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PERFORATING HEMORRHAGIC (CHOCOLATE) CYSTS OF THE OVARY

THEIR IMPORTANCE AND ESPECIALLY THEIR RELATION TO PELVIC ADENOMAS OF ENDOMETRIAL TYPE ("ADENOMYOMA" OF THE UTERUS, RECTOVAGINAL SEPTUM, SIGMOID, ETC.)*

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The serious, though unusual, hemorrhage of ovarian origin into the peritoneal cavity simulating ruptured tubal pregnancy is well known to every abdominal surgeon, even though he may have encountered but few such instances in his own practice. The literature on this subject has been recently reviewed by Novak [1] and by Smith.[2] The larger ovarian cysts, also with hemorrhagic contents due to twisting of the pedicle of the cyst or from other conditions, are so obvious as to make it impossible to overlook them. Ovarian hematomas due to various causes have been reported by Savage,[3] Wolf,[4] Hedley,[5] Novak [6] and others.

There is, however, one type of hemorrhagic ovarian cyst or ovarian hematoma which should receive more careful attention; not only on account of its frequency but because of the nature of the adhesions resulting from the escape of its contents into the peritoneal cavity. These cysts are often bilateral and are usually small, from 2 to 4 cm. in diameter, though they are occasionally smaller than 2 cm.

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1. Novak, Emil: Abdominal Hemorrhage of Ovarian Origin, J. A. M. A. **68**:1160-1162 (April 21) 1917.

2. Smith, R. R.: Hemorrhages into the Pelvic Cavity Other than Those of Ectopic Pregnancy, Am. J. Obst. & Gynec. **1**:240-247 (Dec.) 1920.

3. Savage, S.: Hematoma of the Ovary and Its Pathological Connection with the Ripening and Retrogression of the Graafian Follicle, Brit. Gynaec. J. **21**:285-305, 1906.

4. Wolf, E. H.: Ueber Haematoma Ovarii, Arch. f. Gynäk. **84**:211-243, 1908.

5. Hedley, J. P.: Hematoma of the Ovary with Report of Eighteen Cases, J. Obst. & Gynec. Brit. Emp. **18**:293-311, 1910.

6. Novak, Emil: Hematomata of the Ovary Including Corpus Luteum Cysts, Bull. Johns Hopkins Hospital **28**:349-354 (Nov.) 1917.

and larger than 4 cm. They apparently develop in women during their menstrual life, especially from 30 years of age to the menopause. I believe that many of the cases described by Savage,[3] Wolf[4] and Hedley[5] belong to this group. A very good example of this type of cyst is described by Smith,[2] under the title of hematoma ovarii.

At operation the ovary containing such a cyst is found to be adherent because of a previous perforation and is ruptured in freeing it. The perforation had been sealed by whatever structure the cyst, at that site, had become adherent to, such as the posterior wall of the uterus, posterior layer of the broad ligament or peritoneum of the side of the pelvis.

During some period in the life of these cysts (or possibly many times), material escaped from them into the peritoneal cavity which was very "irritating" and gave rise to adhesions. These adhesions occur most often in the dependent part of the pelvis, namely the culdesac.

The contents which escape, in freeing the cyst at operation, look like chocolate syrup. The amount varies with the size of the cyst, the size of the opening and the consistency of the contents. Adhesions are encountered which vary in extent, density and location in different cases. They may be slight, as those resulting from a mild pelvic peritonitis of tubal origin, or extensive and dense causing the parts involved to become fused with one another and thus making their separation extremely difficult. The most extensive and densest adhesions are usually found in the culdesac uniting the supravaginal portion of the cervix and lower portion of the posterior wall of the uterus to the bottom of the culdesac and the anterior rectal wall. These adhesions vary in extent and degree in this situation and are sometimes so dense as to simulate malignancy. The operator deals with the individual case according to his best judgment at the time and usually considers the adhesions due to some previous pelvic inflammatory disease. For many years, this was my attitude toward this condition, and judging by the gynecologic textbooks which I have consulted (fifteen in number) all but two of the writers were either unaware of the adhesions resulting from the rupture of ovarian hematomas or did not consider them of sufficient importance to mention them. The two authors who do mention them refer briefly to adhesions resulting from the rupture of an ovarian hematoma or hemorrhagic cyst.

I believe that the whole subject is of great importance from an economic, clinical, pathologic and even physiologic point of view. These cysts are of frequent occurrence. I have had fourteen cases during the year, May 1, 1920, to May 1, 1921, in 178 abdominal operations for pelvic conditions in women between 30 and 50 years of age.

They affect women in a most valuable period of their lives, usually from 30 years of age to the menopause. The variation in size of the cysts, with the varying extent and denseness of the adhesions, leads to mistakes in diagnosis both before and during the operation. The smaller cysts with slight or moderate adhesions may be mistaken for pelvic inflammatory disease of tubal origin; the larger cysts with dense adhesions for malignant ovarian cysts and the dense adhesions in the culdesac for the implantation of cancer, or, when the rectal wall is extensively involved, for rectal cancer. Many kinds of operations have been performed to relieve the condition resulting from these cysts:

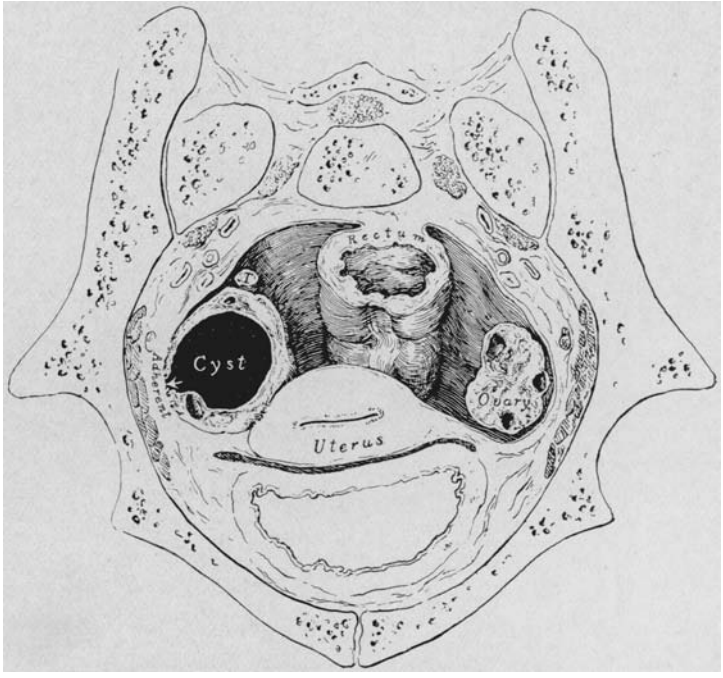

Fig. 1 (Case 11).—Cross section of the pelvis showing the condition found at operation; × ½. The ovarian cyst had ruptured and the perforation was sealed by the peritoneum of the side of the pelvis to which the ovary had become adherent. On freeing the ovary, its "chocolate" contents escaped. The histology of the ovary is shown in Figures 2, 3 and 4. Tissue was not removed from the side of the pelvis adherent to the ovary to determine whether or not adenoma of endometrial type was present.

conservative operations in which the adhesions have been severed, a portion of an ovary excised or one tube and ovary removed; radical operations, with the removal of the uterus, tubes and ovaries, and still more extensive operations in which a portion of the large intestine has been excised, with or without the removal of the uterus, tubes and ovaries.

Of histologic and pathologic interest is the finding in these ovaries of tissue of endometrial type lining the wall of the hematoma and also

often in pockets in the ovary especially about the site of perforation. This tissue may also often be found in the structures which are involved in the adhesions, as the organ or tissue to which the ovary or cyst is adherent at the site of perforation and in the folds formed by the tube and ovarian ligament, the tube and the round ligament, the vesico-uterine fold of peritoneum, about the uterosacral ligament, and bottom of the culdesac, namely, in places in which the hemorrhagic contents escaping from the rupture of the ovarian hematoma would be likely to settle. The most extensive development of this adenoma of endometrial type is usually found in the culdesac, sometimes as a localized thickening; other times as a diffuse growth involving the posterior surface of the supravaginal portion of the cervix, the posterior uterine wall, the bottom of the culdesac and the anterior wall of the rectum, all of which may be adherent to one another. The process

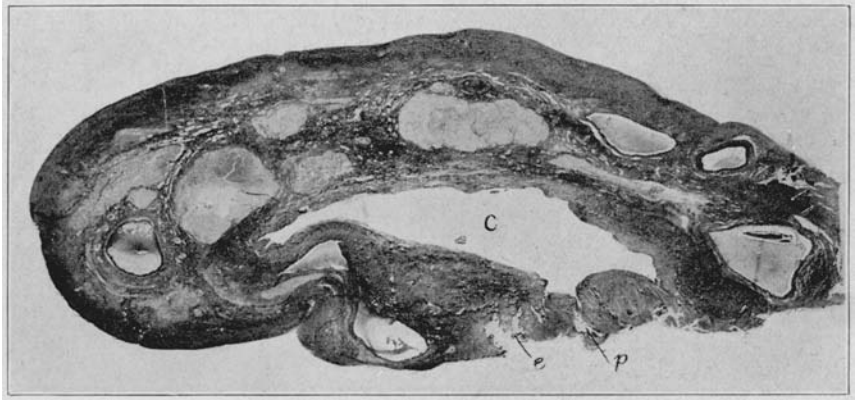

Fig. 2 (Case 11).—Enlargement (× 4) of a stained cross section of the ovary, cyst collapsed and empty. The cyst *c* is for the most part lined by low epithelium which lies directly on the ovarian tissue without any intervening stroma (Fig. 3). There are in the ovarian tissue about the perforation *p* depressions or small clefts *e* lined by columnar epithelium with gland formation and a stroma which is vascular and in places hemorrhagic. These areas strongly suggest misplaced uterine mucosa (Fig. 4). From a histologic study of this cyst one would hesitate to say that it is a hematoma of endometrial type. Nevertheless, hematomas may be found in "adenomyoma" of the uterus with a similar lining. The latter should be our standard of comparison in studying ovarian hematomas rather than the normal uterine mucosa (Fig. 6).

may even extend out between the layers of the broad ligament or between the rectum and vagina, the latter giving rise to "adenomyoma of the rectovaginal septum."

Of physiologic interest, it is to be noted that the adenoma of endometrial type developing in the ovary and arising in the portion of the pelvis as the result of the escape of the hemorrhagic contents of the ovary may be the seat of periodic hemorrhages, i. e., they may be "menstruating organs." Such hemorrhage or menstruation from the ovary would escape into the cavity of the cyst or into the peritoneal

cavity to be absorbed or to give rise to secondary foci of adenoma of endometrial type in various portions of the pelvic cavity. The secondary pelvic foci usually remain quiescent except for slight hemorrhages into the lumen of the glandlike spaces forming small "hematomas" (hemorrhagic cysts). Sometimes they are invasive, and when so are apt to invade the uterus, forming an "adenomyoma" or they may grow down between the rectum and the vagina, forming an "adenomyoma of the rectovaginal septum" and may penetrate the vagina and appear in the posterior vaginal vault. In other cases, they may extend through the wall of the rectum or sigmoid. The "menstrual" blood may escape into the vagina or the large intestine depending on which structure is penetrated by the growth.

