

# THE DYNAMICS OF THE FEMALE PELVIS WITH SPECIAL REFERENCE TO MALPOSITIONS OF THE UTERUS AND THEIR TREATMENT.<sup>1</sup>

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**T**HERE has existed in the past, and there still exists at present, considerable difference of opinion regarding the normal position of the uterus and the means by which this position is maintained.

The uterus, more so than any other organ in the body, rests in a state of unstable equilibrium, and undergoes frequent changes in position consequent upon a shifting center of gravity and physiological changes in the adjacent viscera or within its own walls.

Being of small bulk, in weight less than three ounces, and suspended by highly elastic structures in a cavity large enough to admit of considerable latitude of movement, it can be readily understood how very slight a cause may often be sufficient to produce a displacement.

To understand how the normal balance is maintained, it will be necessary to turn for a moment to the anatomy of these parts. With the woman standing upon her feet the pelvis occupies an oblique position with regard to the trunk of the body, and is placed at an angle of 60° to 65° with the ground upon which she stands. Within the

pelvis lies the uterus, parallel, or nearly so, to the horizon, its fundus directed forward and resting by its anterior face on the posterior aspect of the bladder, to which it is united by a reflection of peritoneum. The cervix is directed backwards toward the hollow of the sacrum, perpendicular to the axis of the vagina, and nearly so to that of the pelvis. This relative position between uterus and pelvis remains pretty constant, though considerable variation within physiological limits may occur. For example, as the bladder fills with urine it rises up in the pelvis, carrying the fundus upward and backward and the cervix forward until the fundus approximates the promontory of the sacrum and the uterine axis is nearly parallel to that of the pelvis; then, as the bladder is emptied the uterus rises again to its former position. An overdistended rectum crowds the uterus well forward, even flexing the cervix upon the fundus, and at times raising the fundus well out of the pelvis. As the body is bent forward the uterus changes somewhat its position in the pelvis, which it tends to leave, approaching the abdominal cavity. In the dorsal posture the uterus sinks somewhat back toward the hollow of the sacrum, though normally this occurs only to a slight degree.

Now, the means by which this support, allowing as it does of such extensive change in position, is accomplished, is the same as all other organs of the body—namely, suspension by ligaments, for Nature makes no exceptions to her rules and takes no chances, and here on the cradle which she nurtures to fruition her greatest and most marvelous achievement she has been particularly lavish in this respect, as no other organ in the body compared in size has so many and so strong ligaments as the uterus.

That these ligaments are the sole support of the uterus is amply proven by investigation, and that the uterus derives its support from underlying structures is absolutely false, notwithstanding past, and even present, assertions to the contrary. That the perineum is not the support of the uterus, as was so long believed, is clearly demonstrated in cases of complete laceration when, though the integrity of the perineum is completely destroyed, the uterus still remains in place. The principal suspensory ligaments of the uterus are undoubtedly the uterosacral, two in number, passing from their origin at the third and fourth bones of the sacrum downward and forward to their insertion at the waist of the uterus. Composed largely of connective tissue, they are not as elastic as the other ligaments, and with the uterovesicle ligaments running forward to the bladder form a firm sling of tissue which holds the cervix in place. So long as they remain intact the cervix stays high up in the hollow of the sacrum and retrodisplacement, the first step of which is descent of the cervix, cannot occur. The uterovesicle ligaments together form a thick fibrous band, connecting the neck of the uterus to the posterior surface of the bladder, and control

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the antero-posterior and lateral motions of the uterus.

The broad ligaments are reflections of the peritoneum, passing from the lateral walls of the pelvis to the sides of the uterus. Their rôle is largely a passive one in relation to the uterus, in addition to aiding to the support of which their chief function seems to be the support of the uterine appendages and blood vessels going to the uterus.

The part played by the round ligaments is largely an accessory one and only at times are they called upon to actively enter into the support of the uterus. Attached to the fundus, they serve to guide and limit its excursions upward, and pulling away forward by virtue of their attachment to the external ring, it is easily seen how a tendency to retroversion is prevented so long as they maintain their normal tone. Largely muscular in structure, they possess, in common with other muscles, the power of undergoing hypertrophy and atrophy, which is well illustrated in pregnancy. Here they enlarge with the uterus, their chief function being to hold the fundus well forward as it rises in the abdominal cavity, thus keeping it in contact with the anterior abdominal wall and preventing injury to the intestines that might occur should they become anterior to the uterus and compressed between it and the abdominal wall.

