parametrium was not already involved has there been recurrence as early as at the end of one year. The first operation was done five years ago, and the patient is still alive, free from recurrence. In the three fatal cases the causes of death were respectively angina pectoris due to arteriosclerosis, nephritis, and endarteritis obliterans. An extended report will be made at a future date. Enough has been said here to furnish reasons for the procedure.

The Operation. The Vaginal Stage.—The uterus is curetted and all cancerous spots are cut away. The cervix is then thoroughly roasted with the dome-shaped cautery. The vagina is now cleansed, and a self-retaining catheter introduced and left open to drain the bladder. This stage has been conducted by the first assistant, who now resterilizes his hands. The patient is then placed in position for laparotomy.

The Abdominal Stage.—A median incision is made from the pubes to the umbilicus. It is necessary to go through the pyramidalis muscle down to the pubic cartilage. If the woman be fat, the umbilicus is removed and the incision extended above this. Upon entering the abdomen the table is lowered into the exaggerated Trendelenburg position. The intestines and omentum are gently taken from the pelvis and placed in the abdomen, and the sigmoid flexure is straightened out. The curvature of the loins upon each side of the spine above the pelvic brim is carefully and accurately filled with gauze pads, and other pads are used so as to make a complete dam across the body at the upper end of the incision, holding the intestines back. The table is now raised so as to be almost horizontal. A careful survey of the field is made, but rapidly. I then pick up the ovarian vessels of one side at the pelvic brim before they cross the external iliac artery and ligate them. Provisional ligatures are then applied near the ovaries. The same is done on the other side. The broad ligaments

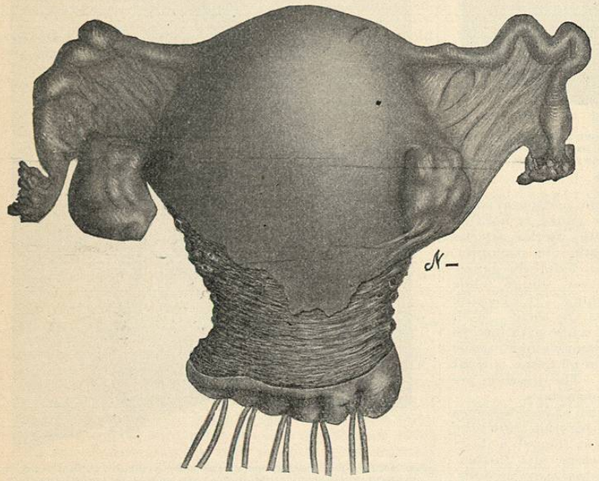

FIG. 4916.—A Specimen of a Uterus Removed by Vaginal Hysterectomy (by the forceps operation). The cervix, which was the seat of a cancerous growth in an early stage, is shown closed by heavy silk sutures, which were employed to prevent soiling of the field of operation by the contents of the uterus. (Pryor.)

between are cut close to the first ligatures, which latter are cut short. The round ligaments are seized by artery forceps, drawn out, ligated close to the internal inguinal rings, and cut short. Beginning upon the right side the peritoneum is split upon a director from the point of the first cut, along the pelvic brim below the internal iliac artery, to the vesico-uterine fold. This having been done on each side and the two cuts united by a third across the bladder at the vesico-uterine fold, the peritoneal covering of the organs to be removed is severed at all points except posteriorly. Using the fingers only, I push (on one side at a time) the lower flap of peritoneum, in which should be the ureter, away from the upper, feeling for the pulsation of the common iliac artery. This blunt dissection proceeds down into the pelvis until the internal iliac is found. At a point over this, about one-half an inch below the bifurcation of the common iliac, the internal iliac is carefully exposed. For this purpose I use toothed forceps and Sims' blunt vesico-vaginal scissors. It will be seen that the artery is accompanied, as a rule, by one vein, which usually lies below it; sometimes it is accompanied by two veins. The aneurism needle is passed unthreaded around the vessel from within out. It should then be threaded with a chromicized tendon one-sixteenth of an inch in diameter, perfectly round and tested. This is drawn around the vessel. The first knot is made with one turn of the strand and tied. It should be tied slowly without lifting the artery, and by a pressure of about two pounds so as to approximate without rupturing the intima walls. The second knot is carefully tied. If pulsation is found below the ligature another is passed and tied. The ligatures are cut short. To one side of the bladder, beneath the horizontal pubic ramus, the loose areolar tissue and fat are spread apart by the fingers so as to expose the white obturator nerve. The needle carrying a fine tendon is passed around the vessels, and they are ligatured. The variations of the obturator artery must be borne in mind at this stage. The dissection described above and the ligations are repeated upon the other side. These eight preliminary ligations have cut off all blood supply through the ovarian, round ligament, uterine, superior vesical, pubic, obturator, gluteal and sciatic arteries, and sometimes through the ilio-lumbar. The field of operation will be bloodless except from severed veins and anastomoses low down in the pelvis. I next dissect out the ureters to the point where they pass beneath the uterine arteries, ligate these arteries at their origins from the internal iliacs as a precaution, and trace the ureters forward well up to their insertion into the bladder. All fat in the obturator foramina about the upper third of the vagina and between the iliac vessels, together with all glands which are visible, are now removed. Particular attention is paid to the bases of the broad ligaments and obturator foramina, to remove all lymphatics and glands. While the ureters are held up, the operator dissects the bladder from the uterus and upper half of the vagina. In freeing the ureters they should be dissected entirely away from the peritoneal flaps, otherwise much fat will be left clinging to them. I usually at this stage ligate, as a precaution, the superior vesical and other anterior branches of the internal iliac close to the main artery. The uterus is now held high up so as to put the vagina and utero-sacral ligaments on the stretch, and the vagina and utero-sacral ligaments, with their peritoneal covering, are circled by the scissors below the upper third of the vagina. Deep down in the pelvis the erectile tissue of the vagina will be found bleeding. This is grasped and ligated. All loose bits

