alkaline, even when fairly free from cloudiness. The specific gravity varied mainly between 1010 and 1020. This tendency to alkalinity even when no apparent organic ferment existed in the urine, showed the tendency to calculus formation at any point from the Malpighian bodies to the urethro-vesical orifice, and seemed to furnish an indication for treatment. To that end urotropin was given, even to a half dram in 24 hours and continued for some time, but without apparent influence. After the cystotomy the alkalinity was so marked that if protection from future calculus formation was to be secured other means than the use of urotropin seemed required, so a trial was made of methylene blue in 2 to 2½ grain doses, t. i. d., with the result that an acid reaction was soon secured. When the reaction became acid the drug was omitted, to be resumed again promptly on the reappearance of alkalinity, and it has been continued in that way to the present. Whether the fault in metabolism that results in the secretion of alkaline urine will pass away is the problem of special interest in the future of the case, for it is manifest that even this tolerant lad must have a limit to endurance of operative work.

THE POST-OPERATIVE MICTURITION.

A few words as to the amount of urine secreted after the nephrotomy may be of interest. During the time of the occlusion of the ureter, a period of nearly 18 hours, only about 3 drams was taken from the bladder, but during the following day 15 oz. came from the bladder, besides some drainage from the tube in the loin, and on the following day it increased to 33 oz., when the rubber tube was removed from the kidney as well as the gauze packing to allow a speedy repair of the renal wound, the packing being replaced in the loin wound for obvious reasons. The amount of drainage by the loin varied with an apparent corresponding variation of the urine by the urethra, which was from 6 to 30 oz. each 24 hours until January 6, when drainage from the loin had practically ceased and the chart for that operation was discontinued.

After the suprapubic cystotomy the drainage through the vesical tube varied from 20 to 30 oz. each 24 hours until after a few days the mural packing of gauze was so far removed as to allow much of the urine to escape by the side of the tube into the gauze fluff.

I do not find the date when the suprapubic wound closed, but I show you the patient with the sundry scars marking the sites of the operative procedures.

THE CALCULI PICTURED.

On the photographs you will observe the shadows made by the stones, the radiograph in Fig. 1 showing the two small shadows of the two calculi in the right kidney that had the fistula and was removed at the first operation, while the larger shadow is in the left kidney and marks the stone removed at the nephrotomy. In the pelvic region is a shadow that probably represents the stone removed from the urethra. In radiograph Fig. 2 is the sharp shadow of the vesical calculus removed by suprapubic cystotomy, which had probably formed since the taking of the former x-ray picture, an interval of four months. It is interesting to note the variation in the shadow effect in the renal regions in the two pictures, No. 2 being subsequent to the nephrectomy and nephrotomy.

In the photograph, Fig. 3, showing the calculi in one view, 1 represents the two found in the right kidney which was removed, 2 the one removed from the left kidney by nephrotomy, 4 that from the fossa navicularis,

and 3 that removed by suprapubic cystotomy. In this photograph the calculi are shown of the actual size, as also is the case in the original x-ray pictures.

THE SURGICAL TREATMENT OF COMPLICATED BUT ASEPTIC RETROVERSIONS OF THE UTERUS IN FRUITFUL WOMEN.

THE PERMANENT AND HARMLESS RESULTS THAT SHOULD CONSTITUTE THE NORMAL MINIMUM REQUIREMENT AND BY WHAT METHOD THEY ARE BEST OBTAINED.*

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It must be distinctly borne in mind that in this article we refer to the treatment of this disorder, only as it occurs during the childbearing period of women's lives; in women who should and can retain a probable capacity for conception. In patients of this class, it is our duty to correct these comparatively inferior disorders, not merely for some uncertain temporary period, but permanently, and, in doing so, also promote rather than compromise the patient's chances for maternity. These more ideal results are obtained only by a judicious selection and skilful use of only a few of the greater number of operations which are admissible for cases in whom the crucial test of pregnancy is not likely to occur.