After delivery involution takes place in the ligaments as well as in the uterus, and the subsiding fundus is held forward until it again reaches the pelvis in safety.

The malpositions most commonly met with and upon which our subject has the most direct bearing are the retrodeviations and procidentia. The former admit of two divisions, the versions and flexions, the difference between them being simply one of degree. We have seen how normally the uterus lies in the pelvis, supported by the broad ligaments on either side, and the firm sling of tissue composed of the uterosacral and uterovesicle ligaments holding the cervix well up in the hollow of the sacrum, the fundus being held forward, guided and limited in its excursions by the round ligaments. In this position the intra-abdominal pressure directed against its posterior surface helps also to keep the fundus forward. The first step in all retrodisplacements and procidentia is the sinking of the cervix, which results when the support of the uterosacral ligaments is lost. This brings the axis of the uterus more in line with the axis of the pelvis, changing its horizontal position, and admitting of a posterior recession of the fundus to the limits of control exerted by the round ligaments. This position is an extremely hazardous one for the uterus and one that cannot be maintained for any great length of time. Sooner or later the round ligaments, unable to stand the continuous strain put upon them, yield, either slowly, or suddenly, as in the traumatic displacements, thereby allowing the fundus to recede and the intra-abdominal pressure to act on its anterior face, forcing it back into the hol-

low of the sacrum. So long, then, as the cervix remains in place it is impossible for the retrodeviations and procidentia to develop, for the fundus and cervix cannot change their positions to any extent independently of each other. How, then, is this relaxation of the uterosacral ligaments, whereby the support of the cervix is lost, brought about? Probably the all-important mechanical factor in its causation is the constant traction downward exerted on the cervix by the posterior vaginal wall when a retrocele exists, for in complete laceration of the perineum, unaccompanied as it is by the formation of a retrocele, the cervix remains in place. Bearing these facts in mind helps greatly to an understanding of the process by which procidentia is brought about. Relaxation of all the uterine ligaments permits the sinking of the cervix, the swinging backward of the fundus and the descent of the uterus in the pelvis, when the downward pull of the retrocele and cystocele, plus the intra-abdominal pressure from above, do the rest.

This almost continuous tugging of the retrocele at the cervix is probably the all-important factor in causing its downfall, and explains the reason why many uncompleted retrodisplacements are permanently cured by replacing the uterus and operative correction of the retrocele, that invariably recurred under other forms of treatment.

In discussing the treatment of these malpositions, the retrodeviations and procidentia, I shall divide the former into two classes—the uncomplicated and the complicated—and the latter also into two—partial prolapse and complete prolapse.

That in individual cases the previously normal uterus can lie in a retroposed position without in any way affecting the general balance of health, is a well-known fact, but as the condition is a progressive one, proceeding from bad to worse, sooner or later indications for its correction arise. In uncomplicated cases, those free from adhesions and adnexial disease, and not congenital, where a retrocele does not exist, replacement of the uterus with the insertion and two to three months' use of a proper-fitting pessary is, as a rule, all that is indicated. The replacement may be effected in a number of ways. The one I prefer is downward traction with a tenaculum forceps on the posterior lip of the cervix, continued for a sufficient length of time to overcome the resistance offered by the patient, and to paralyze the uterine ligaments sufficiently to admit of the uterus being drawn fairly deeply down in the pelvis; the index finger of the free hand is then passed well up the rectum and with its tip firm pressure is made against the posterior face of the uterus above its waist. With this point as a fulcrum, the cervix is pushed backward into the hollow of the sacrum, when the fundus will swing forward into position. In dealing with large, subinvolved uteri it may be necessary to assist the fundus forward, and this can be accomplished by deep pressure on the abdomen, directed against the posterior surface of the fundus, or by placing



the patient in the knee-chest position to obtain the cooperation of gravity.

The uterus being replaced, a suitable-sized retroversion pessary should be introduced to retain it in place until involution is complete, and the ligaments have regained their normal tone and supporting power. This requires usually a period of two to three months, during which time the pessary should be occasionally removed and a smaller one substituted. The action of the pessary is not a support to the uterus in the sense of being placed under it to hold it up, as is so often believed, but by taking in the slack of the uterosacral ligaments, the cervix is kept up in place while they are regaining their normal tone.