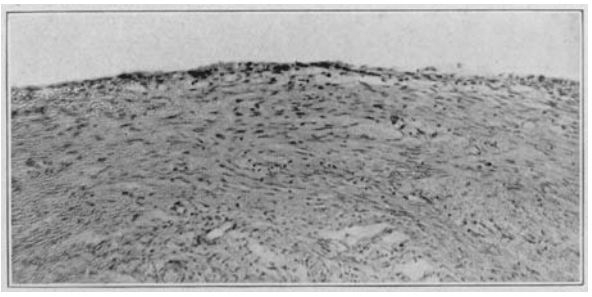

Fig. 3 (Case 11).—Photomicrograph of the wall of the cyst shown in Figure 2. The cyst is in places lined by a single layer of low to cuboidal epithelium resting directly on the ovarian tissue without any intervening vascular stroma. The condition is similar to that shown in Figure 6, a section of the wall of a hemorrhagic cyst due to the retention of "menstrual" blood in an "adenomyoma" of the uterus.

THE INCIDENCE OF PERFORATING HEMORRHAGIC CYSTS OF THE OVARY

My attention was first directed to the dense peritoneal adhesions which may result from the escape of the contents of these cysts, in the year 1910 (Case 1). At the operation, March 8, of that year, a myomatous uterus with bilateral adherent, medium-sized ovarian cysts was found. When these cysts were freed, "chocolate" colored fluid escaped. The lower portion of the posterior uterine wall was firmly adherent to the rectum, and these structures were separated with great difficulty. The supravaginal portion of the cervix was so adherent to the rectum that a supravaginal hysterectomy was performed and the pelvis drained through the dilated cervical canal. The anterior rectal wall felt so indurated after the removal of the uterus that I thought the patient might have a malignant growth of the rectum. I made a digital rectal examination before the patient left the operating room.

While the induration in the anterior rectal wall could be distinctly detected, the rectal mucosa over it felt normal. The patient developed a postoperative ileus which was relieved by an enterostomy. She eventually recovered and has never had any trouble from the rectal condition. At the time I thought that the condition might be syphilitic and advised her family physician accordingly. In view of my present knowledge of these conditions, I believe that the adhesions probably arose from the cyst contents and that there was present an "adenomyoma of the rectovaginal septum." It was only after I had removed other similar cysts that I began to recognize that the adhesions accompanying these cysts arose from the escape of their hemorrhagic contents into the peritoneal cavity. I have since been impressed with the fact that the diagnosis of such a definite clinical and pathologic entity should be made before the operation.

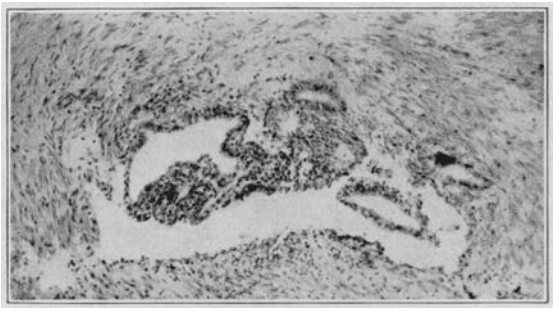

Fig. 4 (Case 11).—Photomicrograph of a small pocket (*e*) in the periphery of the ovary near the perforation of the cyst shown in Figure 2. Histologically, it closely resembles endometrial tissue, the epithelium, stroma and gland formation are the same. This tissue did not resemble the depressions lined by the typical surface epithelium of the ovary which were present in the same section.

The association between these cysts and "adenomyomas" of the posterior uterine wall with adhesions between it and the rectum was first observed by me, in 1912. March 27 of that year, I removed an "adenomyomatous" uterus in which the "adenomyoma" had apparently extended through the posterior uterine wall and had invaded the anterior wall of the rectum (Fig. 64, Case 2). On section, the "adenomyoma" was apparently not connected with the uterine mucosa. Bilateral perforating hemorrhagic cysts of the ovary were present. Just a month later I encountered a similar condition which would have been overlooked had it not been for the first, as the "adenomyoma" was much less extensive (Case 3 and Fig. 63). I did not observe another similar condition until June 13, 1918 (Case 6), but I undoubtedly had overlooked many. During the years 1918 and 1919, I observed

these cysts many times and studied them more from the standpoint of gross pathology, basing the microscopic studies solely on the routine examination of the material in the pathologic laboratory. I found that this was inadequate, and, therefore, I am reporting only a few of the cases observed by me during that period. Until a year ago, I believed that the adhesions arose solely because the contents were exceedingly irritating; that they contained a digestive ferment (menstrual) or were infected by some bacteria. Cultures were made and proved sterile, and some experimental work on animals was done which will be considered later.

It was only this last year that I fully realized the true relation between these cysts and pelvic adenoma of the endometrial type and

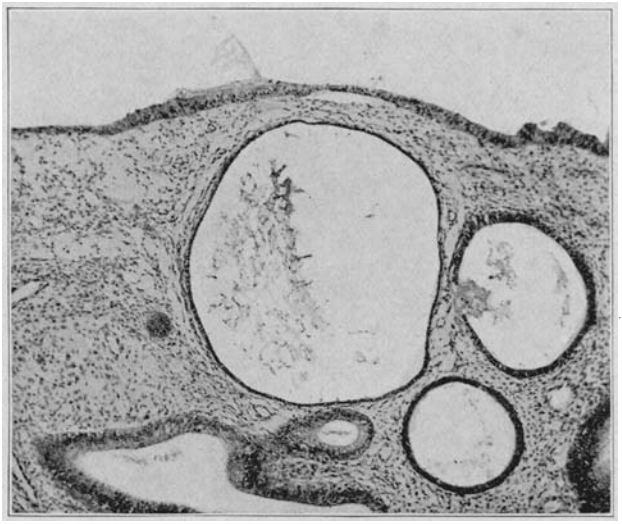

Fig. 5.—Photomicrograph of a portion of uterine mucosa showing glandular dilatation. The epithelium lining these glands is columnar, cuboidal or low varying with the dilatation of the glands. The greater the dilatation (distention), the lower is the epithelium lining the gland. The same holds true for hematomas of endometrial type whether of the ovary or the uterus. (Compare with Figure 3 and also Figure 6.)

that the pelvic adhesions were often associated with or were in large part due to this adenomatous growth.

From May 1, 1920, until May 1, 1921, I have operated on fourteen patients with these cysts, and in ten, an adenoma of the endometrial type was found in the organs or tissues which were adherent. In the four in which it was not found, the adhesions were slight, conservative surgery was performed and tissue was not removed from the adherent structures for microscopic examination.

PATHOLOGIC ANATOMY

A. Pathologic Changes in the Ovary.—As previously stated, these hemorrhagic cysts are found at operation to be adherent, and in freeing

them, the cyst is ruptured and some, or all, of its contents escapes. This rupture arises from reopening a previous perforation which has been sealed by the organ or structure to which the cyst has become adherent at the site of the perforation, or the cyst is torn in freeing it. Adhesions are also found in other portions of the pelvis and especially in the culdesac, and these adhesions are apparently the result of the escape of the contents of the cyst. The cyst with the evidence of a previous perforation is often the only apparent cause for the adhesions which occur in situations where fluid or contents from a ruptured cyst would tend to fall or accumulate. I have found at operation, in four instances, evidence of recent "hemorrhage" into the pelvis from this source. The situation and extent of these adhesions vary greatly in different cases. The pathologic conditions found at operation also vary and depend on many factors, such as the size of the cyst, its situation in the pelvis, whether unilateral or bilateral, the situation and extent of the adhesions

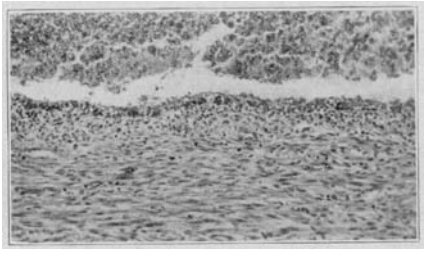

Fig. 6.—Photomicrograph of the wall of a hemorrhagic cyst (hematoma) present in an "adenomyoma" of the uterus. This hemorrhagic cyst is due to the retention of "menstrual" blood. It is lined by a single layer of epithelium, cuboidal on the left and low on the right. The epithelium rests on the uterine tissue with little or no evidence of an intervening "endometrial" stroma. The hemorrhagic contents of the cyst are shown retracted above the epithelial lining. Histologically, the lining of this hematoma (uterine) and the one shown in Figure 3 (ovarian) are similar.

and secondary changes associated with, or arising from, these, and finally other pathologic conditions in the pelvis which may occur in women of the same age incidence.

The size of the cysts has already been discussed. It is usually between 2 and 4 cm., occasionally larger; the largest one in this series was approximately 9 cm. in diameter. They are often bilateral, eight out of the twenty-three cases in this series; when unilateral, the right ovary was involved in nine, and the left, in six instances.

