operation may, perhaps, interest some of my readers besides myself.

Before being incised the uterus was of a purple color, and the tightly stretched peritoneal covering reverberated the light like a polished surface. The fundus was so much developed that it formed half a circle; the tubes and ovaries lay way up in the abdominal cavity. During the incision the edges retracted, and when it was finished the uterus presented a large gaping opening with bevelled edges, the outer parts being more retracted than the inner. At the bottom of this gap lay the ovum as a transparent greenish-gray bag, in which the fœtus could be seen indistinctly. When the membranes were ruptured the body of the womb contracted so as to fit its contents tightly. After the removal of the fœtus it contracted again—so much as to measure only six or seven inches from the cervix to the fundus. The cut edge was about one and one-half inches (4 cm.) thick. The peritoneum was shrivelled up and lay in wrinkles like a misfit coat, and had a light gray color, and dull, waxy appearance, having lost all its former shining gloss. It was easily lifted up and folded in a quarter or three-eighths of an inch. The cut surface had a grayish-brown color as of half-boiled meat, and on it appeared the contracted sinuses as round, cherry-colored spots one-eighth of an inch in diameter. Douglas's pouch was remarkably shallow. In front of the uterus was yet left a good-sized pouch, but that was because I had not extended the incision down to the symphysis of the pubic bones.

The placenta was inserted on the posterior wall of the uterus. It was loose, a normal consequence of the contraction of the surface to which it is attached. The membranes behave in an entirely different way. In the three Cæsarean sections I have seen and, so far as I remember, in all I have read of, they remained fastened to the inside of the uterus and had to be carefully peeled off by inserting the fingers between them and the uterus. On account of their thinness and great elasticity they adapt themselves to the size of the surface on which they have grown, which the placenta under normal circumstances cannot do. The difference between the peritoneum, that lay in wrinkles, and the membranes, that adapted themselves to the inside of the uterus, was very striking. The separation between the ovum and the uterus took place in a white spongy substance that broke easily under the advancing fingers. The fact that the membranes adhere to the inside of the womb after the placenta is cast loose is of special importance for those who use Credé's expression method or any other method by which the placenta is delivered artificially soon after the birth of the child. It teaches the necessity of withdrawing the membranes very slowly and carefully in order not to tear them.

After the removal of the placenta and the membranes the uterine wall was entirely smooth and so clean that I did not even care to touch it with a sponge. When the tube was loosened the uterus became violet.

Remarks on the Operation.—I take it to be a valuable improvement to turn out the uterus before opening it, as advised by P. Müller. It is true that this necessitates a somewhat longer incision through the abdominal wall, but I do not think the difference will be more than one

or two inches, for, in order to incise the uterus in the proper place, *in situ*, we have to go at least two inches above the umbilicus, as I did in my first case, and in this last one I could turn out the uterus by extending the incision four inches above the umbilicus. Even those who are opposed to turning out the uterus before opening it, do so after the removal of the child. Consequently they extend the incision to the same point downward as when the uterus is turned out beforehand. But we must remember that the abdominal wall is very elastic and recedes considerably when the uterus is pulled through it. It is, therefore, by no means necessary to extend the incision as high up as the uterus reaches. The fundus stood seven inches above the umbilicus, and still it could pass through an incision that went only four inches above that point.

By turning out the uterus before opening it we have the great advantage that we can surround the cervix with a soft rubber tube and thereby control all hemorrhage (Esmarch's method). I take it to be better to let an assistant hold the ends of the tube with his hands than to fasten them with a clamp or even to tie them as advised by others. If any part of the fœtus be caught in the constrictor the assistant can loosen it and immediately tighten it again after the operator has liberated the imprisoned part. In my first case there was considerable hemorrhage from the uterine sinuses, which it sometimes might be hard to control. In the last hardly any blood was lost during the operation. But, on the other hand, there was some hemorrhage after the constrictor was taken away. This is said to take place in all cases in which the constrictor is used.[1] It is due to the return of the dammed-up blood into the empty vessels below the constriction. The tube ought, therefore, to be loosened very slowly in order to let the equalization take place gradually.

