The Lower Uterine Segment Incision in Conservative Cæsarean Section.

By Professor J. M. Munro Kerr, M.D.

By the term "conservative Cæsarean section" is meant the non-sterilization of the patient following upon the extraction of the child and the suturing of the uterus.

I feel I am voicing the opinion of all enlightened obstetricians in this and other countries when I say that our desire is to perform the conservative operation and not to sterilize the patient. We feel that sterilization of the patient after Cæsarean section unless there is some definite disease of uterus, heart, lungs, etc., or mental weakness, is a crude procedure and will only be justifiable in the future if it is proved beyond doubt that it is not possible to secure a sound uterine cicatrix. If such a decision is forced upon us it will be most unfortunate, for it will undoubtedly compel us to limit the scope of Cæsarean section and preclude us from extending the operation to many obstetrical complications which we feel could undoubtedly be more suitably dealt with by Cæsarean section than by the ordinary methods of treatment at present employed. It is unnecessary to enter into details regarding such conditions, for the indications for Cæsarean section were freely considered at the recent meeting of the British Medical Association in Newcastle.

The purpose of the present paper is to discuss the relative merits of the ordinary longitudinal incision through the body of the uterus, and the incision through the "lower uterine segment." With this object let us consider the subject under the following heads :—

(1) The evidence that the uterine scar in conservative Cæsarean section is frequently unsatisfactory.
(2) The reasons why the uterine scar is so frequently defective.
(3) The means by which a better scar can be secured with the ordinary longitudinal incision.
(4) The lower uterine incision which, in my opinion, is preferable to the ordinary longitudinal incision as I believe it gives a sounder cicatrix.

(1) *The evidence that the uterine scar in Cæsarean section is frequently unsatisfactory.* This question has been gone into very fully by Eardley Holland. The results of his inquiries and inves-

tigations will be referred to later. As regards the Glasgow Maternity Hospital, Drs. Hewitt and Lindsay found in their investigations over the years 1912—1919 inclusive that the liability to rupture was present in 5 per cent. of cases, and that rupture occurred in 1.8 per cent.

Practically all writers have been forced to the conclusion that in a fair percentage of cases the uterine scar is not satisfactory. Take, for example, the most important contribution made by Couvelaire. This author in his most excellent work, "Introduction à la Chirurgie Uterine Obstetricale," states on p. 141 that in 17 per cent. of cases there is an unsatisfactory cicatrix, in 10 per cent. extreme thinning of the cicatrix, and in 2 per cent. rupture of the uterus. Losee,[1] McPherson,[2] and Findlay[3] give somewhat similar experiences.

Let us turn now to the figures of Eardley Holland.[4] They are the most exact data at our disposal. He organized, early in 1920, amongst a large number of obstetric surgeons in Great Britain and Ireland, a "follow-up" inquiry into the subsequent obstetrical history of hospital patients who had had Cæsarean section performed between the years 1912 and 1918 inclusive. He summarizes his results in the following table:—

Total number of Cæsarean section patients (excluding fatal and sterilized cases, and cases of repeated Cæsarean section where the first operation was performed prior to 1912)	1,605
Number followed up	1,103
Number in whom no subsequent pregnancy occurred ...	616
Number who subsequently became pregnant...	487
Results of pregnancies:—	
Delivery by natural passages	78
Repeated Cæsarean section	352
Abortion	47
Pregnant now	86
Rupture of scar	18

These figures show that the frequency of rupture of the scar in subsequent pregnancy or labour (cases of abortion and early pregnancy excluded) is 18 in 448, or 4 per cent.; also, that the proportion of ruptured scars to cases of delivery by the natural passages is 18 to 740, or 1 to 4.3 per cent. We may safely, therefore, take it that at the present time there is definite evidence to prove that the uterine scar after the conservative Cæsarean section is not as sound a scar as is generally supposed, and that it frequently gives way completely or partially.