The structure or organ to which the cyst is adherent at the site of perforation varies. In this series of cases the posterior surface of the uterus was most frequently involved (Fig. 38); then the posterior surface of the broad ligament (Fig. 27); the peritoneum lining the side of the pelvis (Fig. 1), and in one instance the anterior surface of the broad ligament and the round ligament (Fig. 47), that is, any

organ or structure which may be in contact with the ovary or cyst at the site of perforation. There are two rather characteristic features about the gross appearance of these cysts after their removal. One is the perforation with a raw area of ovarian tissue about it, where it was adherent (Figs. 16 and 37), and the other is that these cysts usually differ from the ordinary retention cysts of the same size in that the walls are thicker, and after the contents have escaped, they stand apart and do not collapse to the same degree as do the others (Figs. 2, 17 and 28). The size of the perforation varies with the amount of trauma done at the time of operation in freeing the ovary. The situation of the perforation is of interest. I have always found it either on the lateral

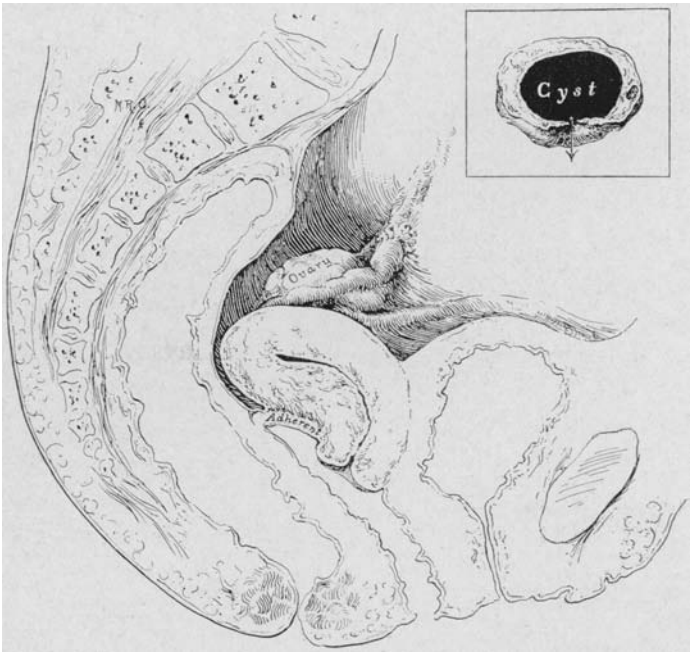

Fig. 7 (Case 10).—Perforating hemorrhagic cyst of the left ovary with adherent retroflexed uterus. Sagittal section of the pelvis; × ½. The cyst of the left ovary had ruptured, causing adhesions between it and the posterior layer of the left broad ligament and also between the posterior wall of the uterus and the anterior wall of the rectum. The histologic structure of the hemorrhagic cyst is shown in Figures 8, 9 and 10. Sections were not made of the adherent pelvic structures. Therefore, it was not determined whether or not adenoma of the endometrial type was present in these tissues.

surface of the ovary (Figs. 16 and 37) or on its free border (Fig. 28), and have never found it on the mesial surface. Even when adherent to the posterior surface of the uterus, the ovary has been turned upward so that its lateral surface was in contact with the uterus (Figs 37 and 43).

The appearance of the inside of the cyst varies in different specimens and often in different portions of the same specimen. In some instances,

nearly the entire inner surface is rough and brown owing to pigmentation from old hemorrhage. This is often true of the deeper portion of the cyst cavity (Figs. 16 and 17). In others, the lining of the cyst is for the most part smooth and gray, with or without areas of brown pigmentation or elevated red areas due to old or recent hemorrhages in the wall of the cyst. The smaller cysts of this series consisted of only one cavity while some of the larger ones were apparently multilocular with the loculi communicating with one another as though the cyst had ruptured into cystic follicles adjacent to it or there had been a fusion of several hematomas. Savage [3] has called attention to the tendency of "hemorrhagic follicles" to rupture internally into each other.

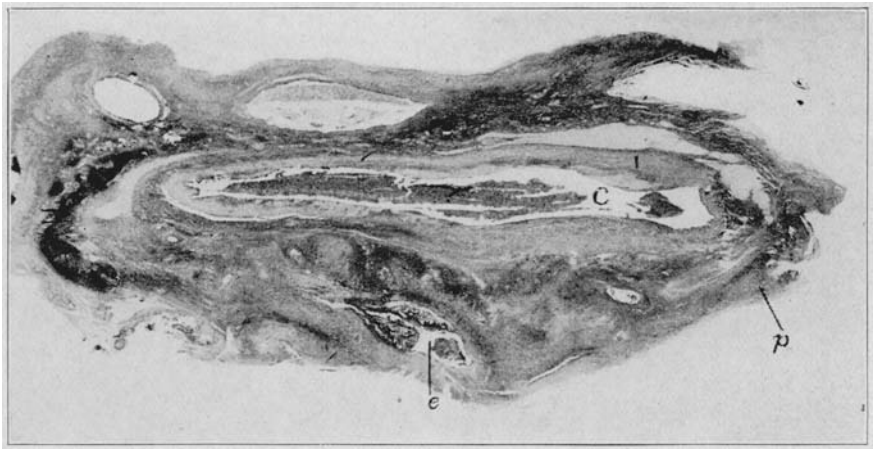

Fig. 8 (Case 10).—Enlargement (× 5) of a stained cross section of the ovary shown in the previous illustration. The cyst *c* is partially collapsed, with some of the "chocolate" contents still in its cavity. The wall of the cyst is for the most part lined by a single layer of epithelium (in places absent) which is low, cuboidal and columnar, and except near the site of perforation, lies directly on the ovarian tissue without an intervening stroma. In a few places, recent subepithelial hematomas are present and also in other places evidence of old hemorrhage as shown by pigmented cells. In the cyst wall near the site of perforation, a cellular stroma is present which contains glandlike structures lined by columnar epithelium, the picture resembling endometrium (Fig. 9). A small cyst or pocket is present lateral to the hemorrhagic cyst in which the lining more nearly resembles typical endometrium (Fig. 10).

Novak [6] has classified the various forms of ovarian hematomas thus: (1) follicular, including graafian follicle and atretic follicle; (2) corpus luteum, and, (3) stromal.

He believes that hemorrhage into atretic follicles is the most frequent form of follicular hemorrhage.

To this classification should be added a fourth variety of ovarian hematoma, namely, one lined wholly or in part by "endometrial tissue." Russell,[7] in 1899, published the report of a case in which uterine mucosa

7. Russell, W. W.: Aberrant Portions of the Müllerian Duct Found in the Ovary, Bull. Johns Hopkins Hospital **10**:8-10, 1899.

was found in an ovary. Lockyer [8] (page 328) pictures and describes a specimen of Semmelink and Joslin de Jong. The ovary was adherent to an "adenomyomatous" uterus. There was in the ovary a blood cyst lined in part by "adenomyomatous tissue" and with similar tissue in spaces in the periphery of the ovary. Casler,[9] in 1919, reported an unusual case in which a patient menstruated through the vagina after a conservative hysterectomy in which one ovary was saved. The uterus was removed for an "adenomyoma" which contained stroma but no glands. At the second operation, four years later, the enlarged ovary was removed and it was found to contain cavities lined by "normal uterine mucosa." Cullen,[10] in his recent article, "The Distribution of Adenomyomas Containing Uterine Mucosa," describes three specimens of ovaries containing uterine mucosa, one sent to him by Dr. Charles

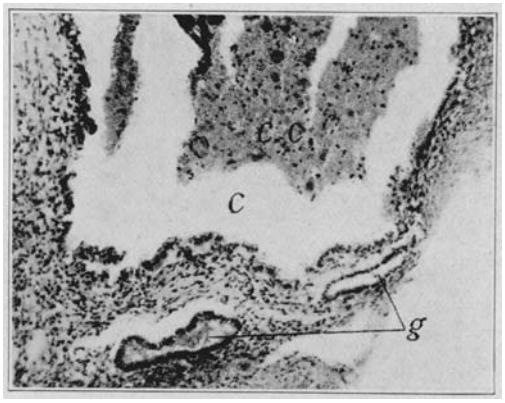

Fig. 9 (Case 10).—Photomicrograph (from another section) of the wall of the cyst *c* shown in Figure 8 near the perforation. This portion of the cyst is lined by a single layer of columnar cells resting on a cellular stroma. Glands (*g*) resembling uterine glands are also present in the stroma. *C* indicates the cavity of the cyst, and *C-C* its hemorrhagic contents. One would have little hesitation in calling this a hematoma of endometrial type and considering that the hemorrhagic contents are probably retained "menstrual" blood.

C. Norris,[11] another by Dr. Otto Schwarz, and the third of his own, the latter occurring in an ovarian cyst lined with a brownish membrane. In all these cases, the histologic picture was similar to that of normal endometrium. In the study of ovarian hematomas to determine whether or not the lining of the hematomas is of endometrial type, it would seem

8. Lockyer, Cuthbert: Fibroids and Allied Tumors, New York, The Macmillan Company, 1918.

9. Casler, D. B.: A Unique, Diffuse Uterine Tumor, Really an Adenomyoma, with Stroma, but no Glands. Menstruation After Complete Hysterectomy Due to Uterine Mucosa in Remaining Ovary, Tr. Am. Gynec. Soc. **44**:69-84, 1919.

10. Cullen, T. S.: The Distribution of Adenomyoma Containing Uterine Mucosa, Arch. Surg. **1**:215-283 (Sept.) 1920.

11. Norris, C. C.: Am. J. Obst. & Gynec. **1**:831-834 (May) 1921.

preferable to use as our standard of comparison not normal endometrium but ectopic endometrium in which there is a cyst (hematoma) formation due to the retention of "menstrual blood," similar to the condition in ovarian hematomas. We have abundant opportunity to study the variations in the appearance of the uterine mucosa in the hemorrhagic cysts or cavities, so often found in uterine "adenomyomas." These should be our standards of comparison in the study of ovarian hematomas because the physical conditions are similar. Even in the glandular hypertrophy of the mucosa lining the uterine cavity in which there is dilatation of the glands we may find these dilated glands lined by columnar, cuboidal and even low epithelium (Fig. 5). In the hemorrhagic cysts of uterine "adenomyomas," the epithelium may also be columnar, cuboidal, low, or in places it may be absent. Furthermore, in these cysts, the characteristic "endometrial stroma" may be very thin or even lacking entirely, the epithelium resting directly on the

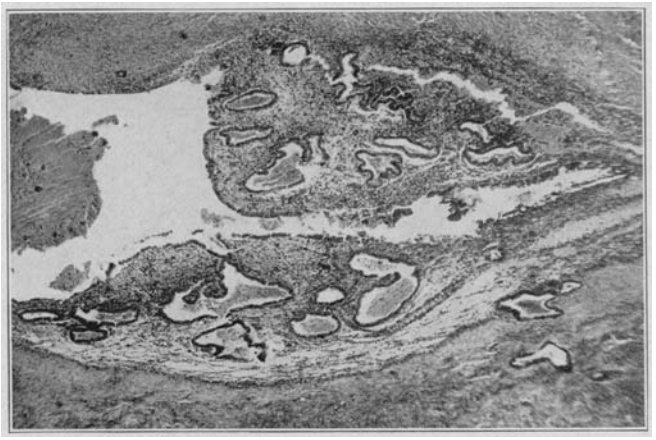

Fig. 10 (Case 10).—Photomicrograph of a portion of the pocket *e* shown in Figure 8. Histologically, the pocket is in part lined by "endometrial" tissue.

tissue of the uterine wall or the "myoma" (Fig. 6). In the ovarian hematomas that I am reporting, the histologic appearance of the portion of the cavities lined by epithelial tissue is identical with that of the uterine hematomas above mentioned except as altered by tissue peculiar to the ovary. These questions naturally arise: What is the source of this epithelium? Are these hematomas primarily of endometrial type or may an ovarian hematoma be secondarily lined by epithelium from another source?