To sew the peritoneum to the rest of the abdominal wall (Leopold) is not necessary. It is more expeditious merely to leave the two pairs of compression forceps on it, so as to find it readily when the abdominal wound is to be closed. But to put in sutures at the upper end of the incision before turning out the womb (Frank) is an excellent thing. Having seen how much another operator was troubled by the intestines coming out through the large opening behind the empty uterus, I inserted sutures before turning out the uterus, and tied them before opening that organ. The result was that I did not even see the intestines, and that no fluid entered the peritoneal cavity.

It is much better to help the head out first than to seize a foot, as taught by the old and some modern authors. When we lift the head out, the body follows without any difficulty; whereas, when extraction is made by the feet, it sometimes happens that the uterus contracts

[1] Zweifel: Archiv für Gynäkologie, vol. xxxi. p. 199.

around the child's neck, exposing it to great danger of suffocation, and necessitating a dilatation of the wound in the uterus.

In making the incision in the uterus care should be taken not to extend it into the lower uterine segment, that is that part of the womb which after the delivery of the child is thin, and which perhaps simply is part of the cervix. That happened to me, as it has to many others, and the difficulty is that the line of demarcation between the thick and the thin part of the womb, cannot be seen beforehand. I began my incision just at the line separating the fundus from the body, but it would have been better to go an inch higher up here and save as much at the lower end. In this respect the incision in my first operation was better. The large veins found on this so-called lower uterine segment may cause a troublesome hemorrhage, or the abundant loose connective tissue found under the peritoneum in this locality become the seat of a hæmatoma.

For suturing the uterus strong curved needles are necessary. I used this time round, trocar-pointed needles, which enter easily and do not cut any vessels. For the peritoneal suture a finer, curved, round, simply pointed needle is the best. For the abdominal wall I prefer Spencer Wells's long, straight, triangular needles.

Many complicated sutures for the uterus are described by different operators. All that is needed is a simple interrupted suture, avoiding the endometrium, and folding in the peritoneum, so as to bring serous surfaces into contact, both of which were done by Dr. S. S. Lungren, of Toledo, Ohio,[1] before the new literature on Cæsarean section was begun. How many of these deep sutures are necessary is to be decided in every particular case by the judgment of the operator. In this latter operation I used only six.

If we insert few deep sutures, a second series of superficial ones, only comprising the peritoneum, ought to be introduced between the others. Some try to make a whole cover of peritoneum over the first row of sutures, but that is not necessary and not always possible. I simply introduced the needle half an inch from the edge, pushed it out a quarter of an inch from the edge, introduced it again a quarter of an inch from the other edge, and pushed it out half an inch from the edge. By drawing the suture together the two linear surfaces a quarter of an inch in length are brought into apposition, and there is even left a little curtain that will be folded in between the suture and the line of incision, and contribute to a more complete closure of the uterine cavity. It will be noticed that this is somewhat different from Lembert's intestinal suture, in which the needle is pushed out and reintroduced exactly at the edge of the wound.[2] In both of my operations, and in the one

[1] American Journal of Obstetrics, 1881, vol. xiv. p. 92.

[2] Bardeleben: Lehrbuch der Chirurgie, Berlin, 1872, vol. iii. p. 666.

described by Dr. Lusk,[1] in which I assisted him, this was easily done. Zweifel,[2] on the other hand, has found cases in which it was impossible to fold the peritoneum, but in these the peritoneal edges came in close apposition on tying the deep sutures.

