Attention is now turned to the defective posterior wall, which should be widely denuded, the upper edge of the denuded area being continued at the sides higher than in the median line, as in the operation for restoration of the pelvic floor designed by Dr. Thomas Addis Emmet. The sutures are so introduced as not only to approximate the sides of the denuded area, but also to draw upward the prolapsed tissues. They take their point of support in untorn fascia at the sides of the pelvis. Another excellent plan of perineal repair is that of Hegar.

Any existing hemorrhoids should be removed by ligation or by cauterization. Extreme degrees of uterine descent will not be permanently cured unless, in addition to the procedures described, some operation be undertaken above the pubic bone to support the uterus and secure for it a permanent anterior direction. The operations that are most favored at the present time for securing these objects are either shortening of the round ligaments of the uterus, or an attachment of the fundus to the anterior abdominal wall.

Shortening of the Round Ligaments; also known as *Alexander's Operation.*—These cords of unstriped muscular fibre take their origin near the uterine cornu, pass forward and outward through a fold in the broad ligament, and entering the inguinal canal are attached at the external abdominal ring to its pillars and to neighboring tendinous structures immediately about the pubic spine. The ligaments may be pulled outward through the inguinal canal after their outer ends have been reached through a small incision over the external abdominal ring. The redundant portion having been cut away or attached by various methods to neighboring structures, the remaining portion of the ligament is sutured in the lower end of the canal. By some operators the round ligament is reached after an extensive opening of the inguinal canal, afterward shortened, and its remaining end attached. Other methods involve the opening of the abdomen in the median line, the folding and suturing of the round ligaments upon themselves, or to the uterine body, after the manner described by Matthew D. Mann, W. Gill Wylie, Palmer Dudley, and others (Fig. 4905). A plan has also been proposed for carrying a loop of round ligament, or the cut end back through a perforation made in the broad ligament to a point behind the uterus where it is to be sutured. The methods of intra-abdominal shortening of the round ligament have not been so extensively practised as those in which it is approached by way of the inguinal canal.

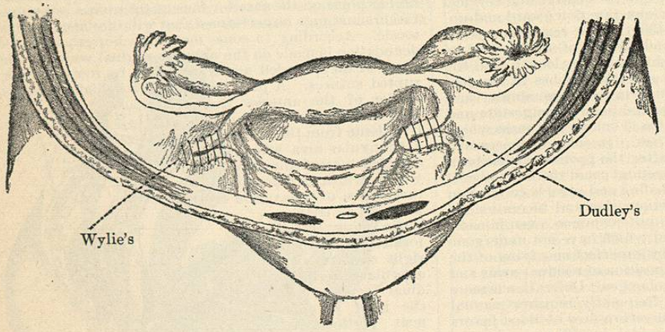

FIG. 4905.—Diagram of Wylie's and Dudley's Methods of Intra-abdominal Shortening of Round Ligaments.

Suspension of the Uterus.—In retroversion of marked degree, after adhesions or disease of tubes and ovaries have been appropriately treated, and after the problem of the support of the uterus from below has been met, the operation of uterine suspension, as devised by Howard Kelly, may be carried out. The object is not to hang up the uterus by a strong supporting band, but to form a light attachment of the fundus to the anterior abdominal wall, which elongates under subsequent traction and forms a delicate cord. This serves to maintain the uterus in the normal position of anteversion, so that the weight of the abdominal contents is received on the posterior instead of the anterior surface of the organ, and the mechanical forces of the normal uterine support are again put in play. The attachment is made by two or more sutures of fine silk entering the uterine substance a short distance posteriorly to the line of the tubes, emerging at a distance of about one-half inch, being again introduced on the peritoneal surface of the anterior abdominal wall, passing through the properitoneal fat, grasping a few fibres of the rectus muscle, crossing the wound and penetrating in turn rectus fibres, properitoneal fat, and fascia, again appearing through the peritoneum, when they may be tied within the peritoneal cavity and remain buried. The abdominal wound is closed separately in layers or by methods usual in the practice of the operator.