(2) *The reasons why the Uterine Scar is so frequently defective.* For many years I have been particularly interested in this subject, and have incidentally referred to it on several occasions when writing on Cæsarean section. In my last contribution, a chapter on Surgical Operations of the Gravid Uterus in "The New System of Gynæcology,"[5] I referred to the matter briefly. At the time the Editors were inclined to think that my remarks relative to the unsatisfactory Cæsarean scar too pessimistic. Personally, I do not think so, and the figures referred to above only confirm my previous impressions.

If a general surgeon were asked his opinion why the Cæsarean section wound is unsatisfactory in a number of cases, he would almost certanly give the answer that it was due to faulty technique, for he would have in his mind the excisions and repairs he is accustomed to make on the abdominal organs. As a matter of fact, I have tested one or two surgeons on the point and have received the answer expected. I beg, however, to differ from them, and to offer the opinion that the process of healing in the uterine wound is liable to certain disturbing factors which do not prevail in wounds elsewhere.

The first of these is the difficulty in securing complete asepsis. Now this is specially difficult to secure in the uterine wound, because of the danger of a spread upwards from the vagina. If the uterine wound in Cæsarean section becomes directly infected through the abdominal opening the surgical team is to blame. The surgeon and his team should be able to prevent such an occurrence. But owing to the fact that Cæsarean section has often to be performed with the patient imperfectly prepared vaginally, and upon a structure so easily infected, it is not to be wondered at that even in the hands of the most careful and experienced operators infection of uterus from below cannot always be prevented.

Another very important factor which militates against an absolutely normal healing in the uterine wound is the *fact that the uterine muscle fibres during the puerperium* are in a state of degeneration. An autolysis occurs in the muscle fibres. It stands to reason, therefore, that the healing process must be interfered with in the early days of the puerperium as a result of this degeneration.

A third disturbing factor is the fact that the sheets of muscle which form the uterine wall are irregularly distributed, and this is seen very markedly in Cæsarean section whenever the uterus begins to retract. The surface of the wound, then, instead of being smooth, becomes irregular and puckered, and no matter how carefully the surgeon stretches the wound it is difficult to prevent

the occurrence of small pockets when he brings the surfaces of the wound together.

A fourth disturbing factor is the state of unrest of the uterus subsequent to operation. Not only does the uterus "retract," but from time to time it "contracts." If the uterus contracts before the sutures are inserted it will be observed that the edges and surfaces of the wound gape; while if the sutures are tied they appear strained when the uterus contracts. This alternate contraction and relaxation of the uterus, therefore disturbs the coaptation and lessens the hold the stitches have on the tissues, and so favours the occurrence of small collections of blood between the coapted surfaces.

A fifth and very important factor is the necessity imposed upon the surgeon of using his ligatures not only as coaptors but as hæmostatic agents. For the ideal healing of a wound, next to asepsis comes complete hæmostasis. The general surgeon secures this by picking up bleeding vessels and if necessary applying ligatures to them. The obstetric surgeon cannot do this. He has to apply his sutures firmly if he wishes to stop bleeding and prevent the effusion of a certain amount of blood between the cut surfaces of the uterine wound. I shall refer to this matter later, under Head 3.

There is yet another disturbing factor. If the placenta is situated on the anterior wall, and this, as I have shown elsewhere,[6] occurs in 40 per cent. of cases, the operator will find that he has a layer of tissue peculiarly difficult to stitch and coapt exactly. It is very spongy, very friable, and contains large vessels, and no matter how carefully he applies his sutures blood collects between the edges and there is a tendency for a gutter to form along the internal line of the wound. Into this gutter at the subsequent pregnancy the membranes protude and a hernia gradually develops, and this is the is the ordinary method of rupture.

I maintain, therefore, that there are very decided factors which militate against an absolutely sound uterine cicatrix. If these old uterine cicatrices are examined microscopically it will be found that in a considerable number of them there is a relatively greater portion of fibrous tissue, even when the wound heals satisfactorily. I have proved this to be the case in several instances, and have microscopic specimens which support the views expressed.