I used exclusively silk sutures, and take them to be preferable to any other. Catgut is hard to tie and is very liable to become untied when used on the uterus. I would not recommend silver wire. Those who are not accustomed to work with it, would find it much more difficult to get a nice adaptation of the edges. The folding in of the peritoneum must be more difficult when silver is used. It is not always easy to find good silver wire. Thus, in Obermann's[3] hands six silver sutures out of eight burst, and had to be replaced by silk. I think aseptic silk is the best of all, but I would not rely on that sold in the stores. I prepare mine myself by boiling it for half an hour, immerse it in bichloride solution (1 : 1000) for another half hour, and keep it wound on glass spools in alcohol.

The great value of a good uterine suture is indirectly shown in an interesting paper by Krukenberg,[4] in which he has collected all the cases he could find of rupture of the uterus in a subsequent pregnancy after Cæsarean section. Sometimes the rupture took place in the cicatrix, and the child was expelled into the abdominal cavity. In another series the rupture occurred likewise in the cicatrix, but the rent was smaller, and the child remained in the uterus. In yet other cases the uterus ruptured in another place than the cicatrix.

Kehrer[5] has advised to aim at producing coalescence between the uterus and the abdominal wall, and washed the peritoneum with a strong solution of bichloride (1 : 1000) for the purpose. I think it would be better, if possible, to avoid it. I used only a very weak solution, and only with the object in view to protect the uterus from contact with hospital air. During convalescence it sank considerably, but still became fastened to the abdominal wall.

The same author[6] gives another advice which strikes me as worthy of being followed, namely, to insert the deep uterine sutures before removing the placenta. By so doing we would let nature have a little time to prepare the uterus for the removal of the after-birth, and still not lose any time in simple idle waiting.

In a typically clean operation as the above described there is no call for any kind of drainage. The abdominal cavity might be washed out with some disinfectant fluid or plain water if anything dangerous, such

[1] Lusk, in New York Medical Journal, 1887, vol. xlv. p. 505.
[2] Zweifel, in Archiv für Gynäkologie, 1887, vol. xxxi. p. 197.
[3] Obermann : Archiv f. Gynäk., 1886, vol. xxvii. p. 275.
[4] Krukenberg : Archiv f. Gynäk., 1886, vol. xxviii. p. 421.
[5] Kehrer : Archiv f. Gynäk., 1886, vol. xxvii. p. 259.
[6] Ibid., p. 257.

as putrid liquor amnii or meconium had found its way into it, but then the cavity ought to be closed. If later there arise dangerous symptoms, the abdominal wound may be partly reopened and a drainage tube inserted, in order to pump out by means of a glass syringe with adapted soft-rubber tube, or Hegar's wire wound with absorbent antiseptic cotton, what fluid may collect in the peritoneal cavity, or a soft-rubber drainage tube with cross-bar may be carried through an opening made in Douglas's pouch to the entrance of the vagina.

To leave a drainage tube in the uterus, as I did in my first case, is objectionable, as it may become a source of infection. If the cervical canal is open, the lochial discharge will find its way out through it, and if it is not, the cervix must be dilated during the operation.

Leopold[1] injects ergotin into the uterine wall before loosening the tube around the cervix. It seems to me that this is to run an unnecessary risk. How often are not abscesses, or at least painful inflammations produced when drugs are injected under the skin, and to what dangerous, nay fatal consequences might such an event lead, if it took place in the uterus.

The temptation to remove the ovaries and thereby protect the woman against all dangers from subsequent pregnancies is great indeed. Still, I believe it is better not to yield to it. Although it might be done in a few minutes, it would, in my opinion, complicate the operation and enhance the risk. After oöphorectomy the patient has very considerable pain for a whole week, which probably comes from the constriction of the nerves in the pedicles, and two stumps are left in a condition in which they cannot be nourished before new channels of supply have been opened. I think we ought to be satisfied, if we can bring the patient safely through the infliction and healing of the unavoidable wounds, without complicating the case by the addition of unnecessary and dangerous elements.