Retroversion and flexion of the uterus, even with a moderate degree of adhesions and of degenerate conditions in its adnexæ, never causes death. It does not lead directly or indirectly to fatal conditions. Nor does it, independent of some more formidable complications, ever completely annul the value and enjoyment of life. Nor does surgery present the only, although the best, method of cure. For these clinical and for well-known anatomic reasons, this disorder with its ordinary complications never presents a major surgical indication for treatment. When major complications such as complete immobility of all the parts, or actively infectious conditions in the appendages, or neoplasms are also present, then these constitute the major and more positive indication; and the uterine displacement with some complications is an incidental and a minor indication. The relief from this disorder, then, is only a small or very moderate good that the patient derives. Therefore, the operation that secures it must not only be devoid of mortality and dare not impair the capacity and facility of the patient's reproductive functions or the anatomy and functions of other organs, but it must also be permanent in its results. This refers chiefly to the continuance of the normal position of the organs after subsequent pregnancies and deliveries at term.

As the good afforded by an operation for this disorder is but small in its present degree or amount, it must be long continued or for life, if it shall be sufficient to warrant an operation at all. And that this double test of pregnancy is not an unreasonable requirement is shown by the fact that such ideal results are quite uniformly obtained by one of the operations in vogue, whose advocates have carefully examined a large number of cases after one or several subsequent parturitions, and have found almost no case of recurring displacement among them. When we apply this only proper test of harmlessness during pregnancy and parturition, and

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also the uniform retention of the uterus in its normal position afterwards, to the various operations that have been or are now most in use we note the following conclusions most unmistakably: Direct and firm fixation of the uterus to the abdominal wall without an intervening band that allows the uterus some independent motion and likewise firm fixation of the uterus to the vagina, high enough up to avoid a large rate of early recurrences of displacement, are procedures that have signally failed to stand even the simple test of pregnancy, by inducing abortions and by creating disastrous conditions in labor, and must be positively discarded in the class of patients here considered.

Mediate ventral fixation or suspension of the uterus by variously improvised or developed artificial bands (not ligaments) is the operation which has probably been performed upon a larger number of patients and by a larger number of operators than any other, for this purpose. It has, therefore, a better chance to show, from its more numerous cases, what primary and remote results it can produce. And while its advocates have abundantly informed us that it is nearly harmless to pregnancy and labor, they have unanimously been significantly silent, until very recently, about the position of the uterus in their cases as found by careful examinations several months or years after subsequent mature childbirths.

Recently, the following have appeared: F. H. Martin¹ observed two cases after a labor following ventrosuspension, both without recurrence of displacement. Cohn² (Kuestner) reports two cases, both recurrences. Stuart McGuire³ one case that had recurred after pregnancy (and one recurrence without it). Burrage⁴ reports two cases, one normal and one recurrence. Thus we have seven cases, four of which were with recurrence of displacement. The report of Woods⁵ (Penrose and Bevea) on this point must be ruled out because it mentions only the seven favorable cases and nothing on this subject about nine others that were observed and reported. Thus all the "artificial ligament" (?) suspension operators together, out of certainly ten times as large a number of cases as the Alexander operators have, have reported only these few paltry cases with a majority of them recurrences; and all of them together are less than one-tenth of the number reported by the Alexander operators out of their smaller material, and with almost no recurrences.

The presumption which, on anatomic grounds, has always been against these suspension operations, as far as the remote results after labor are concerned, is increased by even this small showing. But even without applying this higher standard test, what are the results otherwise? A good and recent report on the subject is that of Woods: 212 available cases, only 129 cured or satisfactory cases, 53 merely improved and 30 failures, and one-third of all the pregnancies aborted. These are positively bad results, even if they are merely reports of subjective conditions. An exact report by Halban from Schauta's clinic gives 12½ per cent. of anatomic recurrences without pregnancies flourishing in the cases at all. Again, more than ten authentic cases of ileus, generally fatal, have been reported as the result of this pathologic surgery and its ingenious "ligaments."