It is in the retrodeviations developing shortly after a full-term delivery, or miscarriage in the latter months of pregnancy, that the pessary has its greatest field of usefulness and where it seldom fails to accomplish a cure if promptly used.

Where the displacement is accompanied by a rectocele, cystocele or lacerated perineum, they should be repaired. The treatment of the uncomplicated cases that do not yield to the pessary, and those complicated by adhesions, should be operative, for in the adherent retropositions, accompanying disease of the appendages is the rule to which there are few exceptions, and any efforts toward replacing the uterus without proper treatment of the appendages should not be attempted, for much harm is often done and time wasted in endeavoring to obtain an anatomical cure, which, however successful, will not result in a symptomatic one.

The methods of operative treatment in vogue at present are almost too numerous to mention, and I shall discuss only those designed to accomplish their result by acting directly on the supporting structures of the uterus, thereby utilizing the same means which Nature herself employs, as I consider that, except under extenuating circumstances, the creation of pathological ligaments, or adhesions, for this purpose is unscientific, unsurgical and highly dangerous to the future welfare of the patient.

We have seen how normally the position of the uterus is maintained by its ligaments, and that when these are relaxed to an extreme degree, the balance is destroyed and displacement occurs. The logical operative means, then, of reestablishing this balance is by shortening the relaxed ligaments, and this may be accomplished, as far as the uterosacral and round ligaments are concerned, by two methods of approach—the extra-peritoneal and the intra-peritoneal. The extra-peritoneal shortening of the uterosacral ligaments is performed through an incision in the posterior vaginal wall close to the cervix, and though at times extremely difficult of accomplishment, is highly efficacious. The round ligaments are reached by incision over the external ring, but this operation is open to the serious objection that it attacks the abdominal wall at its weakest points, where hernia is of most frequent occurrence.

These extra-peritoneal methods are only applicable to cases uncomplicated by adhesions and adnexial disease, so that their field of usefulness is necessarily limited.

In the cases complicated by adhesions and diseased appendages, composing the large majority of all retrodisplacements, access to the peritoneal cavity is necessary, in order that the adhesions may be separated and appropriate treatment of the appendages carried out. This demands an intra-peritoneal operation, and the pelvis may be reached in one of two ways—either through the abdomen or through the vagina. Each route has its advantages, but the vaginal is much to be preferred whenever practicable, as it is attended by less danger, immediate and remote, is followed by shorter and smoother convalescence and does not interfere with the integrity of the abdominal wall, which last, in view of the percentage of hernias developing after laparotomy, is an all-important consideration. The vaginal incision should be made through the anterior fornix, separating the bladder from the uterus, and entering the peritoneal cavity at the reflection of the peritoneum on the anterior face of the uterus. Having separated the adhesions and properly treated the appendages the round ligaments are then folded upon themselves and shortened to a degree sufficient to bring the fundus well forward into place. The incision is then closed and the uterosacral ligaments shortened extra-peritoneally through a posterior vaginal incision close to the cervix, any plastic work that may be indicated following. This operation restores as nearly as possible the normal integrity of the structures from which the uterus derives its support, and seems to me, based as it is upon sound anatomical principles, to offer the best solution of the problem at our command.

In dealing with complete procidentia we have to face one of the most difficult tasks known to surgery, and any operative measures except those which restore the integrity of the supporting ligaments will in the end prove futile. Repair of the rectocele, cystocele and perineum in cases of partial procidentia, with amputation of the cervix when elongated, will at times effect a cure by removing the mechanical cause and allowing the ligaments to regain their tone; but when the ligaments are greatly relaxed they should always be shortened as well. However firmly we may restore the integrity of the perineum below, or anchor the fundus above, the uterus, deprived of its normal powers of support, will tend to again prolapse, pushing through or dragging away from the artificial means by which we have endeavored to keep it in place.

The shortening of the uterosacral or round ligaments may be accomplished by either the vaginal or the abdominal route, but in the extreme degrees of procidentia it is necessary to shorten the broad ligaments as well, and this can only be done satisfactorily from above.

This brings me to a conclusion of the subject,

necessitated by the limited time at our disposal. I have purposely omitted reference to other forms of malposition, rare in their occurrence, or upon which our subject had not a direct bearing, nor have I described in detail the technique of the operations advised, which is readily accessible in the recent literature; but have endeavored to put before you briefly, to the best of my ability, the subject as I understand it, and to point out the lines along which, in my experience, any treatment hoping for permanent success should be conducted.