of fat above the bases of the broad ligaments, between the iliac arteries and between the severed utero-sacral ligaments, are picked out. If the venous bleeding is troublesome the patient may be lowered into Trendelenburg's position while the operation is being completed. The vagina is held open by two forceps and several rolls of gauze are introduced, their ends projecting above the vagina. The ureters are returned to their beds and the peritoneal flaps adjusted by interrupted sutures as far as possible. Upon each side a suture should pass through the round ligament, which is stout, and then through the fold of peritoneum at the sides of the rectum. It is unnecessary to suture the rectum to the bladder, as they will fall together (Fig. 4917).

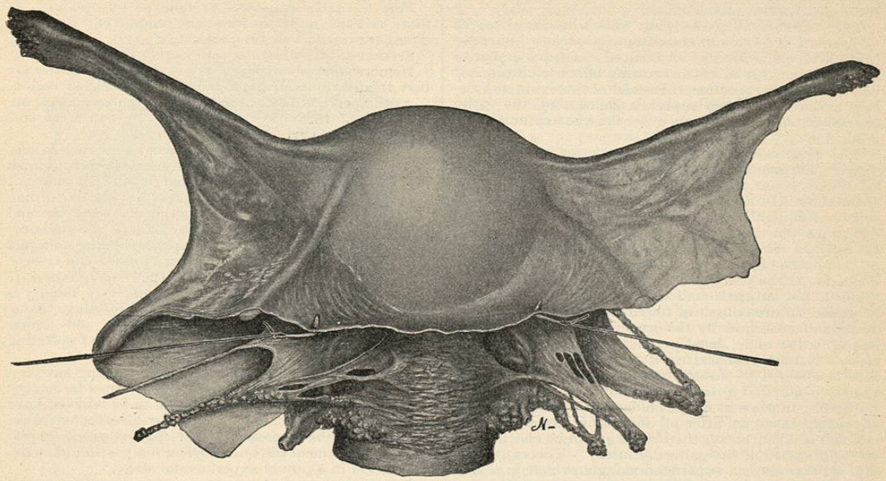

FIG. 4917.—A Second Specimen of a Uterus which was Removed, by the Author's Method of Abdominal Ablation with Preventive Hæmostasis, on account of Cancerous Involvement of the Cervix. The vaginal cuff and the lymphatics surrounded by fat are well shown. The drawing is from life, the specimen having been preserved in alcohol. (Pryor.)

The field of operation having been closed out, the retaining pads are removed, the sigmoid flexure and the omentum are brought down, and the abdominal wound is closed. The wound is dressed and the patient placed in the lithotomy position. The vaginal dressings are examined and adjusted. In doing this the livid hue of the vulva and buttocks, due to the ligation of the internal iliacs, will be noticed. The patient is given a high enema of one quart of warm saline solution containing two ounces of whiskey. This is done by dropping the head of the table and not by inserting a long rectal tube. If shock is present it is to be treated as detailed elsewhere. The vaginal dressings are removed and renewed at the end of ten days.