It is, upon the whole, a great question if it is justifiable gratuitously to deprive a woman of the possibility of again becoming a mother. If, in view of the fact that these operations are almost exclusively performed on poor women who find it hard to rear their children, it is thought desirable to sterilize them, this might probably be done in a safer way by ligating the tubes. There can hardly be any doubt that many ovula fall into the peritoneal cavity, and are dissolved there without giving any trouble; but, on the other hand, blood from Graafian follicles, which otherwise might have found its way out through the Fallopian tube, may form a hæmatocele. Thus, taking everything into consideration, I think it better to limit the operation to the safe termination of the present pregnancy and not to include in it any kind of measure tending toward prevention of future pregnancies.

[1] Leopold: Archiv für Gynäkologie, xxviii. p. 464.

The question presents itself, What is the best way to deal with the omentum? To draw it down in front of the uterus might give rise to adhesions between it and the line of incision or the sutures, which might become dangerous by causing intestinal obstruction. Frank[1] has proposed to draw it down over the intestines behind the uterus and fasten it there with catgut. I simply pushed it up above the fundus of the uterus.

In closing the abdominal cavity care should be taken to include the aponeurosis in the sutures so as to strengthen the cicatrix as much as possible and try to prevent ventral hernia, which often is a sequel to laparotomy, especially when the incision has been long. In order to prevent this accident, Keith puts in about four sutures to the inch.[2] Recently I observed very good union of the whole thickness of the wall at the autopsy of a woman who had died six days after the removal of the fibrocystic uterus, and where only one suture had been passed to the inch.

I used old sponges. The flat sponges which are so useful in laparotomies are so expensive that it would be quite an item if they had to be new every time. In order to clean used sponges I press them out in lukewarm water till the water remains clean; then I leave them for an hour in diluted liquor potassæ (℥j to the quart of water) which draws out all the blood. In exceptional cases it may become necessary to change this solution. Then the sponges are again wrung out in plain water till it stays clean. After that I leave them for an hour in a solution of bichloride of mercury (1 to 2000), dry them in front of a fire and keep them in a muslin bag. By being kept dry they do not become rotten so soon as when they are kept in some antiseptic fluid. Before using them the next time they are left a short time in a similar solution of bichloride, wrung out, and kept in carbolized water (2 or 2½ per cent.) or a weak solution of bichloride (1 to 5000), during the operation.

New sponges give nearly as much trouble to prepare. Even when they are bought prepared they have to be immersed for an hour in acidulated water (hydrochloric acid ℥j to every quart of water) in order to dissolve the lime concretions they contain, and be wrung out many times in water before all sand is out of them.

When my antiseptic pad is used no vaginal injections are called for unless complications should turn up.

I changed the dressing on the eighth day. It might, perhaps, even be left for ten days with advantage in such a feverless case.

For vomiting, which often is so troublesome after operations, I have

[1] Frank: Centralblatt für Gynäkologie, 1881, vol. v. p. 603.

[2] Keith: Contributions to the Surgical Treatment of Tumors of the Abdomen. Part I. Hysterectomy for Fibrous Tumors of the Uterus. Edinburgh, 1885, p. 14.

found black coffee and compound tincture of iodine in one minim doses every hour to be the best two remedies.

The operation of Cæsarean section has reached such a degree of perfection that I believe it is safer for the mother than *difficult* extraction through the natural passages. While we rarely see a considerably flat pelvis here, there is a form which is by no means rare, that is, a pelvis with a moderate general contraction with male type. In such cases I have several times had to perform very difficult operations resulting in the loss of both mother and child. Still, we will have to wait yet and see the result of the Cæsarean operation, since it has been surrounded by all the safeguards of modern surgery, before we decide to what extent it should replace craniotomy. So far, the results in this country are by no means satisfactory. Dr. R. P. Harris wrote me recently that there had been 11 Cæsarean operations from December 16, 1886, till February 24, 1888, inclusive of my own, in the United States, all of them by the improved method but one; saving 6 women and 8 children. 6 of the operations were performed in hospitals, saving 5 women, 5 in private practice saving only 1. Of the children, 5 were saved in the hospital cases and 3 in the private cases. All of the 5 hospital cases operated on by the improved method were successful. If we ask why this great mortality has obtained in private practice here as compared with hospital cases here and in Germany, I think I do not err in surmising that the chief reason is to be found in the defective use of antiseptics in private practice.