(3) *The means by which a better scar can be secured with the ordinary longitudinal incision.* The first detail is the prevention of infection. Undoubtedly it would be of tremendous advantage if we could always have patients resident in hospital and carefully prepared some time beforehand. Without doubt, now that antenatal cliniques have been established and the prospective mother

is being looked after, matters will improve, and patients requiring Cæsarean section will not be rushed into hospital or nursing home at the last minute, and so the preparations for operation will be leisurely and thoroughly carried out.

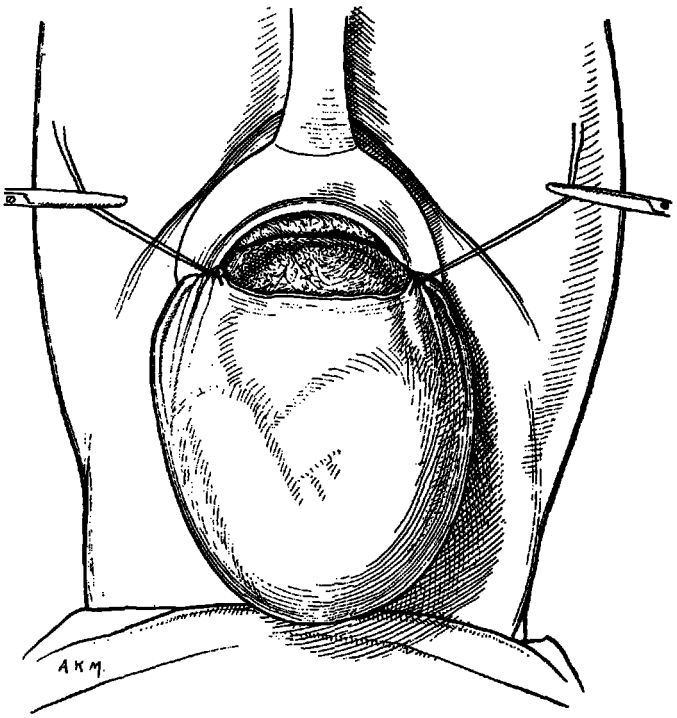

FIG. 1.

The patient is in the Trendelenburg position. A retractor is shown in lower angle of wound. Bladder seen retracted. Two sutures have been applied at the side of the incision. Lower segment seen exposed.

Some years ago I advocated the delivery of the placenta by the vagina after Cæsarean section, especially in cases where there was a possible infection of the vagina. I am convinced that the uterine wound is frequently infected by dragging the placenta and membranes up through it. Naturally this procedure of forcing it downwards into the vagina, as occurs in normal labour, can only be employed when the cervix is well dilated, and this raises the question of the time when Cæsarean section should be performed.

As regards Cæsarean section performed for pelvic deformity, the commonest indication for the operation, the ideal time to operate is when the os is fairly well dilated. But when the obstruction is from fibroid tumours, and when hysterectomy is probably necessary, it is better to operate in the last few days of the pregnancy before labour has actually started, for then the cervix is

undilated and the stump of the cervix or vagina can be more easily stitched over. In cases in which the operation has to be performed for grave complications of pregnancy, such as eclampsia, one has naturally no choice of the time, one must deal with the condition whenever it is thought necessary to empty the uterus by this procedure.