High Amputation.—Indications.—In the author's opinion, the few cases which cannot stand the strain of the perfected abdominal operation will receive a better ultimate result, with less immediate risk, from the operation now about to be discussed than from vaginal hysterectomy. It has been shown that cancer of the cervix has little tendency to ascend above the internal os. It is, therefore, in operating for cancer of the cervix, not necessary to proceed above the internal os. The true indication is for a removal of the upper third of the vagina and the parametric tissue and glands outside the ureter. This is accomplished only by laparotomy, never by vaginal hysterectomy. Vaginal hysterectomy may then be termed an operation of purely local application, such as is amputation of the mamma without muscular and glandular extirpation. It will be seen how thorough a procedure is the high amputation with cauterization.

The Operation.—The patient may be in either the lithotomy or the Sims position. I prefer the former. Wooden retractors are preferable. If metal ones are used they must be frequently cooled by iced water. The uterus is curetted and the cervix amputated by Sims' method. The diverging tenaculum is then introduced into the uterine canal and the excavated stump drawn down. A sharp-pointed knife, curved on the flat, is inserted into the tissues, and a hollow cone of tissue is removed. The tenaculum is again introduced and another cone removed. This is repeated until the uterus is excavated, so that upon digital examination nothing remains of the cervix but a thin shell of tissue. The resulting cavity leads by a broad opening into the uterine cavity, and there should be no constriction at the former site of the internal os. The wound made by the successive applications of the knife should open downward as a cone with a broad base.

The operator now introduces the dome-shaped electrode, cold, as high up as the fundus uteri and turns on the current sufficiently to heat the knife white. It is held in one position until all bleeding stops and the adjacent tissues are charred black. This takes about fifteen minutes. The heat radiates in all directions, and while being applied frequent applications of gauze, wrung out in iced water, are to be made to the vaginal retractors. The staff of the cautery must, of course, not be allowed to touch the retractors. After thus cooking the corpus uteri the current is turned off and the cautery is withdrawn as far down as the cervix. If it is arrested at this point it is because the cervix has not been properly excavated by the knife. The cautery is next held within the cervical excavation and the current turned on. Not only should the heat convert the remains of the cervix into a carbonized mass, but the grayish tint assumed by the adjacent vagina shows that it, too, is destroyed. As the cervical cavity has been thinned out, less time is required to destroy it than in the case of the corpus. In fact, the corpus is so thick that the area of carbonized tissue protects it, and I have never seen it all slough away. The application of the cautery to the cervix

must be most thorough. It is more often done incompletely than in an adequately thorough manner. It is almost needless to say that the heat produces a sterilized wound. It must also undoubtedly destroy the pericervical tissues, particularly the less vitalized cancer cells, throughout quite an area.

The wound is not packed, but when a discharge begins the patient is put on mild antiseptic douches. Surprisingly little pain results. Advanced cases are no bar to the operation. It exerts a retarding effect in all cases of cancer of the cervix uteri. Instead of removing the tissues by knife and then applying the cautery, the entire operation may be performed by the cautery knife, but more slowly.

The Treatment of Advanced Carcinoma of the Cervix Uteri.—This embraces removal of all sloughy and necrotic tissue, so far as is possible, in order to secure local cleanliness. During the application of the curette and scissors frequent digital examinations should be made to determine the thickness of the tissue remaining around the cavity. Should the peritoneal cavity or the rectum or bladder be entered, the patient's danger is much augmented. If the peritoneal cavity is entered it should be drained, not sutured; and if the bladder or rectum be wounded suture is useless, for cancerous tissues will not unite, and consequently the organ entered must be kept empty in the hope, usually vain, that the opening will close. If the peritoneal cavity is entered the drainage is to be effected by means of a catheter; but if the rectum is penetrated a rectal tube should be used for this purpose. In cases in which no damage has been done to any adjacent organ, after all sloughing tissue has been cut and scraped away, the bleeding is to be checked by the application of the galvano-cautery. This cauterization will produce a superficial slough, which in a few days will separate, leaving a granulating wound. Further removal of tissue can be secured by the following method of treatment: Thin circular pieces of cotton, about one-half an inch in diameter, are squeezed out in an aqueous solution of chloride of zinc of twenty-per-cent. strength. These are packed snugly all around the cervical cavity so as completely to fill it. Over the whole the vaginal vault is packed with large pieces of cotton wrung out in a saturated solution of bicarbonate of soda. This is essential, because as the serum percolates through the zinc-laden cotton it would cauterize the vagina unless caught and neutralized by the soda solution.