Both Runge [12] and Wolf [4] have demonstrated the "epithelialization" of ovarian hematomas by the invasion of the "surface epithelium of

12. Runge, E.: Ueber die Veranderunger der Ovarien bei Syncytralen Tumoren und Blasenmole; Zugleich ein Beitrag zur Histogenese, Arch. f. Gynäk. **69**:33-70, 1903.

the ovary," through the opening caused by the rupture. Runge, by serial sections made through the place of rupture, demonstrated that the epithelium lining the cyst was continuous with that covering the surface of the ovary. Wolf's work confirms that of Runge, and he states that the epithelial cells invading and relining the cavity of the cyst may be low, cuboidal or columnar; when columnar it is due to lateral compression. He also believes that glandlike structures in the underlying stroma arise from a pushing downward of the overlying epithelium.

If these cysts are of endometrial type and if their epithelial lining arises from the invasion of the surface epithelium of the ovary through

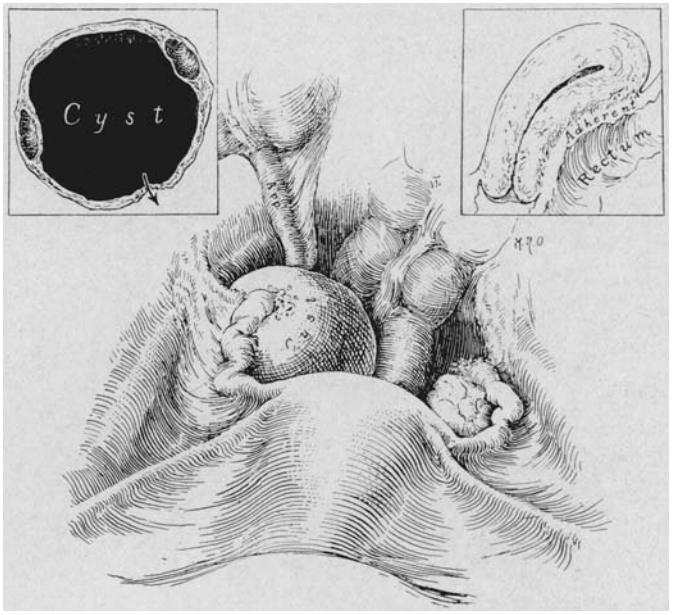

Fig. 11 (Case 5).—Perforating hemorrhagic cyst of right ovary with adherent retroverted uterus and adherent appendix. View of pelvic contents from above; × ½. The cyst of the right ovary had ruptured, causing adhesions between it and the side of the pelvis, and also between the posterior wall of the uterus and the anterior wall of the rectum. The tip of the appendix is firmly held in the pelvis by these adhesions. Only one section was made from the right ovary. This showed that the wall of the cyst in places was lined by cuboidal epithelium resting on ovarian tissue. Sections were not made from the raw areas created by freeing the uterus. Therefore, it was not determined whether or not adenoma of endometrial type was present in these tissues.

the place of rupture, we must conclude that a metaplasia of this epithelium occurs, by which it may not only assume the histologic picture of endometrial tissue but may even function as such. It may be possible that, following the rupture of the hematoma or whatever structure preceded the secondary epithelial invasion, misplaced epithelium of endometrial type was present in the periphery of the ovary at this site and this epithelium was stimulated to become invasive and reline the cavity of the hematoma. We often find glandlike structures

in the ovary, especially in its periphery, which are usually known as "cell inclusions." I believe that some of these glandlike structures are due to misplaced epithelium of endometrial type which under "proper" stimulation might become invasive and actually reline the cavity of the hematoma through the opening caused by the initial rupture, or by hemorrhage into the lumen of the gland they may develop into "endometrial" hematomas. In three patients, recently operated on by me during the menstrual period, small hemorrhagic elevations were noticed on the surface of the ovaries. These were excised or the ovary removed, and in each instance, they proved to be due to hemorrhage

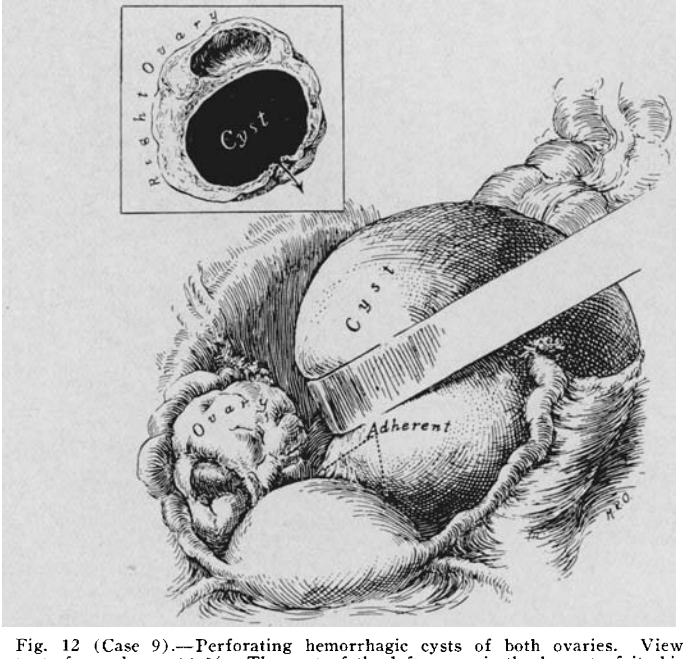

Fig. 12 (Case 9).—Perforating hemorrhagic cysts of both ovaries. View of the pelvic contents from above; × ½. The cyst of the left ovary is the largest of its kind I have seen, approximately 9 cm. in diameter. Both ovarian cysts had ruptured, the right ovary being adherent to the side of the pelvis and the left one to the posterior wall of the uterus, thus sealing their perforations. Only one section was made from each ovarian cyst, these showed that three cysts were in part lined by low to cuboidal epithleium. Pigmented cells, evidence of old hemorrhage, were also present in the walls of the cyst. Sections were not made from the cysts at the site of perforation.

about or into a space lined by tissue of endometrial type. I believe that this tissue was of endometrial type as shown both by its structure and by its function (menstruation).

In most of the specimens which I have examined it has been impossible to determine the exact nature of these cysts before the initial rupture. They may have been endometrial cysts at the start; or they may have resulted from an abnormal condition of a follicle by which a hema-

toma arose in a graafian, or atretic, follicle; or possibly following ovulation, an abnormal corpus luteum developed, due to the invasion of the epithelial tissue as above mentioned. With my present knowledge, I prefer to mention these possibilities rather than make definite statements which later may prove to be incorrect.

The cysts which I have studied histologically, twenty-six in number, may be arranged into three groups.

First, a cyst in which a portion, usually the deeper, is lined by a wavy pigmented "luteal" membrane in various stages of retrogession; while another portion of the cyst, often toward the site of perforation,

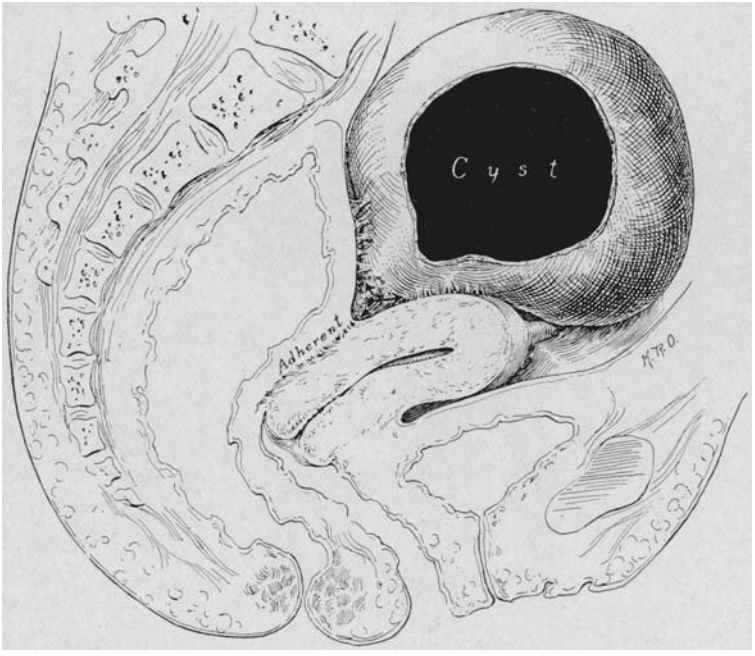

Fig. 13 (Case 9).—Sagittal section of the pelvis shown in Figure 12. The cyst of the left ovary is thin walled, the contents consist of dark hemorrhagic fluid like chocolate syrup. The anterior rectal wall is drawn forward and upward, having been firmly united to the lower half of the posterior wall of the uterus. Tissue was not removed from the posterior wall of the uterus or the anterior wall of the rectum to see whether or not adenoma of endometrial type was present.

is lined by epithelium, low, cuboidal, or columnar, resting on a vascular cellular stroma sometimes containing glandlike structures resembling uterine glands. In this stroma, one finds evidence of recent and also of old hemorrhage. The epithelial portion of the cyst strongly suggests misplaced atypical endometrial tissue both in structure and in function, namely, the evidence of periodic hemorrhage (menstruation). At the junction of the epithelial layer with the "luteal" layer the epithelium

can be seen flattened and riding up over the retrogressing "luteal" membrane (Fig. 20), also described and pictured by Wolf. With the retrogression of the "luteal" layer and the advance of the epithelial lining, the hematoma may be gradually converted into a hematoma completely lined by epithelium of the endometrial type. This group represents either the development of an "endometrial" cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it represents the regeneration of the epithelial lining of an "endometrial" cyst after a hemorrhage (menstrual), as indicated by the contents of the cyst, the pigmented "luteal" layer and the lesions in the pelvis. A good example of this group is shown in Figure 17.

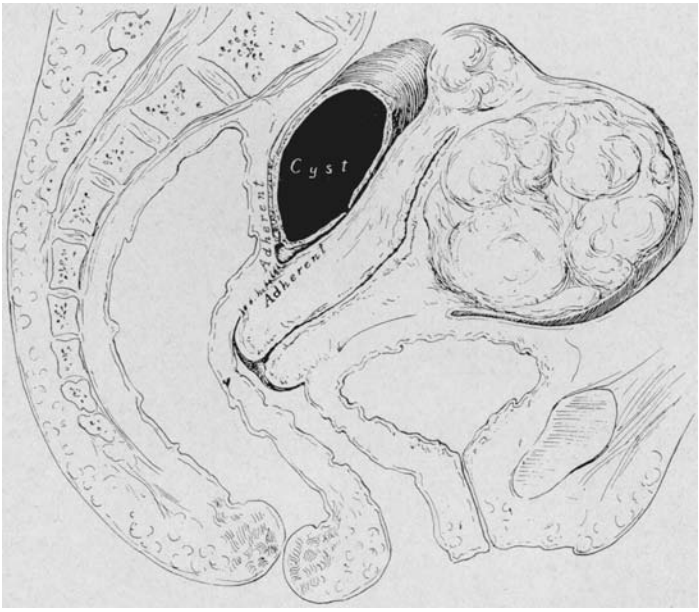

Fig. 14 (Case 8).—Perforating hemorrhagic cyst of left ovary, multinodular myomatous uterus, supravaginal portion of the cervix densely adherent to the anterior wall of the rectum. Sagittal section of the pelvis; × ½. The cyst had ruptured and the perforation was sealed by the posterior wall of the uterus to which the cyst had become adherent. Some of the contents of the cyst had escaped into the culdesac causing dense adhesions between the anterior rectal wall and the supravaginal portion of the cervix. The rectum is drawn upward and forward by these adhesions. Tissue from the posterior wall of the uterus was not examined to determine whether or not adenoma of endometrial type was present.

