

THE LOWER UTERINE SEGMENT : ITS ORIGIN AND ITS BOUNDARIES.

By E. HASTINGS TWEEDY, F.R.C.P.I. ;

Ex-Master, Rotunda Hospital, Dublin.

[Read in the Section of Obstetrics, December 17, 1915.]

THE lower uterine segment, its origin and its boundaries, is a subject which has held for gynæcologists of the nineteenth century an absorbing interest. The most eminent specialists endeavoured with the greatest assiduity to solve the problem, and yet the present century opened with the mystery still unsolved.

What is the uterine segment? At what period does it make its presence apparent? Is it caused by a stretching of pre-existing tissue, or is it an entirely new growth? From what pre-existing tissue does it arise? Whether from the structures above the internal os or from the cervical tissue below it? These are the questions which call for an answer.

Modern gynæcologists have lost interest in the anatomical entity; not that their knowledge is any more precise than that of their predecessors, but rather from a conviction that the subject has been talked out and that they have no further available material to enable them to form any definite opinion. In this I think they are mistaken, for the controversialists of the past did not appreciate the importance of the endo-peritoneal tissue, which we now know divides the body of the uterus from its cervix and forms an impenetrable barrier between the two.

Whether this tissue be derived from the base of the parametrium or from the pelvic fascia seems a point of secondary importance: What concerns us chiefly is that it exists; that it is very strong; that it crosses the pelvic inlet and supports the contents of the abdomen; that it is inserted into the muscle fibres of the uterus, and, in fact, becomes their tendinous extension (this accounts for its richness in unstriated muscle); and that it fixes the uterus and forms the angle of the internal os—"the fixation hinge."

It is unnecessary for me now to enter into a detailed account of this structure. I have done so on two former occasions. Our President, too, has admirably reviewed its anatomical bearings.^a Again, the brilliant results of the modern operation for the cure of prolapse by the shortening of what are known as Mackenrodt's ligaments have made any further remarks of mine superfluous, and it is no longer needful to prove what I am sure all admit is a self-evident fact. It is certain that it constitutes the true boundary between the cervix and the body of the uterus, and we can no longer accept the artificial demarcations which were relied on by our predecessors.

This diaphragm depends for its tension on the tone of the uterine muscles. With a tightened internal os the fibres become taut; with a relaxed os they sag. One of the earliest phenomena of pregnancy is slight dilatation of the internal os. This sign is difficult to demonstrate, and has not, so far as I know, been described. Its presence is at once apparent when a sound is passed into the uterus, and so true is this that the phenomenon should be sufficient to arouse suspicion as to the true condition present. The relaxation of the sphincter brings about the changes which

^aTransactions of the Royal Academy of Medicine in Ireland, Obstetrical Section, 19th Nov., 1915 (this Vol., p. 60).

we associate with Hegar's "early sign of pregnancy." The interdependence which exists between the circular fibres of the internal os and the endo peritoneal tissue is also noted by the great tightening of the os which is observed in cases of procidentia. The sagging of the diaphragm is followed by slight dropping of the uterus and shallowing of the lateral fornices. This tendency to prolapse is soon arrested by the power of the uterine fibres to make again the fascia taut. This they do by their continuous retracting force. Retraction is a law of all unopposed muscle fibres, and the uterine fibres are no exception to this rule. When the tension at their insertion is relaxed, consequent on the opening of the os, they retract. By this mechanism the internal os is gradually pulled upward, and at the same time it opens more and more, so that the opening of its attached fascia may be compared to the swinging inwards of folding doors. Towards the later months of pregnancy the growing ovum is no longer able to accommodate itself within the body of the uterus, and must move downwards through this naturally provided hernial opening; in fact, we may consider the mechanism as constituting the most complete illustration of a hernial process within the body.

Before we consider the changes which arise in the cervix as a result of direct pressure now exercised on it by the ovum, let me summarise the points which are at present established.

1. The endo-peritoneal tissue forms an important diaphragm for the pelvis.

2. Its fibres are inserted into the muscle bundles of the uterus, and may be considered the tendinous extremities of the latter.

3. The diaphragm is held in tension by the uterine muscles; it supports the uterus, prevents descent of the

contents of the abdomen, and constitutes a barrier which effectively protects the cervix from pressure.

4. The os internum opens at an early period of pregnancy, and this relaxation corresponds with Hegar's "early sign of pregnancy."