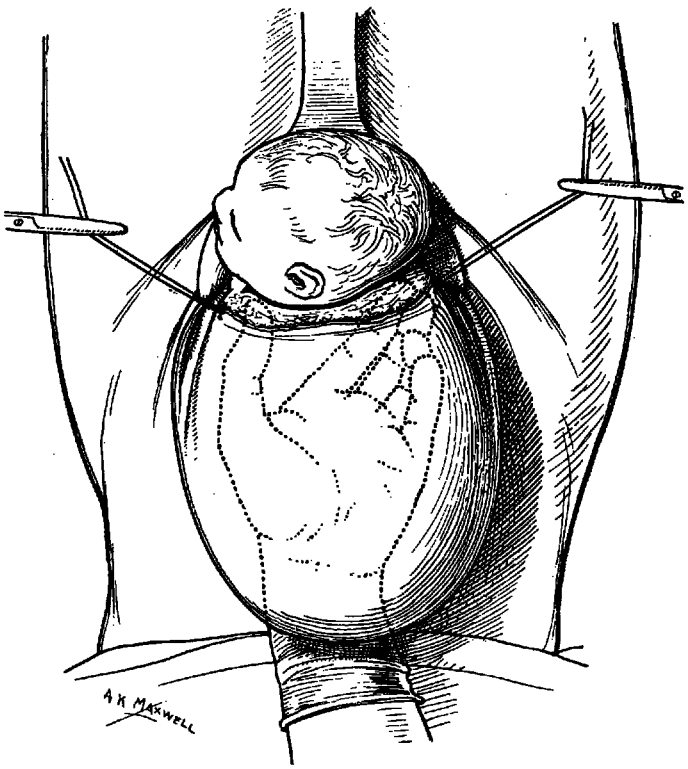

FIG. 2.

Lower segment has been incised transversely. Operator's left hand is shown passed behind uterus and expressing child's head through wound.

Another very important question is whether the uterine wound should be stitched in layers or with through and through sutures. The general feeling at the present time seems to be that it is better to stitch in layers, and this is the procedure I have been following for some years. Very important also is the material used for suture. For many years I used nothing but catgut, and I am inclined to think that in some of my cases in which there was a weak cicatrix the suture material was to blame, not because of the danger of asepsis—with carefully prepared catgut that danger can be excluded nowadays—but because the catgut yields too much and does not keep the surfaces of the uterus coapted. In recent

years I have been stitching the under layer with catgut, but the bulk of the muscle tissue with linen thread or fine silk. Eardley Holland's figures in this connection are most interesting.

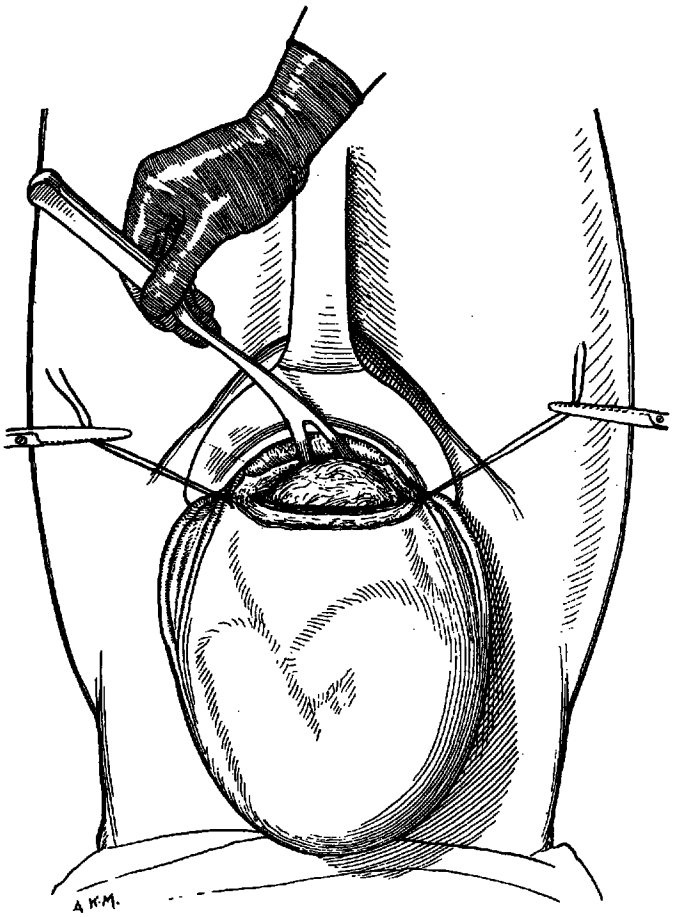

FIG. 3.