All the German operations I have read of were performed in hospitals, which—how different from a few years ago!—have now become the safest place to be delivered in. In Germany even midwives are held by law to use antiseptic precautions in every case of confinement. In this country antiseptic midwifery is yet in its infancy. I believe it has been adopted, more or less, in lying-in asylums, but as to private practice the progress is yet very small. Most physicians do not use any antiseptic precautions at all. Others have recourse to imaginary ones, such as carbolized soap or vaseline. The consequence is that in difficult labors infection is likely to have taken place before even the question of Cæsarean section presents itself to the mind of the physician. If we will obtain similar results as the German operators we must do as they do, decide beforehand that Cæsarean section is to be performed, desist from all attempts at delivery by other methods, avoid unnecessary vaginal examinations, operate as early as possible, and observe the strictest antisepsis before, during, and after the operation. One reason why the German hospitals have had such brilliant results is that the physician-in-chief has autocratic power. As soon as a case comes to the hospital that is suitable for Cæsarean section, his assistant calls his attention to it, and he decides at once whether and when the operation

shall be performed. If we will follow old rules and call numerous colleagues and consultants together and examine and debate, we will either not perform Cæsarean section or run great risk of losing our patients. The bruising of the soft parts of the genital tract occurring during protracted labor predisposes to puerperal inflammation, and ought, therefore, if possible, to be avoided.

In the same letter Dr. Harris writes that my case of improved Cæsarean section is No. 163 on his list of Cæsarean sections in the United States, which is the same number as he has collected of cases of symphysiotomy, by which latter 115 women were saved against 62 by the Cæsarean section. 88 children escaped under the operation of Sigault, whereas only 62 were saved in the United States by gastrohysterotomy. Still I would warn American physicians against giving the preference to symphysiotomy over Cæsarean section. When Morisani laid the results gained by symphysiotomy before the profession at the International Medical Congress in London, 1881, I became much interested in that operation, had a Galbiati's falcetta sent me from Naples, and tried it several times on the cadaver, sometimes with success, but sometimes not. The operation is only claimed to be indicated on a certain field between the forceps and the Cæsarean section. Commonly a conjugate of 2¾ to 3¼ inches (68 to 80 millimetres), just the degree of narrowness where Sir James Y. Simpson advised to prefer turning to the forceps, is said to be its domain.[1] It is not always possible to divide the symphysis, except by means of a chain-saw, and from the histories it appears that the patients not infrequently have had to go through a protracted sickness, and sometimes have become invalids for the remainder of their lives. If anything of the kind should happen in this country, the physician would risk a suit for malpractice, and might have to pay heavy damages.

The Cæsarean section is not a particularly difficult operation, and in contradistinction to other laparotomies and most obstetrical operations it does not call for peculiar or expensive instruments. A knife, a pair of scissors, a rubber tube, needle, and silk, are the only indispensable instruments, but it is useful to have a few pairs of compression forceps. It is hardly wise to undertake such an operation without two or three assistants, which is one reason among others why Cæsarean section will not drive craniotomy from the field in private practice.

Modus operandi.—So many small changes have taken place since I described the operation in my first paper, that it may, perhaps, be found convenient by some readers to have the different steps of it briefly set forth here again.

The best time for the operation is as soon as labor pains have become strong and frequent.

[1] Luigi Mangiagalli, in Annali di Ostetricia, January, 1883, p. 4.