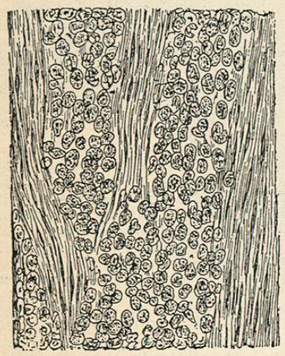

FIG. 4918.—Round-cell Sarcoma of the Uterine Wall, of the usual type. (Wyder.)

The dressing is left in for two days. Upon its removal the cervical cavity will be found lined by a grayish slough. Two days later this can be picked away by forceps. In this way repeated sloughs can be produced and removed. When the physician is not provided with an actual cautery, this treatment by means of caustic solutions can be begun after the operation for removal of the cancerous outcroppings, as soon as the bleeding has ceased. I have tried all the various methods of local treatment and find this the simplest and most efficacious. Immediately upon the completion of this treatment the patient should be put on thyroid extract. I have seen good results follow in many cases, and in no case have I failed to see the disease arrested, for a time at least. The thyroid should be pushed to the point of tolerance.

Pain in carcinoma must be relieved by opiates. At first, codeine suppositories are employed, then the stronger preparations of opium.

Section of the spinal nerves I cannot recommend.

Hemorrhages occurring during the course of cancer are best treated by tamponade with vinegar-soaked cotton.

As the pelvis becomes blocked with cancer masses, obstruction of the bowel may occur. It is then the surgeon's duty to perform colostomy.

The rapidity of growth of a cancer of the uterus may be checked by ligating the blood-vessels which nourish it. The plan which I adopt—and which, I believe, I was the first to advocate—is to ligate, through the median abdominal incision, the ovarian, the internal iliac, and the obturator arteries. When the operation is completed, a short incision is made into the peritoneum—one just long enough to enable the operator to reach the vessels. After completion of this operation the cancer masses are scraped away through the vagina, and every facility is offered for the freest escape of the necrosing tissue. The patient is put upon thyroid extract and tonics. By this treatment life is much prolonged and suffering diminished.

Other Methods of Treatment.—Serum therapy has been employed in a number of cases and in various forms, but without benefit. The cases reported to be relieved have upon critical examination proved worthless for statistics.

Owing to the inaccessibility of the cancerous uterus, the *x*-ray treatment can be carried out only with difficulty. It is as yet in a purely experimental stage.

Injections, into the cancer mass, of various drugs, such as methylene blue and alcohol, have been employed, but with little or no benefit.

SARCOMA OF THE UTERUS.—*Frequency.*—Von Franqué, Gualt, Gessner, and Roger Williams, in analyzing 19,263 uterine tumors, found sarcoma but 44 times. In 1894 J. Whitridge Williams, of the Johns Hopkins Hospital, could find in literature reports of but 144 cases, in 34 of which the cervix alone was involved. The disease is undoubtedly more frequent than these reports would indicate, being often classed as fibromyoma in its beginning, and as cancer after ulceration has set in.

Age.—Sarcoma of the uterus is most frequent before the menopause. Gusserow, in analyzing 73 cases, found 52 under fifty years of age. The youngest child in which it has occurred, according to the report of Holländer, was but seven months old.

Fertility.—About forty per cent. of sarcomatous women are sterile, and in those who bear children the average to each is 1.46 children.

Pathology.—The disease may occur as either a spindle-cell or a round-cell sarcoma. It may involve the mucous membranes of the organ or its parenchyma.

Sarcoma of the Cervix. The cellular invasion becomes so great as to produce knobbed projections into the vagina. The growth is hard and nodular at first, but after a time it sloughs. Or there may be "grape-like" polypi hanging from the cervix. These are always multiple, oval in shape, and yellowish-brown in color, and about one-third of an inch in diameter. They are translucent and easily broken, affording escape to a thick fluid. They strongly resemble a portion of a hydatidiform mole. These projections are composed of epithelium overlying layers of sarcoma cells, with clear spaces between.

Sarcoma of the Corpus Uteri. The surface of the uterine cavity is nodular but smooth, but may be rough after ulceration begins.

Symptoms.—The growth causes a general enlargement of the tissues in which it arises. The uterus is increased in size, is movable until the surroundings become involved by an extension of the new growth, is insensitive, and in all respects resembles either fibromyoma or cancer.