The second group may represent a later, or even an earlier, stage of the preceding. The cyst is lined by epithelium, low, cuboidal or columnar, often with a narrow, underlying, vascular stroma with occasional glandlike structures, most evident about the site of perforation. The entire cyst is like the epithelial portion of the cysts described in the first group. The picture suggests periodic hemorrhages in the recent hematomas in the subepithelial stroma and in the pigmented

cells in the same situation. A good example of this group is shown in Figure 28. All gradations between the first two groups may be found.

The third group (well shown in Figures 2, 3 and 4), and the smaller one, is more difficult to recognize as an ovarian hematoma of endometrial type. The cyst wall is composed of ovarian tissue which lacks a vascular stroma and in places may also lack a definite epithelial lining. When the latter is present, it is usually low to cuboidal and rests directly on the ovarian tissue. However, tissue of endometrial type is present in pockets in the periphery of the ovary about the perfora-

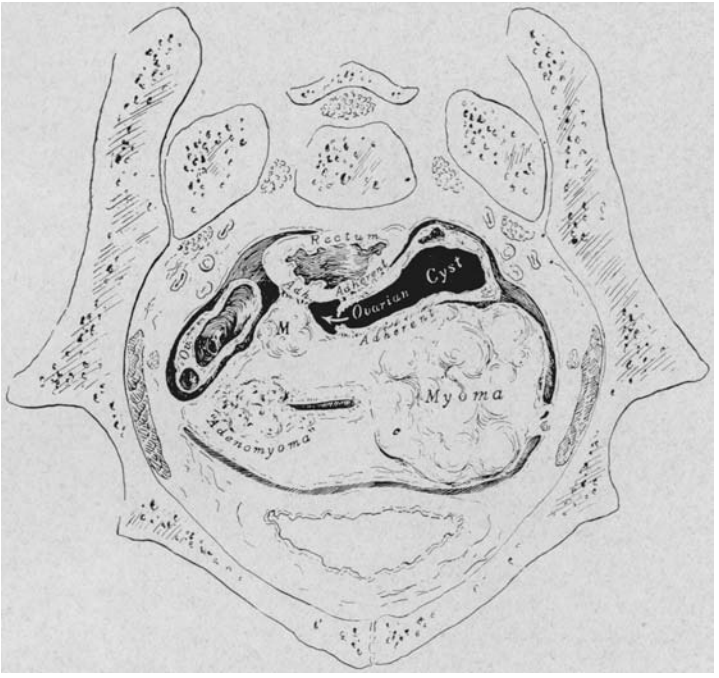

Fig. 15 (Case 4).—Perforating hemorrhagic cyst of the left ovary; multinodular myomatous uterus; "adenomyoma" in the right uterine cornu; adhesions; encapsulated cyst contents in the culdesac. Cross section of the pelvis; × ½. The cyst was badly torn in removing it, and the representation of pelvic contents was drawn from a sketch made just after the operation. Sections were not taken from the raw areas caused by the escape of the contents of the cyst and those made from the cyst were unsatisfactory.

tion. The exact counterpart of the lining of this ovarian hematoma may be found in some of the uterine hematomas occurring in "adenomyoma" of the uterus (compare Figures 3 and 6).

In studying any one of these cysts, certain questions naturally arise regarding the various stages in the development of the cyst prior to the present one and what would be its future stages if it had not been removed. Apparently, these cysts have a definite life history, with

variations, in which they pass through various stages of growth or development to be followed by various stages of retrogression by which the smaller cysts may "disappear" as they are apparently rare after the menopause. It is difficult to determine the duration of their life in any case. I believe it varies greatly in different cases and is not

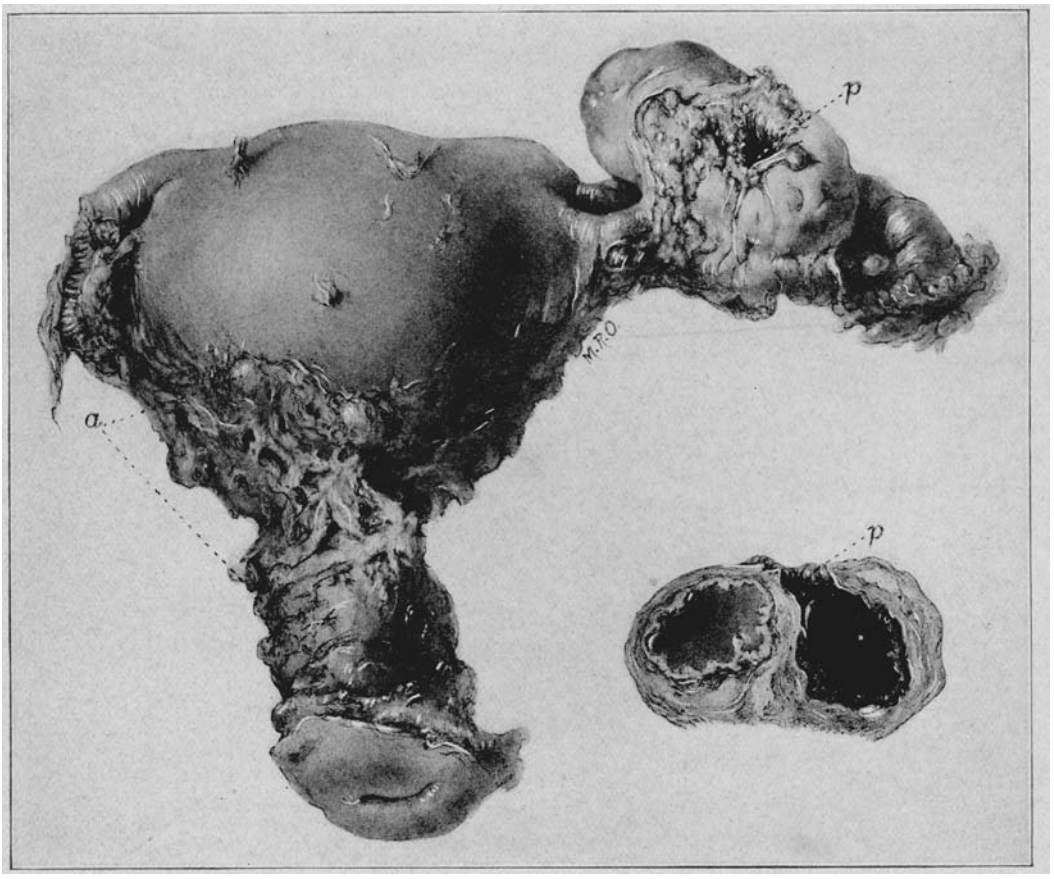

Fig. 16 (Case 21).—Perforating hemorrhagic cyst of right ovary; adenoma of endometrial type of the culdesac invading the posterior uterine wall and uniting it to the rectum. Posterior view of the uterus, right tube and ovary; × 1. Ovary is shown turned upward, with perforation on its lateral surface. A raw area is present about the site of perforation due to freeing the ovary from the side of the pelvis to which it was adherent. Longitudinal section of the ovary shows a corpus luteum in the proximal pole and a hemorrhagic cyst in the other. For microscopic sections of the cyst, see Figures 17, 18, 19 and 20. Adenoma of endometrial type, with discrete "adenomyoma" in places, were present in the greater portion of the raw area of the posterior wall of the uterus. Sections through the nodule indicated in the short "arm" of the "pointer" *a* apparently demonstrate the development of "adenomyoma" of the uterus from epithelium deposited on its peritoneal surface by the escape of the contents of the perforating hemorrhagic ovarian cyst into the culdesac (Figs. 21, 22, 23, 24 and 25).

necessarily of long duration. I hesitate to state what I believe their life history to be because I am not sure that I am correct. It is true that we may possibly be dealing with several different kinds of cysts,

but it is much more likely that most of the apparent different kinds represent various stages of growth or of phases (menstrual) in the life history of one variety.

One of the most interesting features associated with the ovaries containing these cysts is the clefts or pockets sometimes simulating small cysts, lined by epithelial tissue. These pockets are small and situated about the perforation, or they may be lateral to it. I have always found them on the lateral surface of the ovary or on its free border. The pockets are lined by epithelium of endometrial type and function; and the type may be more nearly normal than that lining its

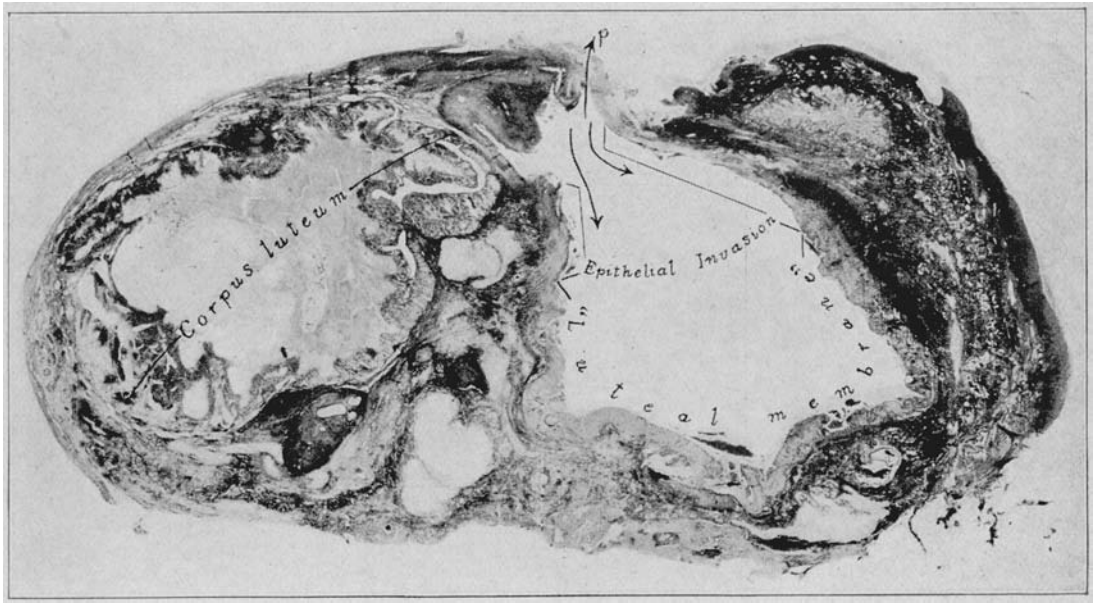

Fig. 17 (Case 21).—Enlargement (× 3) of a stained longitudinal section of the ovary. The deeper portion of the hemorrhagic cyst is lined by a thick, wavy, pigmented membrane. The rest of the cyst (toward the perforation) is lined by a single layer of columnar cells separated from the underlying ovarian tissue by a vascular stroma (Fig. 19). As the latter cyst lining approaches the pigmented "luteal" layer, its surface epithelium (now cuboidal or flattened) extends over the surface of the retrogressing "luteal" layer (Fig. 20). Tissue resembling typical endometrium (Fig. 18) is present both in the torn ovarian tissue within the perforation and in depressions on the surface of the ovary outside. Two interpretations of the picture could be made: first, following the initial perforation of the ovarian hematoma, epithelium of endometrial type situated in the ovary at the site of perforation was stimulated to invade the cyst and is gradually relining its cavity and converting it into an "endometrial" cystoma; or secondly, it represents the regeneration of the epithelial lining of an endometrial cyst after hemorrhage as indicated by the contents of the cyst, the pigmented "luteal" layer and the lesions in the pelvis.

