FRITSCH'S FUNDAL INCISION IN CONSERVATIVE CÆSAREAN SECTION, WITH ILLUSTRATIVE CASES.

By J. M. MUNRO KERR, M.B., C.M., F.F.P.S. (GLAS.).

Obstetric Physician, Maternity Hospital; Assistant to Regius Professor of Midwifery and Gynæcology, Glasgow University; Dispensary Physician for Diseases of Women, Western Infirmary.

IN connection with the operation of Cæsarean section there are at the present moment three important questions *sub judice*. These are: (1) The conservative section *versus* Porro's or intraperitoneal hysterectomy; (2) the sterilization of the patient if the conservative operation is chosen; and (3) the direction of the uterine incision.

My views regarding the first two questions I have given elsewhere. I believe the conservative operation is safer and should be chosen, except in septic cases where the patients have been handled before admission to hospital, and in certain tumours of the uterus. I also think a strong, healthy woman should not be sterilized. To justify that opinion one requires only to mention the good results obtained by Spencer¹ and others in cases where the operation has been repeatedly performed on the same patient. In the only case where I have seen the operation performed twice on the same patient, the previous uterine wound had healed so satisfactorily that the cicatrix could not even be distinguished.

It is not my purpose in this paper, however, to consider these two questions. My desire is to discuss a uterine incision which has recently been very extensively employed and very strongly recommended by certain obstetricians in Germany.

In recent years various incisions of the uterus have been recommended as alternatives to the ordinary anterior longitudinal one so generally employed. These have been very numerous. Thus, Caruso and Müller have suggested a sagittal fundal incision, Kehrer a low transverse incision, Johannowsky a posterior longitudinal one, and Cohnheim a posterior longitudinal incision with drainage through Douglas's pouch into the vagina. Müller's or Caruso's incision—for some give the one, some the other, the priority—has its strongest advocate in Morisani,² who recently reported ten cases in which he had employed it, and some forty which he had collected from obstetrical literature.

Of much greater notoriety than the latter, however, is the

transverse fundal incision, which was first recommended by Fritsch³ in 1897. It was suggested to him by seeing with what ease a child was extracted from the gravid uterus on the post-mortem table.

Since Fritsch's publication the subject has attracted a great deal of interest in Germany, and most contradictory opinions have been expressed regarding its value and usefulness. It has, however, never been considered by obstetricians in this country. Indeed, with the exception of a most interesting summary by Kynoch,⁴ and a passing and unfavourable reference to it by Sinclair,⁵ I know of no British obstetrician who has considered it in writing. In America the position is practically the same. Boyd⁶ is the only one I can find who has employed the incision. In French literature there are no important references to it, and I am not aware that it has been at all extensively employed by any operators in that country.

It may be said, then, that the interest in the incision is confined almost entirely to Germany. As, however, it has aroused so much interest there, it appears to me desirable that the subject should be considered by obstetricians in other countries. The present seems to be peculiarly opportune for doing so, for time has been given to consider it dispassionately, and experience regarding its usefulness has been obtained.

To test the value of Fritsch's incision I employed it in three cases on which I recently operated. I purpose briefly describing them, and afterwards considering in detail the whole subject of the incision.

CASE I.—M. M., twenty-three, primipara, was admitted to the Maternity Hospital under my care on October 27, 1901. Labour had just commenced. There were regular uterine contractions and slight dilatation of the cervix. From the size of the abdomen I did not think she had reached 'full term,' but she insisted, on repeated questionings, that she had. She was markedly rachitic. The pelvis was deformed in all its diameters, the diagonal conjugate measuring only $3\frac{1}{4}$ inches. The child was alive.

The operation of Cæsarean section was performed after the usual preparations of the patient and operating-room had been completed.

The abdomen was opened with a longitudinal incision, two-thirds of which was above the umbilicus. The uterus was opened with a transverse fundal incision, without previously turning the organ out. There was very little bleeding from the uterine wound, and the child was easily extracted. It was alive and weighed 4 pounds. The placenta, which was situated on the posterior wall, was adherent; so that it and the membranes had to be removed by the hand. The stitching of the uterus was carried out in the usual way. Catgut was used. This part of the operation was carried out more comfortably than in those cases where the longitudinal incision was employed.