But one form of sarcoma is at all clinically easy of recognition, viz., the "grape-like" form of cervical sarcoma. Even the microscopic diagnosis is often most difficult, and yet upon the microscope alone does a positive diagnosis

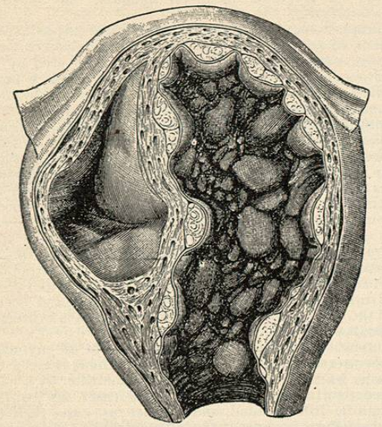

FIG. 4919.—Sarcoma of the Uterine Mucosa, with a Blood Cyst in the Uterine Wall. (Péan.)

rest. The subjective symptoms are at first those of fibromyoma and later of cancer. Sarcoma, however, grows more rapidly than fibromyoma, and the metrorrhagia is in disproportion to the size of the growth. If a nodule projects into the vagina and is seen early, it will be found to present a smoother aspect than cancer and to be more friable than fibroid. The sarcomatous nodules are readily broken into, while submucous fibromyomata, which can be palpated through a dilated cervix, are firm. Sarcoma occurs usually before the menopause, while cancer is most common later in life.

That fibromyoma not uncommonly breaks down into sarcoma must be remembered.

Treatment.—As soon as the diagnosis is made, and if the disease has not progressed too far, abdominal removal of the uterus, ovaries, and tubes is indicated, and should be accomplished by a broad dissection. Although the uterus may be small enough to admit of its removal by the vagina, this should not be attempted because of the exceeding vascularity and friability of these growths. In the removal of the organs by way of the abdomen, the vessels should be ligated at some distance from the uterus so as to add to the prognosis the benefits which such a procedure is known to secure in the treatment of sarcomata.

The injection of Coley's fluid, so successful in the treatment of sarcoma on the surface of the body, is contraindicated in sarcoma of the uterus, owing to the certainty that a fatal sepsis will result.

Even in cases too far advanced for a successful radical operation, the internal iliac, ovarian, and obturator arteries should be ligated.

DECIDUOMA MALIGNUM.—Called also "sarcoma choriocellulare," "syncytioma malignum," "sarcoma deciduocellulare," etc.

Definition.—Deciduoma malignum, first described by Sänger in 1888, is a malignant neoplasm of the uterus occurring only with or after conception.

Frequency.—The disease is about as frequent as sarcoma, 132 cases having been reported up to January, 1902.

Age.—The average age in 124 cases was thirty-two years, but 112 of the 124 cases occurred after the forty-fifth year. The disease is unlike epithelioma in respect of the age at which it occurs.

Fertility.—In 90 of the cases reported the pregnancies are given, and the women averaged 4.2 conceptions. The disease is unlike sarcoma in this regard.

Pathology.—We have not space to discuss the various theories regarding the nature of this interesting disease. The reader is referred to the exhaustive article by Frank Pierce in the *American Journal of Obstetrics* for March, 1902, and also to the article on this subject in the preceding volume of the HANDBOOK. It is my belief that the uteri in which these growths develop are already sarcomatous before the occurrence of the pregnancy which always accompanies deciduoma. The rapidity of the growth after delivery or abortion is not strange, but conforms to the progress of all malignant growths about the pregnant uterus. Microscopically, the growth consists of irregularly shaped protoplasmic masses, of deep color, nucleated, and resembling the syncytium of a chorionic villus; and, in close relation with these, are the cellular masses called Langhans' cells (Fig. 4920).

The growths develop rapidly, the nodular masses soon appearing in all parts of the uterus and pelvis. Metastases are commonly present in fatal cases.

Symptoms.—As already stated, the patient, in every case, either is or has recently been pregnant. About forty per cent. of all cases have been preceded by hydatid mole. Therefore in every case of such a mole, deciduoma malignum should be suspected. The disease is also seen to follow ectopic gestation, normal labor, and abortion. The first symptom after delivery is hemorrhage. This does not occur very soon after delivery, as does a post-partum bleeding, but is first seen during the puerperal months or a little later. The hemorrhages are severe, repeated, and rapidly recurrent. Profound anæmia soon occurs. Soon after the first bleedings a profuse discharge of muddy watery fluid occurs, and is seen when the patient is not bleeding. Metastases occur in the vagina and such distant organs as the lungs, but seldom in the liver.

The patient usually has an elevation of temperature, and an increase in the pulse rate proportionate to the

FIG. 4920.—Syncytioma. *s*, Syncytium; *ns*, necrotic tissue; *l*, leucocytes; *bg*, connective tissue; *c*, cellular (decidual) part of the tumor; *n*, nuclei in the syncytium. (Marchand.)

hemorrhages. Pain is not an early symptom, but occurs when the pelvic nerves become pressed upon by the mass.

