

Pedicle needles have served their purpose and should be given up. The large sharp curved needle is a dangerous weapon. Round-bodied needles should alone be used within the abdominal cavity, and in order that they may be held easily I have had them made with the posterior half flat. The employment of the round-bodied needle constitutes a distinct advance in surgical technique. Its advantages are evidenced, for example, in stitching the uterus, where little or no bleeding results from the passage of the needle. Death from embolism has followed such a simple operation as utero-suspension. Was a cutting needle used?

There are certain situations in the abdomen where transfixion is frequently employed—namely, the broad ligaments, the omentum, and the mesentery.

*The Broad Ligaments.*—Transfixion of the broad ligaments is a most dangerous proceeding. These ligaments contain between their layers a venous plexus specially well developed in the presence of uterine new growths and liable to be injured by the transfixing needle. In this situation it is easy to operate anatomically, to open up the broad ligaments, and to tie the vessels separately with thin material. "Chunks" of tissue should not be left ligatured with thick material liable to cause post-operative pain and maybe thrombosis.

*The Omentum.*—I believe the method of ligaturing the omentum by transfixion and interlocking sutures, as generally taught and practised, to be dangerous and a cause of post-operative thrombosis and embolism. It may be argued that the needle can be passed through an avascular spot. Do all operators take this trouble? Vessels in the omentum should be caught with forceps and tied, the same technique being employed when a portion is excised.

*The Mesentery.*—Here, again, transfixion is dangerous, and it is easy where a portion of mesentery is excised to catch the bleeding points, and to tie them and to approximate the two edges by tying over forceps instead of stitching. Transfixing the mesentery of the appendix with a needle and puncturing vessels may easily lead to thrombosis and embolism. Deaths from this cause after a simple appendix operation are by no means so rare. The "patches of pneumonia" and localized pleurisy seen after this and other operations are most probably embolic in origin. Puncturing veins in the wall of the caecum may be another cause of thrombosis. The use of a small curved round-bodied needle, avoiding blood vessels, should prevent such an accident when covering the appendix stump.

*Stomach and Intestine.*—It is important also to avoid puncturing vessels in the walls of the stomach and intestine during gastric and intestinal operations. The extravasated blood in the bowel wall may easily become infected and break down.

*Abdominal Wall.*—Care exercised in making the incisions in the proper positions and respect for the anatomical arrangement of the structures will prevent accidents in this situation. The deep epigastric vessels may be injured unless sought for and avoided when making lateral incisions in the abdominal wall. If the injury is not discovered a troublesome haematoma may result. Moreover, in using through-and-through sutures it is better to employ a figure of 8 suture whose track can be seen and followed rather than to thrust a needle blindly into the abdominal wall, and puncture a vessel or vessels. Accurate haemostasis in the abdominal walls, as in all other situations, is most essential, so that no clots are left which may subsequently become infected.

#### Summary.

- (a) Do not transfix or puncture blood vessels.
- (b) Do not tie or stitch too tightly and cut into blood vessels.
- (c) Obtain accurate haemostasis, leaving no blood clots.

If by attention to improvements in technique these post-operative fatalities can be still further reduced, "tis a consummation devoutly to be wished." For this purpose neat, clean workmanship, founded on sound anatomical knowledge, is required. There is still scope for the surgical artist.

#### REFERENCES.

- <sup>1</sup> *Annals of Surgery*, i, May, 1913. <sup>2</sup> *Ibid.*, December, 1912.

## MYOMECTOMY OR HYSTERECTOMY.

BY

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In the treatment of uterine fibroids myomectomy has had a very limited application as compared with hysterectomy. The positive indications for the former as against the latter operation have been a single tumour in a patient under 40 years of age either pedunculated, or at least not deeply embedded in the uterus, and not giving rise to excessive menstrual bleeding. It is now, however, in most cases possible, and I hold in many cases proper, to carry out the conservative operation though all these criteria are traversed.