associated hematoma (Figs. 4, 10, 30 and 58). Both the hematoma and the clefts or pockets are apparently part of the same process. The stimulus which causes the epithelial invasion of the hematoma or the development of an "endometrial" cyst also apparently causes the development of the clefts or pockets.

All phases of the hemorrhagic (menstrual) cycle may be observed in these hematomas and often in one hematoma. I judge the process of repair is not so rapid as in the mucosa of the uterine cavity, and the repeated hemorrhages may eventually destroy the cyst. The same hemorrhagic cycle may take place in the clefts or pockets as in the cyst proper. A "premenstrual" condition is well shown in Figure 28, as the patient was operated on the day that menstruation was due. Hemorrhage is present in the entire subepithelial stroma of the larger cyst and likewise in the clefts and pockets in the periphery of the ovary. All of the "endometrial" tissues of the ovary had responded to the "menstrual" impulse.

Evidence of old hemorrhage may be found in the pigmented cells in the subepithelial stroma of some of the cysts. As the "menstrual" process in these cysts is similar to that of the uterine mucosa the blood escapes into the cyst cavity by the rupture of the subepithelial hematomas. One can also see how "menstrual" blood might at times

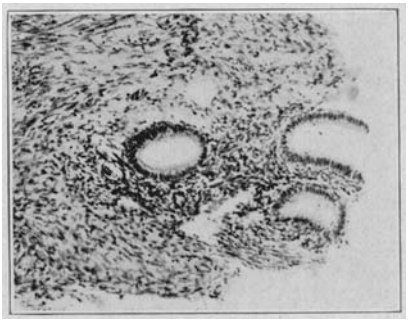

Fig. 18 (Case 21).—Photomicrograph of tissue in the wall of cyst at the site of perforation. Histologically, it resembles endometrium.

escape into the pelvis; either leak by the site of the original perforation; from a secondary perforation or from the endometrial tissue in the clefts or pockets. The "menstrual" blood escaping into the peritoneal cavity may carry with it some of the epithelium lining the cyst cavity, or similar tissue may escape from the endometrial pockets in the periphery of the ovary about the perforation. This epithelium may become implanted in the culdesac or other portions of the pelvis and there give rise to other foci of "endometrial" tissue. The mechanism of secondary perforations of the cyst can be easily explained by a subepithelial hematoma developing in a thin portion of the cyst, the rupture of the hematoma so weakening the wall of the cyst that a perforation would occur.

B. *The Adhesions Arising from the Escape of the Contents of These Cysts.*—I judge that the amount of the cyst contents escaping into the peritoneal cavity is usually small, and clinically, it is rarely accompanied by any subjective symptoms.

The adhesions occur about the ovary at the site of perforation and in different portions of the pelvis where there are naturally folds or pockets in which such material would be apt to lodge, as has been previously stated in this paper. They vary greatly in degree and extent and may be slight, as those resulting from a mild peritonitis of tubal origin or so dense as to simulate malignancy.

Savage [3] has described these adhesions and believed that they arose from a reactive inflammation due to the escape of the hemorrhagic contents of the cyst. Hedley [5] has also described them and mentioned one case in which there was such a marked inflammation of the cellular tissue of the culdesac as to lead to a diagnosis of cancer of the rectum. He obtained a pure culture of *Staphylococcus pyogenes albus* in two

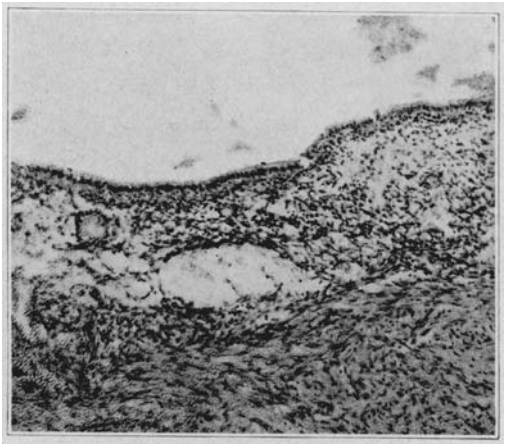

Fig. 19 (Case 21).—Photomicrograph of the wall of the cyst being relined or regenerated by the invasion of epithelium from the periphery of the ovary through its perforation or from epithelium not removed by the hemorrhage (Fig. 17). Histologically, the portion of the cyst marked "epithelial invasion" (Fig. 17) is lined by a single layer of epithelium with a vascular underlying stroma, in places containing pigmented cells evidence of past hemorrhages and in other places fresh blood evidence of a recent hemorrhage.

cases and suggests this organism as a cause. Both Savage and Hedley call attention to the lack of gross evidence of tubal inflammatory disease.

I began to study the cause of these adhesions in the year 1918. Cultures were made both from the cyst contents and also from the pelvic cavity after freeing the adherent structures. Eight cases have been studied in this manner, and the cultures were sterile in all. Agar and blood serum were used as culture mediums. Dr. George S. Graham, in 1918, injected some of the material, obtained aseptically from these cysts, into the peritoneal cavity of rabbits. It caused adhesions. This experiment was performed only in a few instances and was not controlled by injecting normal human blood.

I had planned to present a paper at the last meeting of the American Gynecological Society describing these cysts and the adhesions resulting from them. Some of the illustrations in the present paper were made from sketches prepared for the paper I had planned to read a year ago. At that time I believed that these cysts were "endometrial" hematomas and that the adhesions arose from the escape of "menstrual" blood into the peritoneal cavity. It differed from normal blood in that it was very irritating, and I thought that the irritation was probably due to some "digestive ferment." I still believe that these cysts are hematomas of endometrial type and their contents may be very irritating to the peritoneum. Up to that time, I had observed three patients with these cysts in which an "adenomyoma" of the posterior uterine wall was also present (Cases 2, 3 and 6 of this paper). The "adenomyomas"

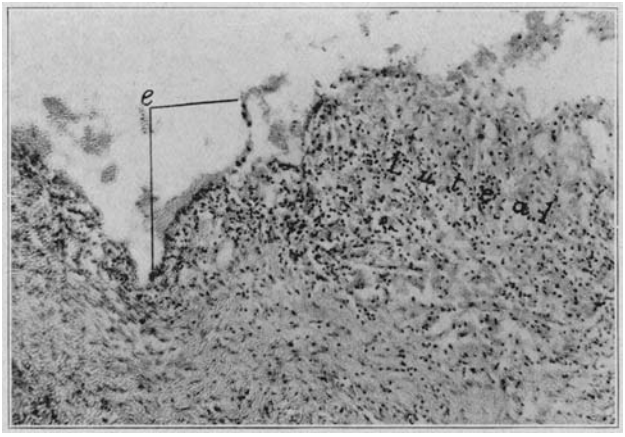

Fig. 20 (Case 21).—Photomicrograph of the wall of the cyst (Fig. 17) at the junction of the "epithelial" and "luteal" lining. The epithelial cells lining the portion of the cyst shown in Figure 19 have become cuboidal and flattened and can be seen extending (growing) over the retrogressing "luteal" layer. The "luteal" layer lacks an epithelial covering; and also the fibrous tissue lining found in typical corpus luteum hematomas. In time this cyst might be completely lined by "endometrial" epithelium as those shown in Figures 28 and 39.

had "apparently" extended through the peritoneal surface of the posterior uterine wall and obliterated the culdesac, fusing the uterus with the rectum. The "adenomyomas" were apparently not continuous with the mucosa of the uterine cavity. I considered these three cases as further proof that the ovarian hematomas associated with them were of endometrial type. Developmental anomalies are often multiple and at that time I regarded these as instances of misplaced "endometrial" tissue in both the ovary and the posterior wall of the uterus. The adhesions between the uterus and the rectum in these three cases were identical in character with other cases of perforating hemorrhagic cysts in which "adenomyoma" had not been observed. The tissue

involved in the adhesions in the latter cases had not been examined under the microscope and therefore adenoma cannot be excluded. I thought that the adhesions in the three cases arose, at least, in part, from the rupture of superficial subperitoneal "adenomyomatous" spaces of the uterine wall which had become overdistended with menstrual blood. This also afforded an opportunity for the invasion of the anterior rectal wall and offered an explanation of the development of "adenomyoma" in the rectogenital space. Sections made of the posterior uterine wall show the adenomyomatous spaces which had been torn open in freeing the uterus from the rectum (Fig. 63).