Upon examination the enlargement of the uterus is first noted. If the nodules have penetrated the uterine

wall, the peritoneal surface of the uterus will be found nodular. The cervix is commonly dilated enough to admit the examining finger, upon introducing which the friable spongy mass may be felt. It bleeds readily.

Whereas usually the primary tumor is in the uterus, occasionally it will occur first in the vagina.

Deciduoma malignum is of more rapid growth than any other neoplasm.

The patient dies from anæmia, hemorrhage, or metastatic complications.

Diagnosis.—In every case of labor or abortion, in which late hemorrhages occur, an immediate intra-uterine examination is indicated. If a rough surface is found, and if, after the roughnesses have been removed, they soon reappear and are accompanied by hemorrhage, this disease must be suspected and the microscope appealed to. The very frequent association of hydatid mole with deciduoma must compel keen watchfulness in all cases of such moles.

Marchand found that eleven patients died in less than six months, and five within a year, while only one lived as long as three years. When the disease occurs primarily in the vagina, the progress is not so rapid.

Treatment.—As soon as a diagnosis is made, if the disease be limited to the uterus, total abdominal hysterectomy should be performed according to the technique laid down for cancer. *William R. Pryor.*

UTERUS, DISEASES OF: NON-MALIGNANT NEW GROWTHS.—The benign neoplasms affecting the uterus may be divided into two groups according to their histogenesis:

1. Those originating in the uterine parenchyma—fibroma, myoma, and adeno-myoma.

2. Those originating in the remains of embryonal structures—cysts of the Wolffian duct and cysts of the Müllerian duct.

Relative Frequency.—The uterus is extremely prone to invasion by non-malignant neoplasms, especially fibro-myomata. Thus, in W. R. Williams' series of 2,649 uterine new growths 883 were myomata. In Gurlt's series of 4,115 uterine neoplasms 481 were fibro-myomata.

The relation of non-malignant new growths of the uterus to malignant ones is 40.62 per cent. of the former to 58.38 per cent. of the latter. The non-malignant glandular tumors occur with much less frequency.

Of the neoplasms originating in the uterine parenchyma the fibromata and myomata are recognized as being of identical structure, varying only in the relative proportion of the fibrous and muscular elements present. They are therefore grouped under the common head of myoma.

Etiology.—The etiology of myomata, in common with other neoplasms, is not as yet understood. These tumors usually develop during the period of sexual maturity, seldom if ever before puberty (never according to Gusserow), and they very rarely appear after the menopause. They are more common in the negro than in the white race, and it would seem from many case-histories that heredity is a predisposing factor.

Myomata may be said to be in general growths of the menstruating uterus, since their greatest activity of growth is during this period. They frequently atrophy after the menopause.

Morphology.—According to their situation uterine myomata are divided into those of the body of the uterus, those of the cervix, and intraligamentous tumors. Those of the body of the uterus are again divided into subserous, interstitial, and submucous tumors.

Strictly speaking, the subserous variety should include only those tumors which are sheathed with peritoneum and lie free in the abdominal cavity, attached to the uterus only by a pedicle. Submucous tumors should include only those which hang free in the uterine cavity, are attached only by a pedicle, and have no muscular coat. All intermediate forms should be designated as interstitial. Ordinarily, however, those growths which project into the abdominal cavity and which originate in the subperitoneal layer of the uterine muscle are called subperitoneal, and those projecting in a like manner into the cavity of the uterus, whether or not they be covered with muscle, are known as submucous tumors.

Besides these situations the tumor may be confined between the layers of the broad ligament, the intraligamentous form.

Subperitoneal myomata are single or multiple nodules which, from being primarily interstitial, have secondarily become subperitoneal. They are closely covered by the peritoneum and are attached to the uterus by a broad pedicle. The tumor is immediateln surrounded by loose connective tissue. Torsion of the pedicle may occur with entire detachment of the tumor from the uterus. Through inflammatory adhesions the growth may become attached to surrounding structures, or it may remain as a migratory tumor in the abdominal cavity. The intraligamentous myoma is a subperitoneal growth arising from the lateral wall of the uterus or from the supravaginal cervix. It pushes apart the peritoneal folds of the broad ligament, and grows either beneath or between them, being thus extraperitoneal. The intraligamentous myoma from its position may exert pressure upon important structures and cause grave symptoms. Usually firmly bound down and in close relation with the pelvic vessels and nerves and the ureters, the intraligamentous myoma is extremely difficult of access.