One blade of the forceps is shown under the head of the child. If the fundus is compressed the child's head will readily slip through wound.

Another very important point is to suture the uterus while it is in a state of retraction as distinguished from that of contraction. Now one usually gets ten mintues or a quarter of an hour after the child is delivered when there is comparatively little placental separation, and very frequently only slight uterine contraction. With the uterus in this passive state one can stitch it more easily and coapt the surfaces more accurately. This is a strong argument in favour of leaving the placenta to separate naturally and be expelled per vaginam. But even if the placenta is removed through the wound it is a great mistake to manipulate the uterus

manually, or to give, as some operators do, an intramuscular injection of ergot or pituitary extract. For this causes gaping of the uterine wound and renders the coaptation of the edges more difficult. If the uterine wound bleeds too freely this can be controlled by temporarily clamping the uterine and ovarian vessels, or by the assistant grasping the broad ligaments.

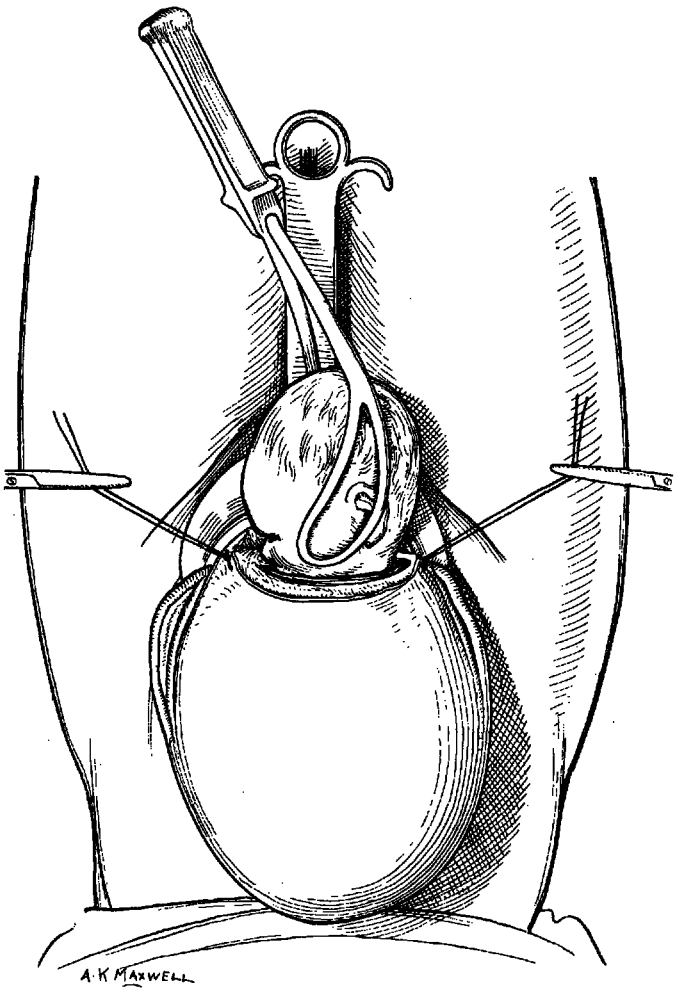

FIG. 4.

In cases in which there is special difficulty in extracting the head, the forceps may be employed as shown here. Author has found it necessary only once in 22 cases.

(4) *The lower uterine incision which, in my opinion, is preferable to the ordinary longitudinal incision, as I believe it gives a sounder cicatrix.* Incisions in the lower uterine segment have been discussed in considerable detail in French and German obstetric

journals in recent years by many distinguished obstetricians, such as Frank, Döderlein, Sellheic, Pfannenstiel, Kustner, Latzko, Jennin. Various names have been given to the incisions, such as the "suprasymphyseal," "extraperitoneal," "subperitoneal," Cæsarean section. In this country the one which has been most discussed is that recommended by Döderlein, which is really, however, a modification of Latzko's incision. It and its variations are the only genuine extraperitoneal incisions. The others are not really extraperitoneal, for the incision is only made extraperitoneal after the parietal and visceral layers of peritoneum have been stitched together.