During the last year, I have examined microscopically all tissue involved in these adhesions except when conservative work was done. Adenoma of the edometrial type was found in this tissue in ten of the fourteen patients with perforating hemorrhagic cysts of the ovary

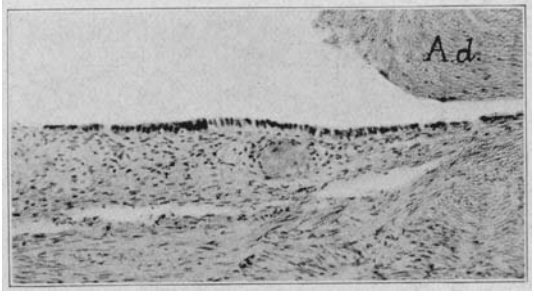

Fig. 21 (Case 21).—Photomicrograph of the posterior surface of the uterine wall near the nodule indicated in Figure 16. The surface of the uterus is here covered by columnar epithelium with an underlyng vascular stroma similar to that shown in the "relining" of the ovarian hematoma by the "epithelial invasion" (Fig. 19). *"Ad"* represents an adhesion on the surface of the uterus. This change in the surface of the uterus is due to the escape of the contents of the cyst into the culdesac. Does it represent an epithelial implantation carried with the contents of the cyst or an "endothelial" metaplasia from the "specific" irritation of the cyst contents on the peritoneal covering of the uterus? I believe the former.

operated on by me from May 1, 1920, until May 1, 1921. In the four cases in which it was not found, the adhesions were slight, conservative work was done and the tissue involved outside the ovary was not removed. During the month of May of this year, I operated on four patients with these cysts, and in all four adenoma of endometrial type was found in the pelvic tissue outside the ovary. These four specimens have not been sufficiently studied to be included in this paper. Of the twenty-three cases reported in this paper, pelvic adenoma of endometrial type was found in thirteen. In the remaining ten it was not found. I believe it might have been found in many, and possibly in all, of these ten cases had the tissue involved in the adhesions been carefully studied. It was examined microscopically in only one of these, and in that one not thoroughly enough to exclude adenoma.

All of the twenty-three cases reported in this paper were of value in the study of the clinical features of this condition, and in most of them a satisfactory histologic examination of the ovaries was made.

Only the thirteen cases in which the tissue involved in the adhesions was examined histologically and adenoma was found will be considered in the following discussion.

These cases may be grouped according to the distribution of the adhesions as follows:

1. Extensive adhesions in the culdesac obliterating the lower portion of it and uniting the cervix or the lower portion of the uterus to the rectum; with adenoma of the endometrial type invading the cervical and the uterine tissues and probably also (but to a lesser degree) the anterior wall of the rectum.

2. Adhesions between the uterus and the rectum with multiple discrete invasions of the posterior uterine wall by adenoma of the endometrial type.

Fig. 22 (Case 21).—Photomicrograph from another portion of the section shown in Figure 21. The epithelium is "sinking" into the underlying vascular stroma forming a dilated gland or bleb, apparently the second step in one form of development of adenoma of the endometrial type on the surface of the uterus.

3. Adhesions in the normal peritoneal folds associated with the development of adenoma of endometrial type, as, about the uterosacral ligaments; on the posterior surface of the broad ligaments between the tube and the ovarian ligament; on the anterior surface of the broad ligament between the tube and the round ligament, and in the vesicouterine reflection of peritoneum.

4. Discrete nodules of adenoma in the wall of the rectum and sigmoid.

To describe in detail the conditions found in these thirteen cases would be but a repetition of the legends accompanying the illustrations and it would not be done so well.

Group I. Extensive adhesions in the culdesac uniting the cervix or uterus or both to the rectum with adenoma of endometrial type, is represented in nine cases (Cases 2, 3, 6, 12, 13, 15, 19, 21 and 23).

In this group the material from the cyst escaping into the culdesac caused adhesions between the cervix or uterus and the rectum. The adenoma of endometrial type apparently develops on the surface of the adherent structures (Figs. 21, 22, 23 and 24), between the adhesions, especially on the posterior surface of the uterus or cervix, and later may become invasive. The cervix or uterus is invaded more often, and usually to a greater extent than the other adherent structures (Figs. 59, 61, 36, 26, 34, 42, 62 and 64). Possibly uterine tissue "attracts" the adenoma; it is better suited for its growth. In some instances, the adenoma penetrates the uterus with very little reaction on the part of the tissue involved (Fig. 59). In others, the reaction is great, causing a diffuse or localized thickening, namely, an "adenomyoma" (Figs. 38, 44, 62 and 64). Adenoma may also be present in the tissues which are adherent to the ovary (Figs. 44, 45 and 51).

Fig. 23 (Case 21).—Photomicrograph from another portion of the section shown in Figure 21. The dilated glands are completely embedded in the vascular stroma, which is thicker, apparently a third stage in one form of development of adenoma of endometrial type on the surface of the uterus.

The epithelial lining of the ovarian hematomas, of the clefts and pockets on the surface of the ovary is similar to that of the adenoma in the tissues to which the ovary is adherent and in the adherent structures in the culdesac (Figs. 39, 40 and 41). The process in all is apparently the same whether in the ovary, in the cystlike cavities of the adenoma of the uterus, cervix, large intestine or in any other tissue, but is altered by the tissues involved and by physical factors caused by the retention of "menstrual" blood.

The question naturally rises, Which is primary? The study of my material has convinced me that the ovary is the primary site. Two methods of extension of the "endometrial" adenoma must be considered. First, extension, of the growth by continuity, and in some of the specimens, this may have occurred, and the second is by the implantation of epithelial cells carried with the contents of the cyst or from the epithelial clefts and pockets in the ovary. The implantation is

analogous to the implantation of papilloma and cancer in the culdesac from the rupture of ovarian cysts containing these growths. The question of the origin of these secondary growths from metaplasia of the peritoneal endothelium due to the irritating action of the contents of the cyst will be considered later.

Group II. Peritoneal adhesions with multiple localized invasions of the uterine wall by adenoma.

This phenomenon was also observed in one of the cases of Group I (Case 21, Fig. 25). It was well demonstrated in Case 17, in which discrete "adenomyomas" were found in the posterior uterine wall beneath and about the adherent left ovarian hematoma (Figs. 44 and 46) and also the adenoma invading the uterine wall beneath the adherent right ovarian hematoma (Figs. 44 and 45).

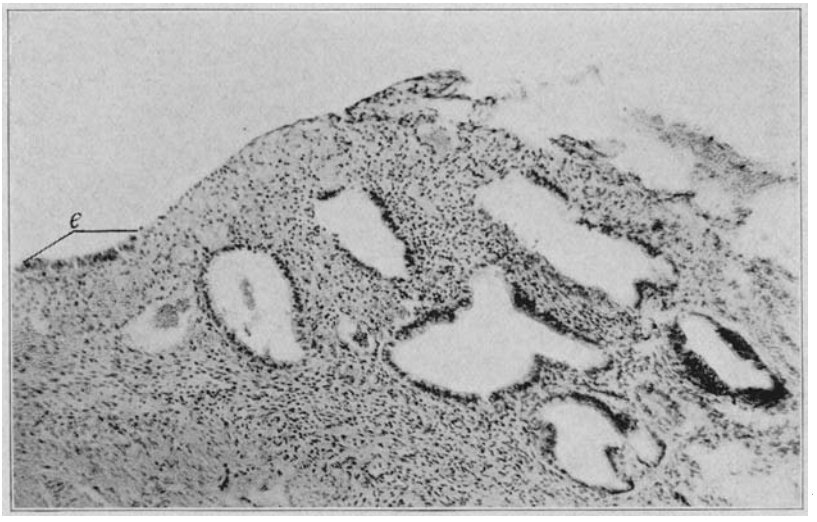

Fig. 24 (Case 21).—Photomicrograph from another portion of the section shown in Figure 21. There is a marked hypertrophy of both the glands and the stroma forming an elevation on the surface of the uterus. Columnar epithelium is present on the surface *e* as in Figure 21. This picture apparently represents a still later stage of development of the adenoma and is similar to the condition shown in Figure 41 (Case 15).

Group III. Adhesion in the normal peritoneal folds of the pelvis associated with the development of adenoma of endometrial type in this tissue, as, about the uterosacral ligament; on the posterior surface of the broad ligament between the tube and ovarian ligament; on the anterior surface of the broad ligament between the tube and the round ligament; in the vesico-uterine reflection of peritoneum and other similar folds where the contents of the ovarian cyst would be apt to lodge. There were two cases in this group, Cases 20 and 22. The illustrations, with their legends, of the specimens from these two cases

picture the conditions found better than any verbal description (Case 20, Figs. 71, 73 and 74, and Case 22, Figs. 65, 67, 68 and 69). There were three interesting conditions found in the specimens of these two cases.

One is the lesion present about the left uterosacral ligament in Case 20 (Figs. 71 and 72). There is a localized thickening of the peritoneum with puckering about its edges, and in this thickened area can be seen small pigment elevations, the surface of small cysts containing "old blood" (Fig. 72). Histologically, these cysts are small hematomas of endometrial type (Fig. 74). The second lesion is that occurring in definite peritoneal folds where the surfaces are adherent

Fig. 25 (Case 21).—Photomicrograph from another portion of the same section as the preceding (lower power). *B* is the small dilated gland or bleb shown in Figure 22. At 1 is the remains of epithelial tissue which had been almost completely "rubbed off" in removing the uterus. 1, 2, 3, 4 and 5 represent the invasion of the uterine wall by the adenoma. There is a marked (reaction) hypertrophy of the uterine tissue forming an "adenomyoma." This represents the final stage in the origin of "adenomyoma" of the uterus from epithelium deposited on its surface from the contents of a perforating hemorrhagic cyst of the ovary.

and an adenoma of endometrial type has developed (Figs. 65, 67 and 68). The adenoma developing in the adherent fold of peritoneum between the left round ligament and the anterior surface of the broad ligament had invaded the round ligament giving rise to an "adenomyoma" of that structure (Fig. 69). The third lesion is still more interesting, that is, blebs or small peritoneal cysts, some containing blood, scat-

tered over different portions of the specimen especially about the lesions in the adherent peritoneal folds (Fig. 68). Histologically many of these blebs are cystomas of endometrial type (Fig. 70). These blebs or cysts are very similar to the one shown in a pocket on the surface of the ovary near the perforation of the hematoma (Case 23, Fig. 50), and also in the development of adenoma on the surface of the uterus (Case 21, Fig. 22). The advocates of the serosal theory of the origin of adenomyoma would look on these specimens as supporting their views on the subject. A full discussion of this phase of the subject may be found in Lockyer's [8] work on fibroids and allied tumors, in his presentation of the serosal theory and his chapter on extra-uterine "adeno-

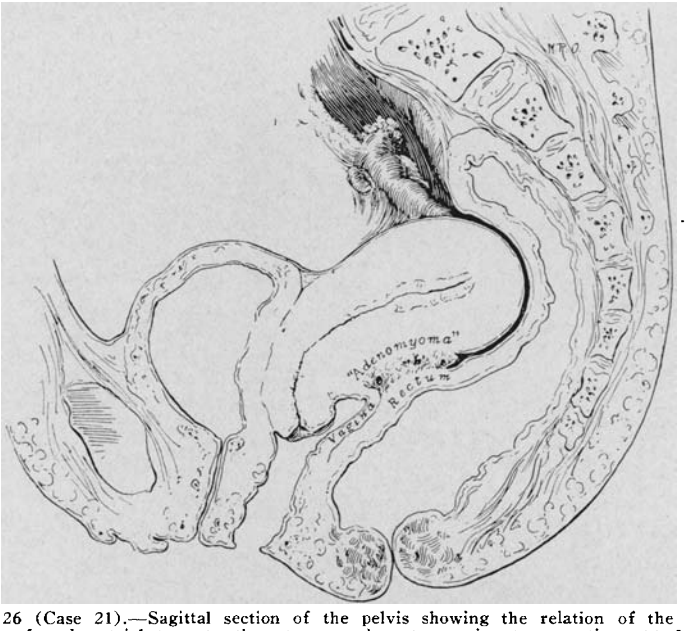

Fig. 26 (Case 21).—Sagittal section of the pelvis showing the relation of the culdesac adenoma of endometrial type to the uterus and rectum prior to operation; × ½. The adenoma arsing in the culdesac "due to the escape of the contents of the cyst" has invaded the posterior wall of the uterus forming an "adenomyoma" and has united this portion of the uterus to the rectum posteriorly. One can see how this growth might extend posteriorly through the wall of the rectum or down between the rectum and vagina or through the vagina presenting in the vaginal vault behind the cervix as in Figure 52, Case 24.

myoma." On pages 295 and 296, Lockyer expresses the following views of the advocates of this theory: "Heterotopy of serosal epithelium is the probable explanation of the existence of the epithelial spaces and cysts in most of the extra-uterine swellings found between the rectum and genital tract," and again he states that "it has also been conclusively shown that the connective tissue which surrounds the 'endothelial' inclusions can be excited to hyperplasia which causes it to assume the characteristic histological features of the stroma of the uterine mucosa."