The drawbacks that have been urged against removing the tumour or tumours and leaving the uterus are, first, that where the leading symptom is menorrhagia the haemorrhage may continue after the operation; secondly, that other tumours may arise either *de novo* or from overlooked seedlings; thirdly, that the likelihood of pregnancy in the conserved uterus is small, and that in the event of its happening the uterine scar may give way; and, fourthly, that the operation is frequently more difficult than hysterectomy while its risk is at least as great and often greater.

There are, of course, certain cases in which the propriety of removing the uterus is in no doubt: elderly women with large and multiple tumours; cases in which the anaemia is so extreme that any further loss of blood, even the amount of a normal menstrual period, is undesirable; inflamed or degenerate tumours, or large tumours growing in the supravaginal cervix. But besides these there is a considerable class of relatively young patients who, having fibroids in the womb, seek advice on account of menorrhagia, dysmenorrhoea, or abdomino-pelvic pain. It is in this type of case that myomectomy is artistry and hysterectomy crudity.

Let us examine the drawbacks that have been alleged against myomectomy and see if they are as cogent to-day.

#### CONTINUANCE OF MENORRHAGIA.

If excessive menstrual loss continues after myomectomy, it is due either (a) to a small submucous fibroid missed at the operation; (b) to endometrial thickening; (c) to the fact that the uterus has remained much hypertrophied although all the tumours have been removed; or (d) to a degenerate condition of the uterine wall.

(a) *A Missed Submucous Fibroid.*—It is easily possible to miss a small submucous fibroid, say the size of a pea, if the uterine cavity is not opened and inspected in the course of the operation, for so diminutive a tumour is with difficulty felt through the uterine wall. Hence the surgeon should as a routine open the cavity in most cases, and should make it an invariable rule to do so in every one where menorrhagia is complained of. I have frequently detected and removed in this way a little nodule which, if overlooked, would have defeated the whole object of the operation. The opening of the cavity in an uninfected case (and in none other should myomectomy be attempted) adds no risk to the operation.

(b) *Endometrial Thickening.*—In certain cases of fibroids diffuse thickening of the endometrium is present, whilst in others a local overgrowth in the form of a mucous polypus exists. Both abnormalities, if not dealt with, will maintain haemorrhage after the operation. An opening into the uterine cavity discloses them. Curettage is far more efficiently performed by this route than *via* the cervix, and a sharp scoop is the best instrument to use. A mucous polypus should be similarly ablated, special attention being paid to the cornua. On several occasions I have found and removed a polypus situated in one of these recesses.

(c) *Hypertrophy of the Uterus.*—With all interstitial and submucous fibroids of any size hypertrophy of the uterus enclosing them necessarily coexists. The condition is, indeed, in this particular exactly analogous to pregnancy. Involution takes place after myomectomy just as it does after labour, but is more apt to be incomplete, and such subinvolution will cause menorrhagia to persist. It is necessary, therefore, in these cases not merely to remove the tumours but to trim down the uterus to a reasonable

size. This is done by cutting away the redundant capsule of hypertrophied muscle tissue or even a segment of the uterine wall down to and including part of the mucosa.

(d) *Degeneration of the Uterine Wall.*—The degenerative states of the uterine wall included under the term "fibrosis" may coexist with fibroids, and in such cases hysterectomy should be performed, not myomectomy. The conjunction, however, is a rare one, the uterine musculature over a fibroid being, as a rule, conspicuously well developed. A smooth, flabby appearance of the uterine wall in a case marked by menorrhagia, especially if there is no enlargement of the cavity, suggests that "fibrosis" is the cause of the haemorrhage rather than the fibroids, and should determine the removal of the uterus.

#### RECURRENCE OF TUMOURS.

That new fibroids do occasionally form after myomectomy is undeniable, but I believe that the large majority of reappearances have their origin in small tumours overlooked at the time of the operation, for the more thoroughly it is performed the rarer are such apparent recurrences. Only on one occasion can I remember having to remove the uterus subsequently on this account.

#### FUTURE PREGNANCY.

Noble, from an investigation of a large number of cases of myomectomy, stated that only 10 per cent. conceived after the operation.