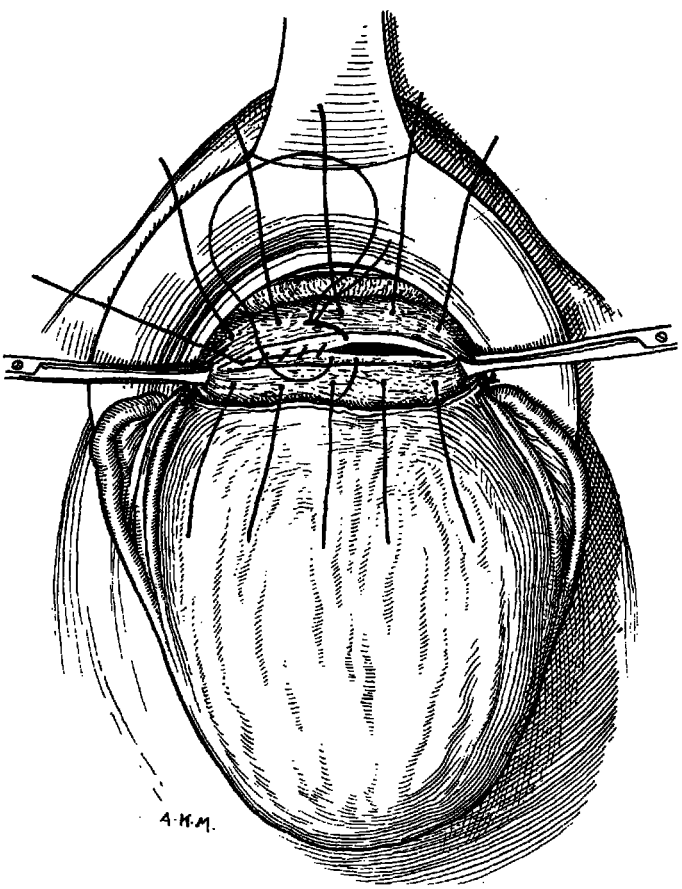

FIG. 5.

Child has been extracted, and the placenta has been removed manually or left to be expelled through the cervical canal. Layers of sutures are here shown—continuous catgut for mucous membrane, linen thread for muscular tissue. Wound is shown here held up by volsellum forceps, but in practice, I usually employ the ligatures shown in previous figures.

As a matter of fact extraperitoneal incisions go back even further than the present century, for Ritgen and others in the early part and Thomas in the later part of last century described extra-peritoneal operations.

One thing, however, has been common to all of the various operations on the lower segment, viz., they have been advocated as being safer in presumably infected cases.