The first part of the operation is identical with that of ovariotomy. The bowels and the bladder having been emptied, and the pubes shaved, the abdomen is washed with soap, ether, and 1 : 2000 solution of bichloride of mercury. The vagina is syringed with two quarts of the same solution, and thoroughly rubbed off with cotton dipped in it, which is best done with a Sims's speculum, and in his position. The operator and his assistants disinfect themselves and the sponges with the solution. The instruments are kept in carbolic acid solution (two and a half per cent.). The temperature of the room ought to be about 80° F. The patient is placed on her back, on a long narrow table covered with a mattress, quilts or blankets, a rubber sheet or oilcloth, and a common sheet. Her legs are bent at the knees, and the feet placed on a stool at the end of the table, so that the assistant who takes care of the rubber tube may have easy access to the uterus without being in the way of the operator or the other assistant. She ought to be warmly dressed. She is anæsthetized. The field of operation is surrounded by four towels wrung out of carbolized water (two and a half per cent.). The operator stands to her right, and his chief assistant to her left, the one who anæsthetizes at her head, and the one who has charge of the constrictor at her knees.

By percussion the operator ascertains that no intestines are present between the uterus and the abdominal wall, or pushes them aside. An incision is made in the median line through the skin and the linea alba from the umbilicus to a point an inch and a half above the symphysis pubis. Bleeding vessels are clamped by means of compression forceps. Next the peritoneum is lifted up with two such pairs of forceps, and a small incision made in it, through which the index is passed into the abdominal cavity, and the peritoneum slit open to the same extent as the incision in the skin. The incision is carried through the whole thickness of the abdominal wall up to the left of the umbilicus, just enough to allow the uterus to be pulled through. The uterus may be helped out by pressure from the vagina, and one of the corners is pulled out first. Before doing so, long silk sutures are inserted at an inch distance from one another through the lips of the abdominal incision above the umbilicus. The two ends of each are clamped or tied together. As soon as the uterus is lifted out it is wrapped up in cloths wrung out of a warm solution of bichloride (1 : 10,000). The sutures are closed. A finger-thick rubber tube, half a yard long, is laid loosely around the cervix, and a flat sponge placed in front of and behind the uterus. The moment the operator puts the knife to the uterus, the lower assistant tightens the constrictor An incision is made in the median line of the uterus so as to avoid the cervix, but long enough to allow the hand to be introduced and the child to be withdrawn with ease, say four and a half to five and a half inches. This incision is best begun with a convex sharp-pointed bistoury,

and continued with a probe-pointed one. If the placenta is in the line of incision it is cut through, together with the uterine wall.

If the waters have not broken, the operator tears the membrane near the lower end of the incision so as to prevent the escape of the liquor amnii, especially if it is decomposed, into the peritoneal cavity. The operator introduces his hand immediately through the rent and seizes, if possible, the head of the child, if not, the breech or the feet. The cord is tied, and the child given to a competent nurse, or, preferably, a doctor, who, if it is asphyxiated, uses proper remedies for its revival.

Now deep silk sututes are inserted half an inch from the edge through the uterine wall, except the decidua. The distance between the sutures ought to be about three-quarters of an inch The ends of each suture are clamped or tied together.

Next the after-birth is removed by peeling the membranes off in one piece. If there are any clots in the uterus, they are turned out and the inside is washed with bichloride and dusted with iodoform.