The recovery of the patient was uninterrupted. There was considerable shock after the operation. During the first two days there was also quickness of the pulse. The temperature was never above

normal. On the fourth, fifth, and sixth days of the puerperium there was slight foetor of the lochia, which disappeared, however, after douching. The wound healed by first intention. The stitches were removed on the fourteenth day, and the patient left the hospital on the thirty-fourth day after the operation. Before she left I examined the uterus bimanually. It was attached firmly to the abdominal wall, and reached above the symphysis pubis to a height of 3 inches.

Note on Case.—Undoubtedly 'full term' had not been reached in this case when labour came on. As the true conjugate, however, was only $2\frac{1}{2}$ inches, the only alternative was to perform craniotomy on a living child.

CASE 2.—Mrs. M., iii-para, was admitted to the Maternity Hospital under my care on October 28, 1901. In both the previous labours the children were extracted with difficulty, and were dead. On the last occasion craniotomy had to be performed. The pelvis was of the flat rachitic type. The diagonal conjugate measured $3\frac{3}{4}$ inches. There seemed to be little, if any, diminution of the transverse diameter. She was not in labour when admitted, but it came on twelve hours afterwards.

My first intention was to perform symphysiotomy, and so I allowed labour to go on until the os was fully dilated. I then put her deeply under the influence of chloroform, with a view of finally deciding and proceeding with the operation chosen. On examining her, however, and testing the relative size of the head to the pelvis, I found that there would probably be difficulty in extracting the child and great separation of the pubic bones if symphysiotomy were performed. I therefore chose Cæsarean section.

The operation was carried out as in the previous case, except that the uterus was turned out before being opened into. I came right down on the middle of the placenta with my incision, so that I had to remove it before extracting the child. The child was very easily extracted. It weighed 8 pounds. There was very little bleeding, and the stitching of uterus was easily performed.

The patient had a good deal of sickness and retching during the first three days of the puerperium; otherwise there were no unfavourable symptoms. The temperature was never above normal, and the pulse after the first three days was not accelerated.

The wound healed by first intention, the stitches being taken out on the fourteenth day. She left the hospital on the thirty-second day after the operation. I examined the uterus bimanually before she left, and found it attached firmly to the abdominal wall to the right, and about 4 inches above the symphysis pubis.

CASE 3.—Mrs. N., twenty-five, primipara, was admitted to the Maternity Hospital under my care on January 15, 1902. She had been sent to see me some months previously by Dr. Finlay, of Dennistoun, because of the extreme degree of pelvic deformity existing. We both made out the diagonal conjugate to be only $2\frac{1}{2}$ inches. Cæsarean section was decided upon at that time, and she was advised to come into hospital a few days before labour was expected. Labour came on twenty-four hours after admission.

The operation was performed when the os was well dilated. The uterus was turned out before being opened into. The incision was as in the two previous cases. With the incision I came right down on the upper margin of the placenta, which was situated on the anterior uterine wall. The child was easily extracted, but was asphyxiated. It soon

recovered, however. The membranes were very adherent, and had to be stripped off in pieces with the fingers.

The puerperium was uneventful, and the patient made an excellent recovery. The stitches were removed on the fourteenth day, when the wound was found absolutely healed and dry. When she left hospital I examined her bimanually, and found the uterus firmly adherent to the abdominal wall about 4 inches above the symphysis pubis.

Note on Case.—I was not nearly so pleased with the incision in this as in the two previous cases. The bleeding was very considerable, and the stitching was complicated by the unequal thickness of the two sides of the wound. The side on which the placenta had been attached was at least one-third of an inch thinner.

The advantages claimed by Fritsch³ and those who advocate the fundal incision are the following: (a) The abdomen is opened into higher up, and so there is less risk of subsequent hernia; (b) by pulling the fundus well forward the escape of blood and liquor amnii into the abdominal cavity can be better prevented; (c) the child can be more easily extracted; (d) the placenta is less frequently cut down upon; (e) there is less bleeding; (f) there is greater diminution of the wound, and less stitching is required. I purpose discussing each of these claims.