Objection is frequently made to this operation on account of its supposed interference with subsequent pregnancy. There have been reported a number of cases in which this operation had been performed, and in which formidable complications were met during labor. Such complications may usually be traced to a too great amount of fixation of the uterus at the original operation, or to inflammatory adhesions which have produced a firm attachment of the uterus to the abdominal wall. Such an attachment is not contemplated in the operation of uterine suspension, and should never be carried out in women who are liable to bear children. In the operations for the cure of procidentia in elderly women a firm attachment may, however, be made by an operation known as uterine fixation.

Fixation of the Uterus.—Through an abdominal incision in the median line just above the pubis, Olshausen secured the indirect support of the uterus by uniting the round ligaments and the broad ligaments to the parietal peritoneum on either side. He secured this union by means of buried sutures. Theoretically the operation provides an opportunity for hernia of the intestine between the fundus and the abdominal wall, and consequently it has never been widely practised. Leopold directly fixed the uterus by its anterior surface to the abdominal parietes after scarification. He passed three of the sutures which were destined to close the abdominal incision though the uterine tissue, one penetrating the uterus in the line of the tubes, another opposite the origins of the round ligaments, and a third still farther down the anterior wall. The result of this procedure was, as a rule, a very firm attachment of the uterus forward and above the bladder, especially when any appreciable degree of inflammatory reaction followed the operation. So firm is the attachment secured by this operation that pregnancy, should it occur, is likely to be followed by dangerous complications. In a number of instances complications of this nature have compelled a resort to the operation of Cæsarean section. It has been found, in these cases, that the anterior wall of the uterus develops as a thick compact mass, confined by adhesions to the brim of the pelvis, while the posterior wall of the uterus, stretching upward, becomes greatly thinned; in consequence of which conditions the normal presentation of the child is rendered impossible, the engagement of the head does not occur, and even version or the high application of the forceps may fail to effect delivery.

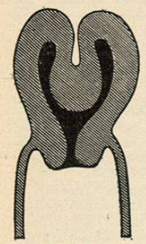

FIG. 4906.—Partial Inversion. (Thomas.)

Vaginal Fixation of the Uterus.—One of the three chief methods of securing the uterus in a forward position and of counteracting its abnormal descent is the operation known as vaginal fixation, which was elaborated by Mackenrodt, who described it in 1892, and by Dührssen, who worked along similar lines. In these operations an attempt is made to overcome the relaxation of the anterior attachments of the uterus, to attach the over-stretched vaginal supports at a higher point on the anterior surface of the uterus, and to overcome the downward displacement of the bladder. In performing the operation the lower limit of the bladder in front of the uterine cervix is first established, and then the surgeon proceeds to take the following steps: a transverse incision is made (just below the point fixed as representing the lower limit of the bladder) down to the bladder wall, and a longitudinal incision from the centre of this transverse line is carried forward nearly to the external urethral orifice; triangular flaps are made on either side and the bladder is separated from the vaginal wall and the anterior face of the uterus. The utero-vesical pouch of peritoneum is opened, any existing adhesions are separated, and the uterus is brought forward to its normal position and sutured to the cut edges of the vaginal wall. In order to overcome the objection that the changes effected by this operation interfere too seriously with pregnancy, it has been later advised to suture the anterior uterine wall to the peritoneum covering the bladder. While the immediate mortality following this operation was small, the effect upon subsequent pregnancy proved in many cases to be unfortunate. Abortion followed in many instances; in others the uterus was unable to rise in the pelvis, the anterior and posterior walls did not develop symmetrically, and complicated operative treatment became necessary to effect delivery. Several deaths have thus been traced indirectly to the operation of vaginal fixation, and it has not secured for itself a permanent place in surgery. It is seldom performed in America.