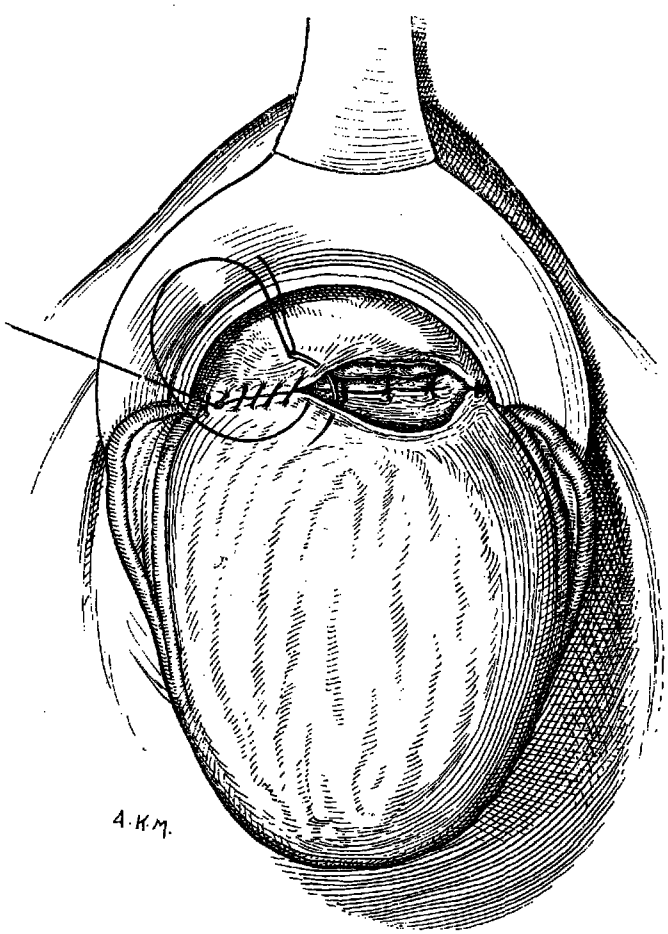

FIG. 6.

The muscular tissue of the uterus is shown united with ligatures tied and coapted A continuous suture is being applied to unite the two flaps of peritoneum.

Now, I wish it to be clearly understood that in the present paper I am not advocating the lower uterine incision on such grounds, but because I believe the cicatrix formed is sounder and stronger than the cicatrix in any other part of the uterus. I have therefore in the last three years experimented on this incision and employed

it on twenty-two occasions. Before discussing its value let me describe briefly the method I have employed. The patient is prepared for operation in the ordinary way, and the vulva, vagina, and cervix are carefully disinfected. She is then placed in the Trendelenburg position. A longitudinal incision is made, reaching from below the umbilicus as far as the symphysis. After the abdomen is opened the bladder is dissected off the anterior uterine wall. A transverse incision is made in the lower uterine segment. (Fig. 1.) A suture is inserted at each end of the wound; this is employed to control any laceration at the ends of the wound and after delivery to pull up the wound so that it can be easily stitched. The child is then expressed by passing a hand behind the uterus (Fig. 2). Where this is not possible and the uterus has not been turned out of the abdomen, one blade of the forceps used as a vectis may be employed. (Fig. 3.) Only once have I employed the two blades of the forceps. (Fig. 4.) The child having been extracted and the cord tied, the placenta may be removed through the wound if the cervix is not sufficiently dilated, but if the cervix is sufficiently dilated I drop the cord into the uterine cavity and deliver the placenta by the vagina. I then pull up the wound so that it is within easy access for stitching by means of the two lateral stitches already referred to. I insert three layers of *sutures* (Fig. 5), catgut for the mucous membrane, linen thread for muscle, and a third layer of catgut for tucking back the bladder into its old position. (Fig. 6.) I generally find that it is an advantage to insert a large retractor in the lower part of the abdominal wall so that the lower segment is within easy access. Sometimes the operation is a little more difficult than the ordinary one, but recently I have found it quite as simple.

I make no claims to originality as regards the incision, and I recommend it only because I believe that the cicatrix that results will be less liable to rupture. The advantages of the incision are that one cuts through a less vascular area; the bleeding is extraordinarily slight unless the wound is allowed to extend into the vessels at the side. In the second place, it is thin and consequently the surfaces can be readily brought together. In one case where I removed a strip of tissue I found the transverse fibres were much greater than the longitudinal ones, but I cannot be dogmatic on this point. The third advantage, and it is a very important one, is that the wound in this area is at rest during the early days of the puerperium. (Fig. 7.) Lastly, there is this great advantage that owing to the fact that the lower uterine segment does not become fully stretched until labour is well advanced the scar is in a safer region than the ordinary longitudinal one.

As already stated, I have performed the operation on twenty-two

occasions with one fatality. To my knowledge there has been one case of spontaneous delivery after the operation, and on four occasions a second Cæsarean section has been performed. In two of these cases my assistant examined the scar very carefully indeed, and could find practically no trace of the former wound. My senior assistant (Dr. Hendry) and Dr. Shannon both report very favourably of the incision.