(a) *The abdomen is opened into higher up, and so there is less risk of subsequent hernia.* The claim that the abdomen is opened into higher up with this incision must be admitted. In my three cases two-thirds of the incision was above the umbilicus, while in the six where I employed the longitudinal uterine incision the greater part was below. Admitting the fact, is Fritsch's deduction that ventral hernia will be less frequent correct? So far there is no evidence available. Personally I think it extremely probable. I have seen several cases of ventral hernia after conservative Cæsarean section—not, of course, in my own cases, because they have only been operated upon during the last eighteen months, and have not had time to develop a hernia. As far as my recollection goes, it has always been the lower part of the wound which has given. There is undoubtedly a great strain upon that part. Cameron⁷ has repeatedly pointed out that the pelvic and spinal deformities favour the occurrence of ventral hernia, and that it is much commoner after this operation than any other abdominal section.

I take it, then, that it is an advantage to open the abdomen as high up as possible. This, however, in no way ties one down to the transverse fundal incision, for one can employ just as well the high longitudinal one.

The following factors appear to me to influence the firmness of the abdominal wound—viz., the size of the wound, its position, the manner in which it has been stitched, the manner in which it has healed, and the time the patient has remained in bed. The effect of the size I will refer to again. As regards position, I would repeat, the higher it is the better. The time in bed should be from three to four weeks certainly, and the patient should lie flat on her back. As regards stitching, it is undoubtedly better to do so in layers. As regards manner of healing, the freer it is kept from any infection the better.

(b) *By pulling the fundus well forward through the abdominal wound, the escape of blood and liquor amnii into the abdominal cavity can be better prevented.* I have tried both ways of operating, packing swabs round the uterus and opening it without turning it out, and opening it after turning it out. Undoubtedly, the latter method results in less soiling of the peritoneum, and it is more surgical. I must admit, however, that, although I have frequently seen liquor amnii escape into the peritoneal cavity, as far as I have been able to judge no harm has resulted. That, however, cannot always be the case, for liquor amnii is sometimes not only non-sterile, but actually occasionally contains pyogenic micro-organisms.

In the last two cases I turned the uterus out, and then temporarily closed the wound above with pressure forceps. That is the most surgical procedure, and the one most generally recommended. The Trendelenburg position, although so strongly recommended on the Continent, I have never employed in this operation. It is said to lessen still further the chance of liquor amnii getting into the peritoneal cavity.

The two objections most generally urged against turning the uterus out before opening it are, that the abdominal wound requires to be made larger, and that there is great risk of infection and shock. That the former is true is quite certain, for I required to make the incision at least $1\frac{1}{2}$ inches longer. This increases the chance of hernia to a slight extent, it must be admitted. The other objection, that the risks of infection and shock are greater, is not of much importance. It can be lessened by surrounding the uterus with a soft towel soaked in a warm saline solution.

(c) *The child can be more readily extracted.* All operators of any experience have occasionally found difficulty in extracting the child. In the nine cases I have operated on, I have found difficulty only once, and in the fifteen to twenty cases where I have assisted Professor M. Cameron I have only twice seen the latter have any

difficulty. In one of his, and in mine, the difficulty arose from the uterus grasping the child so firmly, due to the fact that the membranes had ruptured some time before the operation was performed. The other case where Cameron⁷ had difficulty was most interesting, for the cause was so unusual. It was the retraction ring which became firmly applied round the neck of the child, and prevented the latter from being extracted. There is a similar case on record, and, curiously enough, it was where the transverse fundal incision had been employed. Steinthal⁸ has reported it, and so firm was the grasp of the child that the latter could not be removed until a longitudinal incision through the ring had been made.

In the three cases where I have employed the fundal incision I have been able to extract the child very easily. Over a low anterior longitudinal incision there is not the slightest doubt that the fundal incision of Fritsch has a distinct advantage as regards the extraction of the child, and especially if the membranes have ruptured and the uterus is in tonic contraction. That Fritsch's incision possesses any advantages over a high anterior one, from the point of view of extraction of the child, is very doubtful.