Interstitial myoma, the primary type of all myomata of the uterus, occurs as circumscribed tumors lying in the uterine wall and attached to the myometrium by a loose connective-tissue capsule. In some cases the capsule cannot be differentiated, and in other rare cases there occurs a diffuse myoma of the myometrium. Submucous myomata are those in which the greater part of the nodule projects into the cavity of the uterus as a polypus, having a pedicle of varying lengths. The tumor is soft in consistence, usually has a free blood supply, and is covered with loose connective tissue and to some extent with endometrium. The pedicle is formed of dense fibro-muscular tissue, with a sheath of mucous membrane, and contains a few blood-vessels.

The submucous myomata may become adherent to the neighboring uterine wall by inflammation.

Cervical myomata are of rather infrequent occurrence, forming from five to six per cent. of all uterine myomata. They develop either from the infravaginal or from the supravaginal cervix, the former growing usually into the vagina, the latter into the retrocervical connective tissue.

Myomata in general are multiple; sometimes they are single oval nodules, usually sharply circumscribed and surrounded by a capsule of loose connective tissue. The growth may be hard or soft, is whitish or pinkish in color, and may vary greatly in size. Arising in the myometrium, the tumor develops in the direction of least resistance, and eventually assumes one of the positions described above. On section the tumor is glistening and may be of homogeneous structure, though more frequently it is divided into lobules by septa of dense fibrous tissue which give it, on section, a striated appearance. The consistence of the tumor varies from the soft pure myoma to the hard fibromyoma and the almost stony pure fibroma. The blood-supply of the tumor substance is poor, being limited to a few small vessels. The connective-tissue capsule is freely supplied with large arteries and venous sinuses.

Histologically, myomata are formed of a muscular tissue the cells of which possess the spindle-shaped nuclei and the homogeneous protoplasm characteristic of unstriped muscle in other localities. The muscle bundles are separated into lobules by septa of dense connective tissue. In certain cases this dense connective tissue forms the basis of the tumor. In all cases mast cells of various shapes—long, spindle, ovoid, or round—are present in varying numbers, occurring mostly in the neighborhood of the blood-vessels.

The myometrium undergoes an associated true hypertrophy in interstitial and submucous myomata, as well as in some cases of subperitoneal myomata. The uterine walls become thickened and the cavity is distorted and enlarged. The endometrium also undergoes hypertrophy in myomata, some cases showing a hyperplasia of the gland substance, some a thickening of the stroma, some both.

In the presence of a large myoma the Fallopian tube frequently is the seat of a salpingitis, while the ovary almost always undergoes a hyperplasia of the connective tissue, with some degeneration in the neighborhood of the blood-vessels.

The myoma itself very frequently undergoes pathological change. Among the conditions which may result are atrophy, calcareous infiltration, fatty degeneration, amyloid degeneration, maceration, myxœmatous degeneration, inflammation, necrosis and gangrene, thrombi, telangiectatic change, sarcomatous degeneration, and the association of carcinoma.

Atrophy results when the myoma undergoes a part of the general physiologic involution of the genital system following the puerperium, the menopause, or after a bilateral oöphorectomy. The muscle cells decrease in number and the relative proportion of fibrous matter is greatly increased, the tumor being converted into a dense structure of practically cicatricial tissue. Occasionally the growth entirely disappears.

Calcareous infiltration may take place locally or generally. It occurs with advanced atrophy, and in some instances the entire myoma is converted into a calcareous mass by the deposition of lime salts—the so-called womb stone. Bony changes or osteomyoma have also been described.

Fatty degeneration occurs in the muscle fibres and is frequently found in the interstitial and submucous tumors, rarely in the subperitoneal. It occurs after pregnancy and also in those growths which have a dense consistence.

Amyloid degeneration of the tumor alone or of the tumor and the myometrium may be found, but this change is of rather rare occurrence.

Maceration of the tumor may occur as a result of an acute disturbance of the circulation; the tissue becomes soft, infiltrated with blood, and finally assumes a brownish-green color. Myxomatous degeneration occurs frequently, more especially in the intraligamentous variety, and rarely in the subperitoneal variety. It begins with softening, the consistence of the tumor becomes cystic, and finally cavities filled with mucoid substance are formed in the centre of the nodule. Tumors undergoing myxomatous degeneration increase rapidly in size.

Inflammation, necrosis, and gangrene of myoma are frequent, the pathogenic organisms entering through the vagina, or, in the case of subperitoneal myoma, through the intestines.

Thrombi may be found in the blood-vessels, especially following torsion of the pedicle and incarceration.