Such general figures must not, however, be taken at their face value; for many of the patients are over 40, and the bulk of them over 35, whilst a good proportion are unmarried. Moreover, it is undoubted that the larger number of myomectomies are performed either on unmarried or sterile married women; on the first group in order to leave them not less fit for marriage, and on the second so as to maintain intact their capability for child-bearing in so far as they may be capable. Both these groups are relatively infertile. On the other hand, the fact that a woman has already borne children frequently determines the removal of the uterus, on the ground that she has had children and does not want any more. If the present practice was reversed, and myomectomy was more particularly performed on women of proved fertility, a much larger number of pregnancies would follow the operation than at present obtains.

The fear that the uterus after myomectomy will not stand the strain of pregnancy is groundless. There is probably no tissue in the body that heals so perfectly as the uterine muscle. I have had several opportunities now of viewing through an abdominal incision the after-results of this operation, and on no occasion could a trace be seen of the incisions in the uterine wall. This is in keeping with what one finds when performing Caesarean section on a woman who has previously been delivered through the abdomen.

Some years ago a patient was sent to me for the purpose of hysterectomy on account of large fibroids complicated by pregnancy. I tied her through till term and then delivered her *via* the abdomen, not only of a fine child, but of five large fibroids as well, varying in size from a melon to an orange. The tumours were deeply embedded and the uterine cavity was opened altogether in three places. A year later she again became pregnant, and at her request I repeated the Caesarean section when she reached term. I could find no trace of my six previous incisions, the uterus being absolutely normal.

No time is so favourable for removal of a fibroid as immediately after the uterus has been delivered by Caesarean section, for the retractile and supple state of the uterine wall minimizes the haemorrhage and makes suturing particularly easy.

In the operation of utriculoplasty a wedge-shaped portion of the uterus is excised and the lessened organ sutured, with the object of reducing the "menstrual area." The first patient on whom I performed this operation conceived three times subsequently, and on each occasion delivery by the vagina was successfully accomplished, a fact which strikingly illustrates the reparative power of the uterine wall.

#### THE RISK OF MYOMECTOMY AS COMPARED WITH HYSTERECTOMY.

The risk specially attaching to myomectomy as compared with hysterectomy is haemorrhage either during or

after the operation. There can be no question that the amount of blood lost during an extensive enucleation is considerably more than would be the case if the uterus was removed with the fibroids. Nevertheless, by correct technique the amount can be kept well within the limits of safety. The tumours should be enucleated, and the beds from which they came obliterated by suture one at a time. There should be no delay in inserting the interrupted mattress sutures that effect haemostasis, and if these are insufficient a continuous mattress suture should be inserted between the interrupted mattress sutures and the continuous superficial suture that approximates the peritoneal coat. The whole of the proceedings should be carried through quickly. Where the uterus is very vascular the ovarian vessels should be temporarily clamped with ring forceps, and in exceptional cases the uterine vessels may be similarly controlled.

A much more important risk to guard against than immediate bleeding is post-operative oozing from the uterine incisions. If this occurs not only is convalescence rendered febrile, but there is a very definite danger of a coil of intestine adhering to the clot-covered uterus and causing intestinal obstruction. This, the chief danger of myomectomy, can be prevented, first, by ensuring complete haemostasis before closing the abdominal wound; secondly, by whenever possible incising the uterus through its *anterior wall* so that the suture line presents towards the bladder instead of towards the intestines; and thirdly, by (in some cases) ventrosuspending the uterus to the anterior abdominal wall along the line of the uterine incision. Ventrosuspension has also this advantage, that it prevents the diminished organ from retroverting, which it is very apt to do after the fibroids have been removed. In many instances retroversion by the weight or pressure of the tumours is already present, and should be corrected by shortening the round ligaments, or, in the event of additional defence against post-operative oozing from an anterior incision being required, by ventrosuspension.

If the precautions thus detailed be taken the average risk of myomectomy is probably about the same as hysterectomy under corresponding circumstances. There are certain cases, still within the justifiable limits of myomectomy, where, on account of the size and multiplicity of the tumours, the risk is somewhat greater. In such the pros and cons of the alternative operations must be carefully weighed, the surgeon always reserving to himself the right of final judgement on the operating table.