On reading over the reported cases where the fundal incision of Fritsch was employed, the only two cases, as far as I could find, where difficulty was found in removing the child, were the case of Steinthal,⁸ already referred to, and a case reported by Hink,⁹ where the presentation was 'transverse.'

(d) *The placenta is less frequently cut down upon.* To judge by the older investigations of K. Schröder,¹⁰ Gusserow,¹¹ and Ahlfeld,¹² one would expect that this contention of Fritsch would prove correct. It will be remembered that each of these three observers, many years ago and quite independently, found a fundal insertion of the placenta the exception, and Ahlfeld¹² a central fundal insertion in none out of his 125 cases. The placenta they found most commonly on the anterior and posterior walls. That also has been our experience in cases operated upon in the Maternity Hospital. At first sight these results would appear to indicate, as I have said, that Fritsch's contention is correct, and that with his fundal incision the placenta would be seldom met. I have no doubt, indeed, that his statement was based on the results of Gusserow, etc. In practice, however, although the placenta is situated on the anterior or posterior wall, a portion of it is frequently found to extend up to the fundus, and is cut down upon with a fundal incision.

Let me give some figures. Taking my own first, I have found in nine cases the placenta situated directly over the fundus once,

on the anterior wall thrice, and on the posterior wall five times. In the three cases where I employed the fundal incision, I came down in the middle of the placenta once, and on its margin once.

Schroeder,¹³ an enthusiastic supporter of the fundal incision, admitted in the cases he reported (all were from Fritsch's clinique), that the placenta was met in 35 per cent. Hübl,¹⁴ an opponent of the incision, found from collected cases that the placenta has been met in 41 per cent. V. Braun-Fernwald¹⁵ came down on the placenta in 54 per cent. with a fundal incision, and in only 48 per cent. with a longitudinal incision.

Taking it at the very best, therefore, the placenta is met when the fundal incision is employed in between 30 and 40 per cent. of cases, and when the anterior longitudinal incision is employed in about 40 per cent. With the fundal incision, therefore, the placenta is only slightly less frequently met.

Schroeder¹³ in this connection becomes a special pleader, for he claims that in many cases, as the margin only of the placenta was met, it was of little importance. Now, in the last case I operated on I was struck by the fact that it was a most unfavourable circumstance when one met the margin of the placenta with one's incision. In that case, when I came to stitch the uterine wound, I found I had two surfaces of unequal thickness to bring together. The side of the wound to which the placenta had been attached, for I came right down on the very edge of the placenta, was $\frac{1}{3}$ inch thinner than the other.

Meeting the placenta in one's incision always slightly complicates the operation and increases the risk of infection. It has been suggested, therefore, by Olshausen¹⁶ and others that a choice of incision should be made according to the site of the placenta. Theoretically the idea is sound, but practically it would sometimes be impossible, because it would imply adopting an otherwise very unsuitable place for one's incision. In addition, it must be remembered that it is not always easy by palpating the uterus, even after the abdomen is open, to tell exactly where the placenta is situated.

(e) *There is less bleeding.* It is claimed that there is less bleeding because the placenta is less frequently met, but also because the incision runs parallel to the course of the vessels, and in consequence there are fewer vessels divided. Hübl¹⁴ goes into this question very fully, and has examined a number of uteri incised in different directions. He has come to the conclusion that there are just as many divided one way as another.

From a consideration of all the reported cases, one is left with the impression that there is a little less bleeding with the fundal incision. In the first two cases where I employed this incision I was greatly pleased, because there was so little bleeding, and because it was so easily controlled. In the last case, however, the bleeding was very profuse.

Hübl¹⁴ is quite right when he insists that there are three distinct factors influencing the hæmorrhage, viz., uterine contraction, insertion of the placenta, and the distribution of the bloodvessels. I quite agree with him that much the most important is uterine contraction.