The choice between these operations for maintaining the normal forward position of the uterus will depend upon conditions present in different patients and also upon the experience and preference of the operator. Some gynæcologists perform a large number of operations upon the round ligament and seldom suspend the uterus; with others the practice is exactly the reverse. The objection that the round-ligament operation, as suggested by Alexander, does not permit of the inspection and treatment of intra-abdominal disease is obviated, as claimed by certain operators, by the adoption of the radical method. These surgeons virtually perform a cœliotomy upon each side of the abdomen, lay open the entire inguinal canal, open the peritoneum at the internal ring, and, after performing any necessary intra-abdominal operation, they shorten the round ligament and restore the inguinal canal in a manner allied to that adopted for the radical cure of inguinal hernia. This radical method, however, should not be considered in discussing the relative merits of uterine suspension as compared with an external round-ligament operation. The latter gives excellent results when performed by a surgeon who has had abundant experience with it, and is especially adapted to those cases in which the uterus is small and not diseased, in which the element of descent is not important, in which pregnancy is likely to follow later, and in which there are no complicating disorders of the tubes and ovaries. Suspension of the uterus on the other hand may be chosen in those cases in which it is desirable to open the abdomen for other reasons, such as the removal of an irritable but not greatly diseased appendix vermiformis, the separation of peritoneal adhesions, resection of diseased tubes and ovaries, or the removal of the same. While the band of attachment is drawn out into a thin cord and a certain amount of mobility of the uterus is ultimately secured, and while pregnancy in many cases is followed by no complication, the operation is best adapted to those patients who are not liable to become pregnant.

The intra-abdominal operation of shortening the round ligaments may be applied in the same class of cases as those for which the extra-abdominal is usually chosen.

Shortening of the Utero-sacral Ligaments.—This has been done as a direct procedure by several operators who reach the ligaments either through an incision in the posterior vaginal cul-de-sac or from above after opening the abdomen. The object is to draw the cervix backward and somewhat upward, thereby restoring the tendency of the uterus to incline forward as in the normal pelvis, since it is in this position that the uterus best resists the influences which tend to displace it.

Bishop describes (*Lancet*, March 14th, 1903) an operation which aims to reproduce utero-sacral ligaments for the cure of prolapse of the uterus. The abdomen is opened and, with the patient in the Trendelenburg posture, the uterus is drawn up and by a vaginal instrument the posterior vaginal fornix is thrust upward. A stout suture on either side is introduced well into this prominent vaginal tissue from within the abdomen and then attached firmly and deeply to the sacrum, a point being chosen, on either side of the rectum, which is free from vessels and nerves.

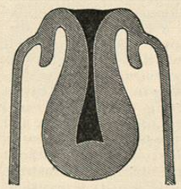

FIG. 4907.—Complete inversion of Uterus. (Thomas.) A cup-shaped depression is in the place of the uterus. The sound is arrested at the angle of flexion.

Hernia of the Uterus.—The true hernia through the pelvic outlet has been described, but among the curiosities of medicine appear a few cases in which the uterine body has formed a part of the contents of a hernial sac in other regions of the body. Gould and Pyle in their work on "Anomalies and Curiosities of Medicine" quote nineteen cases of hernia of the uterus (C. Debierre: "Les Vices de Conformation des Organes Génitaux et Urinaires de la Femme," Paris, 1892). Thirteen of these cases occurred in inguinal, two in femoral, one in obturator, and three in umbilical hernia.

Manning Simons (*Amer. Jour. of Obst.*, January, 1903, p. 70) describes a case in which both ovaries, both tubes, the bladder and rectum were in a sac formed by the prolapsed vagina, whose anterior and posterior walls had adhered below the cervix uteri. The whole mass protruded from the pelvic outlet.

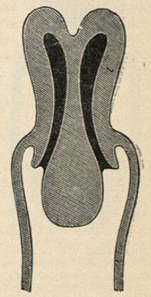

FIG. 4908.—Partial Inversion with Uterine Polypus. (Thomas.)

INVERSION OF THE UTERUS.—The uterine body may be turned inside out or inverted in two principal ways: First, immediately following labor, and as a result of pressure from above, or through traction on the placenta and membranes from below, the fundus of the uterus may become indented (Fig. 4906) and irregular contractions may result in a complete inversion of the organ, so that the endometrium appears in the vagina and the uterus presents itself in that passage as a pear-shaped body (Fig. 4907). As the second cause may be mentioned the contractions produced

by an intra-uterine tumor, especially a fibroid tumor, which is attached by a pedicle somewhere in the upper portion of the uterine canal, and whose body is within the grasp of the uterine muscle. Long-continued contractions of the uterus in the effort to expel the tumor may drag down the uterine wall where the pedicle is attached, first producing an indentation (Fig. 4908) and finally, as the tumor is extruded, complete inversion of the organ. This process may require several months, while the accident following labor occurs in a very few minutes.