#### THE WORTH OF THE CONSERVED UTERUS.

Removal of the uterus, if the ovaries are conserved, does not produce a climacteric, though, in the opinion of some, it tends to accelerate its normal advent; but in certain women the disappearance of the monthly loss does seem to produce congestive sensations, less in degree but similar to the "flushings" that mark "the change."

Removal of the uterine body alone only unfits a woman for marriage in so far as it renders her absolutely infertile, but total hysterectomy has the disadvantage of removing what, in some individuals, is an erotogenic zone, namely, the vaginal cervix.

The conceptional value of the uterus in women still of childbearing age who have grown fibroids is less than that of similarly aged normal women even after the fibroids have been removed, because the agent, whatever it be, that makes for myomatous growth also makes for sterility. The actual comparative ratio is, however, not determinable on account of the reasons previously given.

Apart, however, from its physical value the womb has for most women a sentimental value, which, however illogical, cannot be lightly dismissed; and amongst patients on whom hysterectomy has been performed there are probably more than the surgeon thinks at the back of whose minds dwells abiding regret and rebellion against fate.

#### CONCLUSION.

The outcome of these considerations and the experience on which they are founded has convinced me that the practice of myomectomy as an alternative to hysterectomy should be considerably extended. I now frequently perform the conservative operation with complete success where a few years ago I should have removed the uterus.

When the tumours are small or of moderate size, the proceeding can be carried out very well through a

transverse incision across the pubic hair field. This is a great advantage in relatively young women, especially if unmarried, for it leaves no visible scar. To send a woman back to daily life without mark or blemish, cured of a serious disability and danger, is an achievement of high artistry.

## LAMINECTOMY FOR GUNSHOT WOUND.

WITH A RECORD OF THREE SUCCESSFUL CASES.

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SURGEONS who have had a large experience of the spinal injuries of industrial practice cannot help being impressed by the high proportion of severe and inoperable cases found in comparison with the condition of things in war surgery. The reason for this difference is not far to seek. The coal mines furnish a large proportion of these cases, and the causal agent is so massive (a fall of roof in the pit, for example) that the lesion is necessarily widespread whether caused by direct or indirect violence. In gunshot wounds, on the other hand, a larger proportion of incomplete injuries is seen, and these are due to small missiles which, though they hit the spine, do not often make a direct hit upon the theca. When the theca is directly hit the lesion is complete in all senses of the term, and it is scarcely conceivable that even a part of the theca could be hit without causing such profound changes in the remainder of the segment as to cause, or at any rate initiate, a "complete" lesion.

### *Complete and Incomplete Lesions.*

Complete gunshot lesions of the spine are due to direct hit of the theca, either by the missile itself or by the driving in of a part of the spine. Such cases show a complete interruption in the tracts of the cord—evinced by flaccid paralysis and loss of reflexes and sphincter control. If the theca be exposed by operation gross damage will usually be found, but occasionally the cord will appear uninjured (as has happened in my experience) and yet be completely and irrecoverably damaged.

In incomplete injuries, on the other hand, the missile hits the spinal column, but the theca is not hit either by the missile or by displaced bone, and the resulting paraplegia—

- (1) May be quite transitory and flaccid, but apparently complete;
- (2) May or may not have a transitory period of flaccidity and completeness, merging more or less rapidly into a spastic condition of any degree;
- (3) May only appear after an interval.

The pathological conditions underlying these three possibilities are pressure or irritation caused by effusion (intraspinous, subdural, or intramedullary), by granulation tissue in relation to a sinus or a retained missile, or by callus; with or without a preliminary condition of concussion. Incomplete lesions include a large proportion of conditions that hold out good hope of recovery, either spontaneously when the paraplegia is due to concussion, or in some cases to effusion, or after operation when a definite lesion is present. The indications for operation are so evident in cases of paraplegia arising after an interval that they require no discussion. When, however, a spastic paraplegia is present from the beginning the question whether or not to operate may be very difficult.