An interesting device for checking the bleeding when the fundal incision is employed is that of inserting two ligatures through the wall of the uterus at each end of the wound. Gummert,¹⁷ Döderlein,¹⁸ and others, have found it controls the hæmorrhage, but in the only case (Case 3) in which I tried it the bleeding was in no degree diminished.

(f) *There is greater diminution of the wound, and less stitching is required.* My own experience is in agreement with this statement. I have, however, no exact measurements to give. I have also been impressed with the ease with which the uterus can be held by the assistant while the stitching is being carried out. Among operators generally the impression seems to be that the uterine wound becomes smaller after this incision. Gummert,¹⁷ for example, expresses himself very decidedly of that opinion, and gives actual measurements in support of his view. The patient was one on whom he had previously operated by a longitudinal incision. The old cicatrix of the longitudinal incision measured 14 centimetres and the fundal incision only 10 centimetres.

The advantage that one obtains a thicker uterine wound to stitch with a fundal incision is claimed by Döderlein,¹⁸ Schroeder,¹³ and others. Gummert,¹⁷ however, speaks very decidedly against that view, and believes that the thickest portion is the anterior wall. Hübl, who has made measurements in several cases, has invariably found the same. He found the average difference was 1 centimetre. I have not made exact measurements, and so cannot express an opinion on this matter.

Gummert¹⁷ claims as an advantage for the fundal incision the fact that the two edges of the wound can be more exactly adapted. In two of my cases that was so, but in the third it was not, for, as I have already described, the two edges were of a different thickness owing to the situation of the placenta.

The importance of a strong and sound uterine wound is very

great indeed; especially is this so if the conservative operation is employed and the patient is left unsterilized. It may be desirable, as some are advocating, in order to secure a firm union, to stitch the uterus in two layers. Experience, however, at present does not indicate that as being necessary.

Having considered the advantages claimed by Fritsch and his followers for the fundal incision, I desire now to consider the objections that have been advanced against it.

The objections urged against the incision are that, as it is made high up over the fundus, adhesions to the bowels and high attachment of the fundus to the abdominal wall will result, that involution of the uterus will be interfered with, and that discomfort from dragging on the abdominal wound will follow. Other objections are that general septic peritonitis will be more apt to follow if there is any septic mischief in the uterus, and that rupture of the uterus at a subsequent pregnancy will be more liable to occur.

As regards adhesions of intestines to the uterine wound, there are, as far as I can find, only two reported cases. Everke¹⁹ reported a case of very great interest. The patient died septic, with slight adhesion of intestines over the wound; but what was most important was that the uterine wound was gangrenous. Everke thought that this resulted from the stitches having interfered with the circulation of the part. As the patient, however, had been handled a good deal beforehand, much the simpler, and probably the more correct, explanation is, that the wound was septic, the infection having extended from the uterus. All who have referred to the case have expressed that opinion. The other case is one reported by Hahn,²⁰ where a patient died on the seventh day of septic peritonitis. The bowel was adherent all along the incision. The patient was handled by a midwife for long before she was sent into hospital.

The other objection, that the uterus in operating with a fundal incision will remain attached higher up, is to my mind of great importance. In all my three cases the uterus, at the time of the patients' dismissal from hospital, was firmly fixed to the abdominal wall, 3, 4, and 5 inches above the symphysis pubis. After operating with the longitudinal incision the uterus is usually, as Sinclair⁵ says, 'just exactly in the position where it remains after a successful ventro-fixation.' Not always, however, for in one of my six longitudinal incision cases I found it quite freely movable, and, as far as I could judge, unattached.

To my mind—I am quite aware this is not the view generally

held—the attached surface of the uterus should be below the tubes in ventro-fixation. Still more is this necessary after conservative Cæsarean section, in order that the whole uterus, especially the whole fundus, may expand, should there be a subsequent pregnancy.

It must, of course, be admitted that some (*e.g.*, Döderlein and Hahn) maintain that the position of the wound has no effect on the adhesion. All I can reply to such a statement is that my experience has been different.