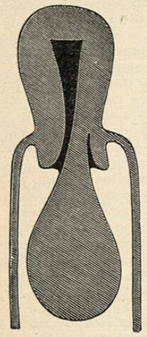

FIG. 4909.—Uterine Polypus. (Thomas.) The uterus is in its normal position. The sound passes into its cavity.

Symptoms.—The chief symptom is hemorrhage, which is persistent and often excessive in both varieties. Dragging, bearing down, irritability of the bladder and rectum, and a sense of fulness may be complained of in the chronic variety, while pain and collapse often accompany the hemorrhage of acute inversion.

Diagnosis.—In acute cases little difficulty will be found in recognizing a depression at the former site of the uterine body in the abdomen, and in the vagina a smooth regular tumor with a freely bleeding surface. In some complete cases it will be found that the uterine cervix and the cervical canal have entirely disappeared. In chronic cases in which the inversion is incomplete, a sound entering the cervical canal will serve to define the limits of the protruding body and its relation to the remainder of the uterine structure as felt above the pubis. When a polyp is present without inversion (Fig. 4909) it will be possible to demonstrate the fundus in its normal position. Obscurity is occasionally increased by inflammatory adhesions of the thick stem of a uterine polypoid tumor to the inner surfaces of the uterine canal (Fig. 4910).

Prognosis.—Reduction of the inversion is very seldom spontaneously accomplished. In recent cases the prognosis is good under well-directed efforts at replacement, although in chronic cases very great difficulty may be encountered.

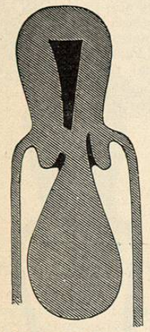

FIG. 4910.—Uterine Polypus. Adhesions around neck of polypus obliterate cervical canal.

Treatment.—In acute cases, under anæsthesia, efforts are made to dilate with the thumbs of the operator the contracted cervical ring, while at the same time the presenting fundus is indented and an effort is made to press it through the ring, one portion at a time. A variety of instruments have been devised, in the hope that by means of them the inverted organ may be restored to its normal relations. The end, which is cup-shaped, is designed to fit the fundus and to receive pressure transmitted through a stem which rests against the operator's body or is held in the hand of an assistant. Manual dexterity, however, combined with patience, will usually succeed in effecting the desired reduction, although the process is frequently a difficult one. In long-standing cases the dilatation of the cervical ring is a matter of much greater difficulty. Some device must be used which will make a slow and constant pressure upon the inverted fundus, after the tumor which produced the condition has been removed. In a few cases the reduction has been effected by opening the abdomen and drawing upon the uterine tubes and the upper portion of the fundus, while at the same time pressure was made from below. In this way more ready access is obtained to the contracted cervical ring for the purpose of dilatation; but reduction can usually be accomplished after repeated efforts without opening the peritoneal cavity. Finally, in some cases the wall of the uterus has been split longitudinally from within the vagina, and then, after reduction had been accomplished, the lips of the incision were united by sutures.

George Erety Shoemaker.

UTERUS, DISEASES OF: MALIGNANT TUMORS.—DEFINITION.—The malignant tumors here referred to, include the various forms of cancer and sarcoma, and deciduoma malignum. The general pathology of the several forms is given elsewhere in this HANDBOOK.

FREQUENCY.—According to the registrar-general of Great Britain in 1900, in England and Wales, 0.975 woman per one thousand of inhabitants died from cancer; and of all female deaths cancer of the uterus caused 1.3 per cent. In 1890 but 0.830 woman per one thousand of inhabitants died from cancer. In New York in 1890 the deaths from cancer in women were 0.37 per thousand of inhabitants, and in 1900 they were 0.43. These figures show the ratio of increase of cancer in women, most of the increase being in cancer of the uterus. It is needless to multiply the statistics.

And of all cases of cancer which occur in the body, William H. Welch found that the uterus was involved in 29.5 per cent. There is no means of accurately determining the ratio between true cancer, sarcoma, and deciduoma malignum.