Telangiectatic change is an occasional condition. The tumor tissue is infiltrated with numerous dilated blood-vessels. In some instances the lymph vessels may undergo dilatation, as a result of which numerous cystic cavities lined with endothelial cells (cystic myoma) are formed.

Malignant Degeneration.—Myomata may undergo a sarcomatous metaplasia, or they may be associated with carcinoma. The transition into sarcoma is thought to be due to a direct change of the muscle cells into sarcoma cells. The tumors increase rapidly in size, undergo necrotic change, and the sarcoma infiltrates the surrounding structures.

The association of carcinoma with myoma is thought to be due to an inversion of the polypoid growth of the mucous membrane into the myoma tissue, or it is a carcinoma developing from the glandular elements of an adeno-myoma, or there may possibly occur a true metaplasia of the myoma elements into carcinoma.

The *symptoms* of myoma uteri are hemorrhage, pain, intermenstrual discharge, and pressure symptoms. Hemorrhage is present in the great majority of myomata of all kinds; it occurs as a menorrhagia or a metrorrhagia. There may be an increase in the menstrual bleeding, or the hemorrhage may appear at irregular intervals, following unwonted exertion, coitus, etc., or it may occur as a continuous bleeding from the uterus. Usually the hemorrhage is not alarming in amount, and can readily be controlled by rest in bed and the exhibition of astringent drugs, as ergot. In some cases, however, a profound and sometimes fatal anæmia is produced. The hemorrhage is independent of the size of the tumor, but varies greatly with its position and variety. Thus the bleeding is most severe in the uterine polyp, less marked in the interstitial variety, and least in the subperitoneal form. Again, the hemorrhage is more severe in the soft and œdematous myomata than in the dense fibrous forms. The hemorrhages are caused by the increased area of the endometrium, due to the uterine enlargement and to a hemorrhagic endometritis set up by the irritating presence of the tumor.

Pain is a more or less constant symptom. It varies greatly in character and degree. It may be referred to the occiput, the top of the head, or the sacral region. Bearing-down and dragging sensations in the pelvis and expulsive contraction of the uterus are frequent. The pain is always increased during the menstrual periods, and during the early growth of the tumor it may be present only at these periods; later, it becomes constant.

Intermenstrual discharge, the result of a profuse secretion from the utricular glands, occurs between the hemorrhages. The secretion is usually thin and serous, and may be very profuse. In some cases in which hemorrhage is not marked its place seems to be occupied by this serous discharge. Dysmenorrhœa is a common symptom.

Pressure may cause many mechanical disturbances: constipation or mucous diarrhœa, hemorrhoids, difficult, painful, and frequent micturition. Pressure upon the ureters may cause hydronephrosis and eventually death from uræmia. Pressure upon the pelvic nerves may cause neuralgia or even paralysis of the legs.

Fatty degeneration and brown atrophy of the heart are sometimes noted. Thrombosis and embolism are frequent complications, especially in the telangiectatic myomata. This is probably the cause of some of the sudden deaths following operations upon these tumors.

The *diagnosis* of myoma is made from a study of the symptoms and a physical examination of the patient. The symptoms described above, while characteristic, are in no sense pathognomonic, and the diagnosis usually depends upon a careful physical examination. In tumors large enough to be palpated through the abdominal wall, the dense consistence and irregular outlines of the myoma may be noted. Bimanual examination detects the general enlargement of the uterus, the outline of the tumor and the consistence, hard and dense, fluctuating or semifluctuating, according as the myoma is hard, œdematous, or cystic. The growth is found to be attached to the uterus and movable with it. Sometimes in the case of a small interstitial myoma a slight elevation or merely an area of induration may be felt. The presence of such an area, together with the increased length of the uterine cavity, is strong evidence of the existence of a small myoma. The symmetrical enlargement of the uterus which occurs in some cases is more difficult of diagnosis.

Differential Diagnosis.—Myomata must be differentiated from pregnancy, ovarian cysts, retroflexion of the uterus, etc. The separation of a myoma from pregnancy is usually easy. The irregular hemorrhage, the mammary changes, the nausea, and the skin pigmentation may be present in both. The absolute signs of pregnancy—the fœtal movements and heart sounds, the bluish discoloration of the ostium vaginæ, and the soft cervix—will usually establish the diagnosis. Should the pregnancy be complicated by myoma the difficulty of diagnosis is much enhanced.

The differentiation between ovarian cysts and myoma is not difficult, and a mistake is not at all serious, cœliotomy being indicated in both conditions.

Small myomata in the posterior uterine wall may be mistaken for retroversion. This mistake may be avoided