Another objection urged by those who are opposed to the fundal incision is that, in the case of any infection of the uterus, general peritonitis will be more liable to occur. This is not so great, they argue, with the longitudinal incision, for it becomes shut off from the peritoneum by adhesion with the anterior abdominal wall. Theoretically, this seems perfectly sound. Some have also stated in addition that, if any septic mischief occurred in the uterine wound, it would escape through the abdominal wound. That, of course, is incorrect, because as a rule the uterine and abdominal wounds are not in apposition, the former being usually over to the right, as the uterus as a rule is displaced to that side.

The danger of rupture of the uterus in a subsequent pregnancy is still a matter on which one cannot speak with any assurance, and certainly one cannot yet compare the danger of rupture after a longitudinal with the danger after a transverse fundal incision. As far as I have been able to find, there have only been two cases where the fundal incision has been twice employed on the same patient. In neither was there any adhesion of bowel along the uterine wound, and, indeed, in Schroeder's case there was no trace of the previous incision, and no special thinning of any part of the uterine wall discoverable.

In Ludwig's²¹ case there was also nothing special to note.

In the foregoing remarks I have tried from my own experience of three cases, and from the records of others, to state as fairly as possible the case for and against the fundal incision of Fritsch.

In looking at the subject dispassionately, one cannot but feel that the excitement—for there was a very considerable excitement over it in Germany until a year or eighteen months ago—was rather out of proportion to the importance of the subject. At the same time the incision should be thoroughly tested, and specially should we come to a conclusion regarding the after-results and the liability to complications in subsequent pregnancies where the incision has been employed.

REFERENCES.

- ¹ SPENCER : *Jour. of Obstet. and Gyn. of the Brit. Empire*, 1902, vol. i., p. 138.
- ² MORISANI : *Monatschrift f. Geb. u. Gyn.*, 1900, Bd. xii., p. 358.
- ³ FRITSCH : *Cent. f. Gyn.*, 1897, No. 20.
- ⁴ KYNOCH : *Scot. Med. and Sur. Jour.*, 1900, p. 277.
- ⁵ SINCLAIR : *Lancet*, January 19, 1901.
- ⁶ BOYD : *Amer. Jour. of Obstet. and Gyn.*, 1901.
- ⁷ CAMERON : Glasgow Hospital Reports, 1900, vol. iii., p. 9.
- ⁸ STEINTHAL : *Cent. f. Gyn.*, 1898, p. 345.
- ⁹ HINK : *Cent. f. Gyn.*, 1898, p. 725.
- ¹⁰ K. SCHRODER : 'Lehrbuch der Geburtshülfe,' zwölfte Auflage, 1893, p. 56.
- ¹¹ GUSSEROW : *Monatschrift f. Geb. u. Gyn.*, Bd. xxvii., p. 97 (results quoted in Schröder's 'Lehrbuch'; see above).*
- ¹² AHLFELD : 'Lehrbuch der Geburtshülfe,' zweite Auflage, 1898.
- ¹³ SCHROEDER : *Monatschrift f. Geb. u. Gyn.*, Bd. xiii., 1901, p. 22.
- ¹⁴ HÜBL : *Monatschrift f. Geb. u. Gyn.*, 1900, Bd. xii., p. 480.
- ¹⁵ V. BRAUN-FERNWALD : *Arch. f. Gyn.*, 1899, Bd. lix., p. 320.
- ¹⁶ OLSHAUSEN : *Zeit. f. Geb. u. Gyn.*, 1897, Bd. xxxvii., p. 535.*
- ¹⁷ GUMMERT : *Monatschrift f. Geb. u. Gyn.*, 1900, Bd. xi., p. 1056.
- ¹⁸ DÖDERLEIN : Quoted in *Cent. f. Gyn.*, 1899, p. 989.*
- ¹⁹ EVERKE : *Monatschrift f. Geb. u. Gyn.*, Bd. v. (reference, *Cent. f. Gyn.*, 1898, p. 107).
- ²⁰ HAHN : *Cent. f. Gyn.*, 1899, p. 1457.
- ²¹ LUDWIG : *Cent. f. Gyn.*, 1899, p. 801.

* Have not been read in original.