Sarcoma and deciduoma malignum are very rare. The one fact which is impressively evident is the steady increase in cancer of the uterus. As the disease has been recognized for many years, this increase is real and not "apparent and due to more precise diagnosis."

AGE.—In New York in 1890 fifty-seven per cent. of all deaths from cancer were below forty-five years of age. In 1900 fifty-two per cent. were below forty-five years of age. The statement that the disease occurs more frequently than formerly in young women is not correct. The apparent greater frequency is due to the fact that a diagnosis of the disease is now made earlier than it formerly was. The youngest woman having cancer of the uterus in the author's service was twenty-six years of age. The maximum number of cases occur above forty-five years of age. It is exceedingly rare before twenty-five years.

RACE.—No race is exempt. It is probable that savage races have it less frequently. The observation used to be made that the negress was exempt. Cullen has proven this not to be the case at the present time. Whether more mulattoes are now found than formerly, and that the pure-blooded negress is less liable, I cannot state.

CAUSES.—These are actual and contributing. The supposed actual causes of cancer are described elsewhere. The contributing causes are many.

(*a*) *Irritation and Trauma.*—The fact is undoubted that cancer of the cervix is rarely seen in the nulliparous woman, and in a number of instances in which it has occurred in them a trauma, such as dilatation, has preceded its appearance. It appears that nulliparæ have adeno-carcinoma of the body of the uterus about as often as mothers, but that squamous-cell epithelioma is seen most frequently after childbearing or other trauma.

(*b*) *Heredity.*—This is not now believed to be as potent a factor as it was formerly held to be. However, in about twenty per cent. of uterine cancers, another member of the family has had some form of cancer.

(*c*) *Locality.*—In an attempt to find the true cause for cancer all the circumstances under which it occurs have been sought. In these investigations it has been found that certain localities, and even certain houses, have an unusual number of cases. This has given rise to the expression "cancer zones." Those who seek to show the contagiousness of cancer point to these facts as corroborative of their views, but thus far most authorities believe that the unusual prevalence of cancer in certain localities is merely accidental.

CANCER OF THE CERVIX UTERI.—This occurs in two forms: as a squamous-cell epithelioma and as an adeno-carcinoma. Furthermore, either the vaginal part of the cervix or the cervical canal may be involved.

Squamous-cell epithelioma of the cervix is the most frequent form. Squamous epithelium multiplies upon the surface and invades the stroma. Occasionally the epithelial cells are found grouped together so as to form "epithelial pearls." One of the earliest changes in the epithelial cells is the increase in chromatin. The ingrowth of the epithelium precedes the outgrowth, but after a time the epithelium produces delicate filiform projections on the surface of the cervix. The papillary growths consist of branching stroma and epithelium, and are exceedingly vascular. After a time necrosis of the projections takes place and ultimately an ulcer occurs where formerly an outcropping was present.

At first the cervix is nodular and hard, and new vessels may be seen coursing across the nodules. The nodules are of deep color and unequal in size. It is in this state that the disease is seldom recognized. In the state of papillary excrescence the outcroppings appear as delicate papillæ, red in color, bleeding upon the slightest touch, and always pedunculate. They may be so numerous as to form, when massed together, what is appropriately described as a "cauliflower growth." The least touching of such a growth causes bleeding. The excrescence is generally covered by a foul-smelling pus, the result of necrotic changes, and at points minute blood clots may be seen. Without difficulty the finger can be made to penetrate the growth. As ulceration proceeds all traces of the cervix become lost. There is then present at the vaginal vault a cup-shaped ulceration surrounded by raised edges, the surface of the cavity being covered by pus, and the ulcer bleeding easily. The adjoining vaginal wall may be involved, or cancerous foci, the result of secondary "inoculation," may be seen upon the vagina, even at some distance from the cervix.

Extension.—Cancer of the cervix tends to extend bilaterally along the lymphatics in the broad ligament, downward into the vagina, anteriorly toward the bladder, and posteriorly toward the rectum. There is but little tendency for it to grow upward above the internal os, the body of the uterus being usually free even in those who have died from cancer of the cervix.