Two years ago before this section, I stated the reasons for the following: That it is not in the power of any operator to determine either the strength or the length of any such band, that no one can know how soon or how much it will stretch, that it can and probably will elongate enough to accommodate the pregnant uterus, but that afterwards it can not undergo involution or retract;

but, if not torn off, it will remain long and useless, but not always harmless.

These anatomic considerations and the poor clinical results, even when not measured by the higher standard double test of pregnancy of the Alexander men, have induced many, if not most, of the former patrons of this kind of suspension to adopt a part of the uterus itself, namely, the round ligaments, as a means with which to correct its displacements. And in which manner and by what routes to use these ligaments for that purpose is now the only proper question on this subject before the profession.

The reason why the round ligaments of the uterus—no matter what, if anything have been their function previously—are a natural and efficient means for the purpose here intended, is that they not only actually grow with the uterus during every pregnancy, becoming palpable at term through the abdominal wall, but that they also undergo involution—grow back again—with the uterus after parturition, if the then heavy uterus does not prevent them from doing so by being too much retroverted. They are always there and may be used with impunity. Several German observers assert that the shortened round ligaments after an Alexander operation gain in strength, on the principle of growth by exercise, after succeeding pregnancies.

The unfortunate feature about these ligaments is that they are not of even thickness throughout their course, but that they taper and are much stronger at their uterine origin than at their insertion in the subperitoneal ring and inguinal canal. This is particularly unfortunate because by the usual ventral and vaginal routes, the weaker parts of the ligaments are not accessible, and shortening of the ligaments is possible only by doubling up or by transplanting their strongest portions. Thus, they may be shortened, but never strengthened; and the weaker parts that did the stretching before will be very likely to stretch again. Furthermore, the shortening of these ligaments by the formation of loops upon themselves or upon the anterior or posterior surface of the uterus is not a certain and stable one, because it depends upon the uncertain and transient service of adhesions and of sutures that tend both to cut off the circulation and to cut out. In two cases of pronounced retroversion in which I shortened these ligaments via the inguinal canals, an intervening normal pregnancy and labor had completely eliminated the loops from these ligaments, by means of which they had been shortened by others in ordinary celiotomy. Transplanting the uterine ends into a groove or a tunnel on the anterior or the posterior surface of the uterus may do a little better, but the newly constructed ligaments remain as weak as their weakest spot was formerly. These methods of shortening these ligaments by the ordinary ventral route are generally accepted as harmless to pregnancy and labor. But no cases at all of this kind are reported as having stood the double test of pregnancy; and therefore the presumption remains standing against them nearly as much as against the old-time suspensions, that they are probably not competent to prevent a return of retroversion, in a majority of cases, after full time labors.

One of the best methods of using the round ligaments in ordinary celiotomy is that of Ferguson and Gilliam, using their stronger portions to suspend the uterus, by drawing them into the abdominal wall. The results of that operation are good aside from the contingent results of pregnancy. Whether, in this new rôle, they will also undergo involution or retraction after

pregnancy and continue to hold the uterus, as they do after thorough Alexander operations, remains to be seen. Shortening the round ligaments by way of the vagina is subject to the same disadvantages and uncertainties as doing it by median ventral section. And it gives a poorer opportunity to enucleate badly adherent adnexæ, and the poorest of all approaches to do exact reconstructive surgery upon them. But Buccura⁶ (Wertheim) and Ries⁷ have creditably begun to report their remote results of vaginal shortening of the round ligaments. Wertheim had 20.7 per cent. of recurrences of displacement among 55 cases that were traced and examined. Among this number were 7 normal pregnancies and labors and Halban observed one more. But one of these 8 cases had a recurrence of retroversion. Ries observed one such successful case after his method, which had stood the double test successfully. These results are much better than those of vaginal anchorage of the round ligaments, suggested by Bode (Dresden) and practiced mostly by Vineberg⁸ who reports several early recurrences of displacement, admits the need of additional vaginofixation sutures in the uterus itself, sometimes, and is silent as to permanent results of his work after subsequent pregnancies.