The indications for operation given by Sir George Makins from experiences in the South African campaign are so helpful and explicit that I will venture to quote them:

1. Excessive pain in the area above the paralysed segment; operation is here of doubtful practical use except in so far as it relieves the immediate suffering of the patient.
2. An incomplete or recovering lesion, when such is accompanied by evidence furnished by the position of wounds, pain and signs of irritation, of pressure from without, or possibly palpable displacement of parts of the vertebrae, that the spinal cord is encroached upon by fragments of bone.
3. Retention of the bullet accompanied by signs similar to those detailed under 2. . . .

Operation, if decided upon in either of the two latter circumstances, may be performed at any date up to six weeks, but if pressure be the actual source of trouble it is obvious that the more promptly operation is undertaken the better.

The purpose of this paper is to examine the outstanding features of traumatic paraplegia in the light of these indications and with reference to the possibility of treating underlying causes; to endeavour to show that the causes are very often extra-theical and therefore amenable to a comparatively safe operation; to indicate one or two practical points respecting the operation that have impressed themselves upon me; and to give a short account of three illustrative cases.

### *Prognosis.*

The gravest sign is, of course, flaccid paralysis, which indicates a complete physiological interruption in conduction. It entails complete sphincter, motor, and sensory paralysis below the lesions, and is necessarily bilateral. It may, however, be quite transitory, as I have good cause to remember, having given a bad prognosis in an industrial accident of this kind, in which a month afterwards the patient was walking about. Persistent flaccid paralysis, it need scarcely be mentioned, places the case beyond scope of operation, except perhaps for the relief of girdle pain. Spastic paralysis, however, merits further inquiry, and I believe that involvement of the sphincters is of great prognostic importance.

Except in lesions of the lower cauda equina, where, in fact, involvement of the third and fourth sacral nerves frequently appears to be the salient feature, sphincter paralysis rarely appears without a high degree of motor involvement. I have met only one case, a mid-dorsal wound, and even in that, though the gait was not noticeably affected, the reflexes were very active and sensation diminished in both legs. The bladder trouble, which was of the nature of precipitancy rather than dribbling, had existed from the time of wounding; and in the absence of gross motor symptoms it is reasonable to suggest that the trouble might be due to intramedullary injury, perhaps a minute haemorrhage picking out the bladder-controlling fibres and exerting slight but not destructive pressure upon adjacent tracts. This reasoning is based upon the probability of the bladder fibres lying deeper and therefore less exposed to pressure from without than the tracts to the limbs, as the signs of a slowly increasing paraplegia would suggest. The slow progress of caries paraplegia gives good opportunity for prolonged observation. A definite order of involvement of nerve tracts is seen; motion is first affected, and very soon sensation, but a considerable degree of impaired sensation may exist with slight loss of motion. Sensation, however, is usually lost before the sphincters are affected. In recovery, sensation returns before motion, and sphincter activity precedes both. It is reasonable to conclude that a prolonged period of sphincter paralysis should affect prognosis adversely, especially when the compressing agent is displaced bone or callus, as may occur in gunshot wound. In caries paraplegia spontaneous recovery occurs in the remarkable proportion of 83 to 95 per cent. of cases (Tubby). It is to be noted, however, that many orthopaedists regard involvement of the sphincters as gravely affecting the prognosis, and this even in a condition in which the compressing or irritative agent is nearly always granulation tissue or pus, and not bone. In traumatic paraplegia, on the other hand, though in one of the cases described below (Case III) the causal agent seemed to be granulation tissue in contact with the theca, the offending body is usually something far less kind. Hence the smaller likelihood of recovery without operation, and, in fact, the probability, in the absence of operation, that complete sclerosis of the cord at the point of pressure will follow. It would be difficult to deny that sphincter paralysis is at least as grave a symptom in traumatic paraplegia as it is in caries. When it occurs from the first and does not rapidly improve, it indicates a lesion not amenable to operation; when late, it may indicate that the time for operation has passed, and this as much in relation to the fitness of the patient to undergo a severe operation as to the recovery of the cord itself.

### *Spontaneous Recovery.*

Spontaneous recovery in concussion, when the whole thickness of the cord has been temporarily put out of