As the disease extends toward the broad ligaments, the glands lying over the obturator foramina, then those along the iliac arteries, and later the inguinal glands become involved. This glandular involvement is at first due to saprophytic and septic invasion, but later to the presence of cancer elements. It is also true that the epithelia occasionally appear in masses along the veins (Fig. 4911). Cancer of the cervix has little tendency to leave the pelvis. Not only is it at first localized in one part of the uterus, but even to the end it remains as a rule localized in the pelvis. After general pelvic involvement has occurred, all the various phases of pelvic suppuration may be presented: ovarian abscess, pyosalpinx, broad-ligament suppuration, suppurating glands, and peritonitis. The paths along which the cancer extends become ulcerated, and as a result fistulous openings into the bladder, less frequently into the rectum, may be seen. The ureters, for some strange reason, although surrounded by cancer, rarely become corroded.

As the broad ligaments become involved, which involvement takes place, as a rule, more rapidly upon one side, the ureters become obstructed and hydro-ureter results. The rectum may be pressed upon and constipation result. When the rectum or bladder is invaded, the lesions of inflammation of these viscera may be present. The cervical growth may be so large as to block the cervical canal, causing retention of the uterine discharges and pyometra.

SYMPTOMS.—The writer believes that he has discovered a first early symptom of cancer of the cervix which has been furnished by all his patients who were intelligent and cleanly enough to observe such a symptom. Inasmuch as epithelioma of the cervix is characterized by a multiplication of epithelial elements and by increased vascular supply to the cervix, the earliest functional evidence of the disease *is a marked increase in the woman's habitual leucorrhœa, or the occurrence of a whitish leucorrhœa in those who have not previously had it.* In drawing out this symptom, the questioner should first determine the exact amount of discharge which is normal and usual to the individual. In refined women the toilet embraces a certain amount of and frequency in douching, every day or every few days. Without assignable cause such a woman will notice that her habitual leucorrhœa has become markedly increased, and that more frequent douches are needed to keep her tidy. In the case of an old woman whose glandular structures have

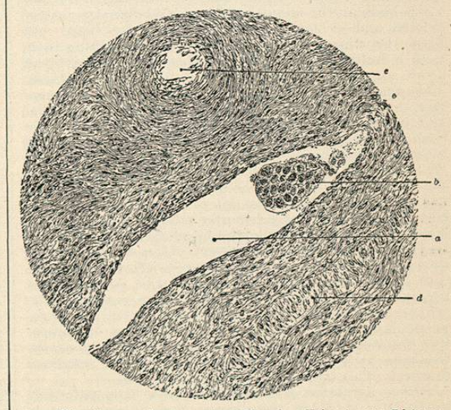

FIG. 4911.—Shows a Carcinomatous Mass in a Vein at some Distance from the Original Seat of the Disease. *a*, A vein containing a carcinomatous mass; *b*, isolated mass of carcinomatous tissue; *c*, transverse section of an artery; *d*, section through a vessel; *e*, muscular tissue. (Abel.)

shrunken with the menopause, a return of her forgotten leucorrhœa will be observed. Old women are apt to look upon this as an evidence of rejuvenation, a pathetically mistaken interpretation. The writer has given such prominence to this symptom in order that the attention of readers may be fixed upon it, and that more extended observations by other physicians may either corroborate or correct him. In his cases this symptom has preceded all others by from three to six months, months most valuable to the surgeon and to the woman. But as a rule women, accustomed as they are to vaginal discharges, seldom pay attention to an increase in leucorrhœa. The next symptom is a *change in the type* of the vaginal discharge. From being mucous and odorless, it now becomes watery and often has a putrid odor; or there may be an occasional muddy stain due to the admixture of blood. The menstruations are not altered in periodicity or in character. The presence of a putrid odor is always an indication of molecular death of tissue. Upon coitus, douching, straining, and lifting weights, or even after ordinary exercise, this muddy spotting of the underclothing may be noticed. The putrescence of the discharges and the intermenstrual bleedings become so marked that the attention of even the most indifferent woman is attracted to them. Up to this time the general health of the patient has not suffered. As the broad-ligament lymphatics become infiltrated, there is produced some pain, particularly if the obturator glands enlarge and press upon the obturator nerve. The pain is usually referred to a sacro-iliac joint or to the hip. Should the bladder be invaded, symptoms of cystitis supervene. As the pelvis