5. Consequent on this opening the uterus and abdominal contents sag downward and the fornices become somewhat shallowed.

6. The uterine muscle fibres are put out of tension by the opening of the os with consequent contraction and retraction of these fibres and the upward movement of the diaphragm with its attached blood-vessels and ureter. This upward movement produces a still wider opening of the diaphragm, and will permit the growing ovum to pass through it and allow the latter to exercise direct pressure on the structures immediately beneath. To this structure I now desire to call attention, for many erroneous impressions have arisen in connection with the cervical portion of the uterus. It is spoken of as a structure which is easily dilated and stretched, and in proof of this the text-books adduce the extraordinary elongation of the tissue which occurs in procidentia uteri. It is certain that this lengthening is not due to any stretching action, and, indeed, the cervix is a tissue which does not easily tolerate a stretching force. All have experienced the difficulty in procuring slight dilatation by means of graduated metal dilators. Even in labour the cervix cannot be forcibly stretched save within narrow limits. Again, I have seen it pulled with vigour by volsella forceps during a two hours' operation without displaying any appreciable elongation. If the elongated cervix of prolapse were really a process of stretching it would be pulled thin as a piece of twine; instead, it remains of normal thickness, no matter how greatly it

is strained. We must, then, conclude that the cervix is not a stretchable structure, but, on the other hand, that it has a power of extraordinarily rapid growth when stimulated by continuous pressure.

In a case reported by Dr. Henry Jellett a small cervical stump left after the performance of a subtotal hysterectomy was firmly stitched to the aponeurosis of the abdominal wall in an effort to cure prolapse. It remained fixed in this position, but prolapse recurred, and it was of so extreme a nature that the os protruded for many inches through the vulva. This enormous elongation was not accompanied by diminution of its diameter, but rather the reverse, and in this instance the increase of the cervix must have amounted to about fifteen times its original size. Further, let it be noted that the vaginal portion of the cervix when not subjected to pressure does not enlarge.

The similarity in the growth of the cervix, as described above, with that of the growth of the lower uterine segment is very apparent, and now that we know that the ovum during the second half of pregnancy is certainly pressed against the upper portion of the cervix we have no difficulty in following its subsequent development into the part known as the lower uterine segment. So long as it was supposed that the lower uterine segment arose by a stretching or unfolding process, an insuperable objection seemed to be forthcoming to the belief that it arose from the cervix through the fact that the cervix did not diminish in length materially throughout the pregnant state. That the cervix does diminish to some extent all competent authorities are now agreed, and it is clear from the evidence already advanced that it will only require a very minute portion of the upper part of the cervix to suffice for the growth of the lower uterine segment. We see, then, that the ring

of Müller must be considered the undilated portion of the cervix which has as yet not been subjected to direct pressure, and Bandl's retraction ring must consist of the structures which go to form the internal os.

The subject under review has a practical importance both for the obstetrician and the gynæcologist. We no longer should consider the stretching and dilatation of the cervix as synonymous terms. We must think of the cervix as growing rapidly large rather than of its being rapidly stretched. It, in common with every other tissue of the body, stretches, no doubt, to a certain extent. The stretching process works within narrow limits, and is absolutely dependent on the margin of its previous growth. This, too, is true of the lower uterine segment. The gynæcologist on his part must once and for all dismiss the notion that the retention of the cervical stump tends in any way to strengthen the pelvic diaphragm, and must realise that an abdominal operation undertaken for prolapse may fail in its purpose if the cervix be retained.

SIR WILLIAM SMYLY said that most of the ideas in the paper were new to him, and he could not immediately make up his mind as to how far they would conform to the established facts, though, to a large extent, they appeared to do so. As regards the origin of the lower uterine segment the communication left the arguments depending on the histology of that part unaffected.

DR. ASHE said that the opening of the pelvic fascia is more rigid than is usually imagined. The uterus fits into this as a hanging hinge. He considers the elongation of the cervix in cases of prolapse is due to a piping of the uterus, which is driven down, whilst at the same time the cervix elongates.

DR. KIDD said he would wish Dr. Tweedy to reconcile one or two practical points with his theory. Firstly—In cases of elderly primiparæ, if hypertrophy of the cervical zone took

place instead of elastic distension, why was there more tedious dilatation in elderly primiparæ than in young primiparæ. Secondly—In cases of “rigid os,” where the cervical zone was so thinned out that it was very difficult to say where was the position of the os, how could he reconcile that with hypertrophy of cervical zone? Thirdly—When premature rupture of membranes occurred labour would be prolonged in the first stage because the “hydrostatic dilation” was lost. Did not that circumstance point rather to an elastic distension than to a hypertrophy? Dr. Kidd asked these questions solely for information as to how Dr. Tweedy reconciled the conditions with his theory.

DR. SHEILL considered the theory advanced to be very ingenious, but queried if this growth, due to sustained pressure, could account for hypertrophied cervix in virgins following increased abdominal pressure from tight lacing and constipation.

DR. GIBSON said the supravaginal portion of the cervix adapted itself to pregnancy just as the body does. The growth of the cervix began, however, long before labour commenced. It could be recognised after artificial dilatation of the cervix during the seventh month.

THE PRESIDENT said that the original controversy over Bandl’s and Müller’s rings was left in an undecided position, and was still undecided. Dr. Tweedy supported Bandl’s view, and the explanation which he offered for the formation of the lower uterine segment out of the upper dilated portion of the cervix seemed very plausible and to be what was required to give preponderance to the one theory over the other. He (the President) concurred with Dr. Tweedy in his view of the structures.