The one method of shortening the round ligaments that is anatomically entirely correct or consistent and which has given eminently superior ultimate clinical results, is by way of the inguinal canal from without. This, if properly performed, eliminates the frayed-out, weak and uncertain portion of these ligaments, brings their stronger portions alone into use, secures the uterus in either an entirely normal position or in one that is more nearly so than that produced by any other operation now in vogue, and does this without mutilation of the uterus itself and without disturbing the anatomy or function of any other parts or organs. The superior serviceability of this method has been so highly appreciated by at least four good operators, that they have performed the operation; at the same time, with a regular laparotomy, in cases that required the latter for other reasons, and also had a retroverted uterus.

The following facts must be admitted by all unbiased parties who are familiar with the literature on this subject for the last 5 to 6 years: In reasonably competent hands the Alexander operation is without mortality. It does not invite hernia, but furnishes a convenient and auspicious opportunity to eliminate weaknesses predisposing to it, or to cure either inguinal or femoral hernia, when present, by the same incision. It favors conception and does not embarrass gestation or parturition. It is followed by a lower rate of recurrences of retroversion than any other established procedure and it stands almost alone in the quite uniform stability of its results, in not permitting a return of retroversion after subsequent labors. Of cases that have passed this crucial test successfully, without exception I have 11; and the following are recorded: Rumpf (Berlin), 11; Burrage¹⁰ (Boston), Gradewitz and Asch¹¹ (Breslau), and Schultz¹² (Hamburg), each 9; Stocker¹³ (Zürich), 8; Edebohl's¹⁴ New York), 7; F. H. Martin (Chicago), 6; Braun¹⁵ (Cleveland-New York), 1, and Kroenig and Feuchtwanger¹⁶ (Leipzig), 9. Of these, two cases that had been operated for marked prolapse, showed a recurrence of displacement, and for that reason, I think, because of the excessive elongation of the sacro-uterine ligaments in prolapse cases, they are not properly cases for this operation. Burrage also had 3 cases of recurrent displacement in 12; but they were cases that could not fairly be counted because two of them were primary failures when they left the hospital, and one was the

victim of violent treatment and inordinate puerperal infection. Thus we have 80 cases, with two recurrences, and these for cause.

An operation that affords such advantages should be used not merely for the cases with simple retroversions, but it should also be made available for the much larger class of cases complicated by adhesions and degenerate conditions of the appendages, in which the actively infectious elements have died out.

This a number of operators have partly accomplished by liberating the internal parts with a finger through a preliminary incision in the posterior cul-de-sac. But it can be done better without any such additional incision, by simply following the round ligament as a guide into the peritoneal cavity. The subperitoneal inguinal ring at the point of entrance will usually permit an index finger to enter almost without stretching, and if necessary it can be stretched wide enough without any cutting to admit two fingers. But one is nearly always sufficient, when introduced on both sides in succession, to sever any adhesions and to draw the tube and ovary out of the wound for reconstruction or for removal. The exact technic of making and closing the wound I have elsewhere repeatedly given. The round ligaments are anchored against the posterior surfaces of Poupart's ligaments in the act of closing the wounds after the manner of the Bassini hernia operation. I have performed this extended Alexander operation, or bi-inguinal celiotomy, upon more than 200 patients, in nearly all of which resection or removal of some part of the adnexæ was done, and adhesions were broken up in the majority of them. About 3-5 of this number have been carefully examined, an average period of 21 months after operation, by competent physicians, and most of the remainder I know to be subjectively well. In one single instance a retroversion recurred sufficiently to require use of a pessary. No hernia is known among them. And in every case of subsequent parturition, the anteverted position of the uterus seemed to be improved rather than compromised or lost.

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THE SURGICAL TREATMENT OF THE UTERO-SACRAL LIGAMENTS THROUGH THE VAGINA IN RETROVERSION OF THE UTERUS.*

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The treatment of retroversion of the uterus has been a subject that has afforded a great amount of discussion and application of mechanical ingenuity. That it is a condition, *per se*, requiring treatment is still an unsettled question. In nearly every discussion of the subject before any body of scientific men, either ignorant of or well informed concerning the subject, there are

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