Next the deep sutures are closed, the assistant approaching the edges by means of two tenacula and folding as much as possible of the peritoneal covering in between the edges. Thereafter fine silk sutures are passed superficially between two and two of the deep ones, only comprising the peritoneum. If this is movable enough the needle is passed in half an inch from the edge, out on the same side a quarter of an inch further in and reintroduced in the corresponding points on the opposite side of the incision. While they are being tied the assistant takes off the strain with two tenacula. A hypodermatic injection of fluid extract of ergot or two grains of ergotin is made on the extensor side of the left forearm. The rubber tube is loosened very slowly and left in place. If there is any hemorrhage from the wound that does not stop on simple pressure with a hot sponge, extra sutures are passed under bleeding spots. If this cannot be obtained by the simple interrupted suture, a so-called mattress suture may be substituted. A curved needle is introduced in the usual place, passed under the bleeding sinus and out on the same side. A similar suture is inserted in the corresponding point of the other lip, and in tying the sutures the two upper ends are united, and so are the two lower ones. The uterus is squeezed, and if the hemorrhage continues an intrauterine injection of solution of bichloride (1 : 5000) is given so hot that the hand can just be held in it (110° to 115° F.). In exceptional cases injection of tincture of iodine or diluted liquor ferri chloridi (1 : 10), or faradization might be called for. When the hemorrhage is controlled the constrictor is removed.

The peritoneal cavity is cleaned with sponges held in long forceps, and if decomposed liquor amnii, meconium, or other dangerous material has got into it, it is washed out with plenty of plain warm water. The

uterus is replaced and the omentum pressed up above it. The abdominal wound is closed with deep silk sutures comprising the whole thickness of the wall, and special attention is paid to include the aponeurosis of the muscles and the peritoneum. They are passed at intervals of an inch, and superficial ones, through the skin alone, between them.

Dressing.—The wound is dusted with iodoform, covered with a piece of gutta-percha tissue, a pad of iodoform gauze, and a thick layer of borated or salicylated cotton fastened with broad straps of rubber adhesive plaster to the sides of the abdomen. The usual belly binder is put on.

The genitals and anus are covered with a pad of absorbent cotton or lint wrung out of bichloride (1 : 2000); outside of that is placed a piece of gutta-percha tissue, then a layer of dry cotton batting, and a piece of muslin is fastened to the belly binder in front and behind.

After-treatment.—The patient is placed in a bed with bottles filled with hot water. As soon as she can swallow she is given alcoholic drinks or hot, strong coffee. Pain is subdued by small doses of morphia. After the patient has recovered from shock she may have light liquid food, and after a few days meat and other solid food. The urine is drawn with a catheter if she cannot pass it herself. The bowels are kept open by enemas or aperients.

If the temperature rises, it is combated by antipyrin, quinine, salicylic or carbolic acid, and cold applied to the head and abdomen by ice-bags or rubber coils. Vomiting is treated with coffee, tincture of iodine, bismuth, hydrocyanic acid, strychnia, creasote, carbolic acid, carbonic acid water, counter-irritation over the pit of the stomach, etc. Peritonitis is either treated with large doses of morphia or perhaps preferably with a saturated solution of a saline aperient (L. Tait). If a collection of pus in the peritoneal cavity can be diagnosticated, the lower end of the abdominal incision is reopened, an opening made in the vaginal cul-de-sac and drainage established, combined with antiseptic injections; or an incision is made in the vagina and drainage established in that way. A weak and frequent pulse due to anæmia and weakness of the heart calls for hypodermatic injections of digitalis or camphor dissolved in ether, or intravenous injection of a weak alkaline solution of chloride of sodium.[1]

In favorable cases the abdominal dressing may remain undisturbed for a week or ten days. Then the sutures are removed and replaced by long, narrow strips of rubber adhesive plaster. The perineal dressing is changed every six hours, and the genitals syringed outside with bichlo-

[1] Swartze's method: Sodium chloride 6 parts, ammonium carbonate 1 part, distilled water 1000 parts. A quart, for an adult, is usually injected (Centralblatt für Gynäkologie, 1882, p. 477; 1885, p. 809). Modifications of the method are to inject the fluid into the subcutaneous areolar tissue or into the peritoneal cavity.

ride (1 : 2000). No vaginal douche is given under normal circumstances. If the lochia become fetid and the temperature rises, the vagina is syringed every three hours, and even an intrauterine injection given as in other cases, followed by an intrauterine suppository with iodoform.[1]

[1] Antiseptic Midwifery, p. 59.