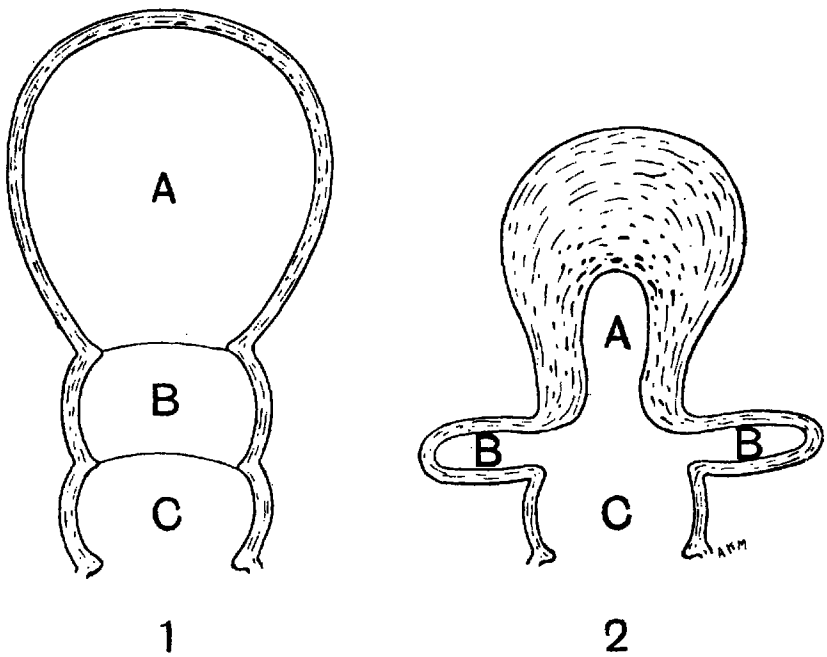

FIG. 7.

Diagram to illustrate the appearance of lower uterine segment when labour is advanced, and after delivery.

1. The three areas of uterus are indicated: A. active contractile portion; B. lower uterine segment; C. cervix.
2. The appearance presented by lower segment twenty-four hours after delivery. This can be confirmed by the illustrations of frozen sections of puerperal uterus.

But, like every other surgical procedure, the lower uterine segment incision has its limitations and disadvantages. It is an operation particularly suited for the case in which labour is well advanced in the second stage, and where the lower uterine segment is thin. On the last occasion on which I performed the operation, some three weeks ago, the patient had reached term, but labour had not started. The wall of the uterus was much thicker and the lower segment more difficult to reach. But even in such cases, viz., cases in which labour has not started, if the uterus is turned

out of the abdomen, the patient placed in the Trendelenburg position, and a retractor used to pull down the lower angle of the wound I believe the incision preferable to the ordinary longitudinal one.

Some of my colleagues, *e.g.*, Blair Bell, have referred to the danger of excessive hæmorrhage owing to great varicosity of the veins or the presence of placenta prævia, but anyone who has had experience of a number of Cæsarean sections knows that even in the longitudinal incision bleeding is often excessive, and the placenta is encountered in 40 per cent. of cases.

There was, however, one case in which I found it impossible to deliver the child through the incision. It was a case of contraction at the outlet. The waters had drained away, and the head of the child lay transversely at the pelvic outlet. I made the incision, but could not raise the head out of the pelvis. I had therefore to extend the incision longitudinally. This extension of the incision longitudinally leads me to say a word regarding the longitudinal incision over the uterine segment rather than the transverse one which I employ. This has been recommended by several operators in the past, and more especially by Eardley Holland recently. I see no objections to the longitudinal incision as far as I can judge at present, but I am inclined to think that the transverse one is preferable. The selection of the most suitable direction of the incision will be decided when we know how the muscular fibres of the lower uterine segment are distributed. In a specimen which I examined microscopically the largest portion of the fibres ran circularly. From the development of the uterus I should imagine that this would prove to be the case.

Undoubtedly the operation is a little more complicated than the ordinary longitudinal one, and it is not so suitable for emergency Cæsarean section in domestic practice.

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