Group IV. Discrete nodules of adenoma in the wall of the rectum or sigmoid.

These occurred in two cases (Cases 12 and 19). In Case 12 it was situated in the anterior wall of the rectum back of the adherent uterus (Fig. 62). It was distinctly palpated on rectal examination prior to the operation. The rectal mucosa was freely movable over it. It was also palpated during the operation but was not excised. A positive statement cannot be made as to whether or not adenoma was present. The patient was operated on, June 5, 1920. I examined her, May 23, 1921, and was able to detect it; but it had decreased in size

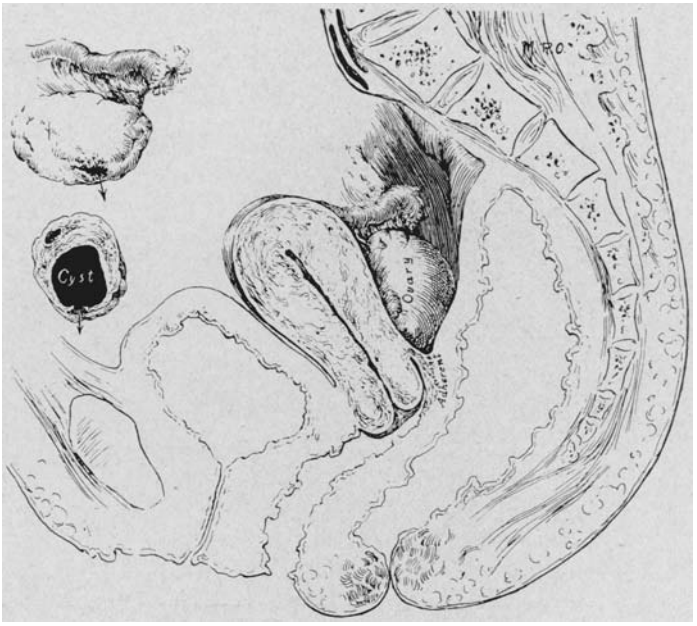

Fig. 27 (Case 13).—Perforating hemorrhagic cyst of the right ovary; ovary prolapsed and adherent; anterior wall of the rectum drawn forward by adhesions between it and the pelvic portion of the vagina. Sagittal section of the pelvis (× ½) showing the condition found at the first operation, June 28, 1920. Prior to the operation a small thickened area was palpated in the culdesac between the cervix and rectum. At operation, the right tube and ovary and the appendix were removed. Before leaving the hospital this thickened area was detected, and I realized that I had probably overlooked an adenoma of the endometrial type in the culdesac.

probably due to the cessation of ovarian function, as both ovaries and the entire uterus had been removed. The second case (Case 19) was even more interesting. In addition to the adenoma of endometrial type of both ovaries (Fig. 54), and the posterior uterine wall (Figs. 55 and 59), two distinct nodules were palpated in the sigmoid. The upper one was not in contact with the adhesions about the ovaries and the uterus. The upper nodule was the larger and was excised, and the intestine was repaired by an end-to-end suture. Sections of this nodule showed

that the adenoma had extended through the wall of the intestine into the submucosa and there formed small cysts dilated with "menstrual" blood. Adenoma of endometrial type was found on the serous surface of the sigmoid beneath an epiploic appendage and in all the coats of intestine to, and including, the submucosa. Apparently some of the contents escaping from the ovarian hematoma had carried with them some of its epithelium, which was deposited on the surface of the sigmoid and later invaded it. The further description of this case will be reported in another paper. The lower and smaller nodule was not excised. The patient made a satisfactory recovery and so far has remained well. I am waiting with great interest to see whether

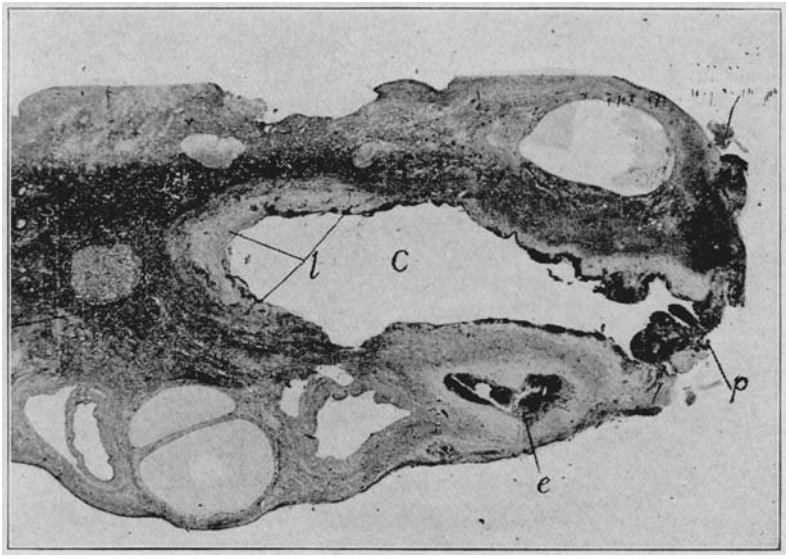

Fig. 28 (Case 13).—Enlargement (× 5) of a stained cross section of the ovary through the site of perforation. Patient expected to menstruate the day of the operation. It, therefore, represents a "premenstrual" condition. The chief features of interest are the larger collapsed hemorrhagic cyst *c*, the small cyst or pocket *e* (Fig. 30) and the ovarian tissue about the site of perforation *p* (Fig. 32). The wall of the cyst *c* is lined by epithelium, for the most part cuboidal, in places columnar, with a cellular stroma containing recent (premenstrual) hemorrhage which appears black in the picture. The columnar epithelial is most marked near the site of perforation where definite glandlike structures are present resembling uterine glands in cross section (Fig. 29).

or not the "adenoma" left in the sigmoid will cause her any further trouble. Both ovaries and the entire uterus were removed and I hope and expect that the cessation of ovarian function will cause any adenomatous tissue which was left in the pelvis to atrophy.

I believe that a large percentage, and possibly all, of the ovarian hematomas reported in this paper were of endometrial type. The microscopic findings in all those examined showed in places a lining

which resembled the lining of hematomas found in "adenomyomas" of the uterus, which apparently had arisen from the mucosa of the uterine cavity. The most typical endometrial formation was found in the portions of the hematomas about the site of perforation and in pockets or clefts in the periphery of the ovary about the same site. This would be expected, as in these situations the epithelial growth is not subjected to the pressure which is present in the hematoma proper. The hemorrhagic feature of these cysts is similar to that of menstruation both in its gross manifestations and in the presence of subepithelial hematomas in the lining of the cyst, with evidence of rupture into its cavity. The hematomas manifest their activity during the menstrual life of the patient as does also the uterine mucosa. In two patients operated on at the time of the menstrual period, one the day that menstruation was due (Case 13, Fig. 29) and the other the last day

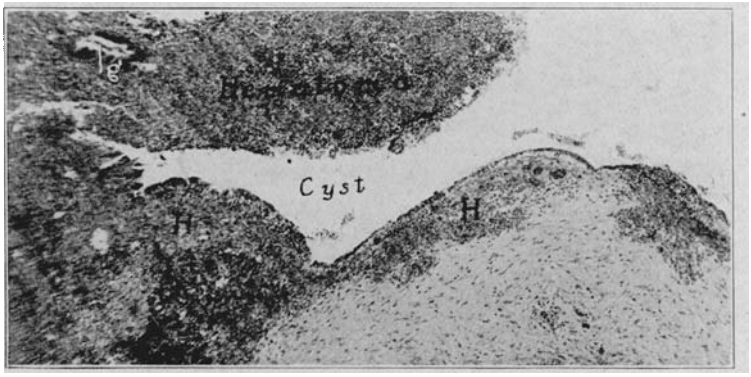

Fig. 29 (Case 13).—Photomicrograph of the wall of the cyst shown in Figure 28, *c*, near the site of perforation. The cyst is lined by cuboidal and columnar epithelium with moderate and extensive subepithelial hemorrhage (premenstrual). A structure resembling a uterine gland is present at *g*. The cyst is an ovarian hematoma of endometrial type.

of menstruation (Case 19, Fig. 57), the histologic changes in the ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient. The contents of the ovarian hematomas resemble old menstrual blood. The most important evidence that these ovarian hematomas and clefts or pockets are of endometrial type is the secondary development of adenoma of endometrial type in the tissues or structures which have become "infected" by material escaping from them. The adenoma in these secondary pelvic foci may more closely resemble normal uterine mucosa than the original ovarian condition and may, in importance, overshadow the latter. "Menstruation" occurs in these pelvic foci and they may be the source of a further extension of the growth, just as it extended from the ovary.

From the standpoint of its origin, "adenomyoma" of the uterus may be divided into at least two groups:

1. The generally recognized group in which the growth has apparently arisen from an invasion of the uterine wall by the mucosa lining the uterine cavity, namely, invasion from "within" the uterus.

2. "Adenomyoma" arising from the invasion of the serous surface of the uterus by adenoma of the endometrial type secondary to adenoma of the ovary, namely, invasion from "without" the uterus. Histologically, the two tumors are identical. The advanced stage of the latter may very closely resemble the former in its gross appearance (Figs. 62 and 64). I presume that it is possible for the adenoma arising on the surface of the uterus to penetrate the entire wall and even reach the mucosa lining the uterine cavity.

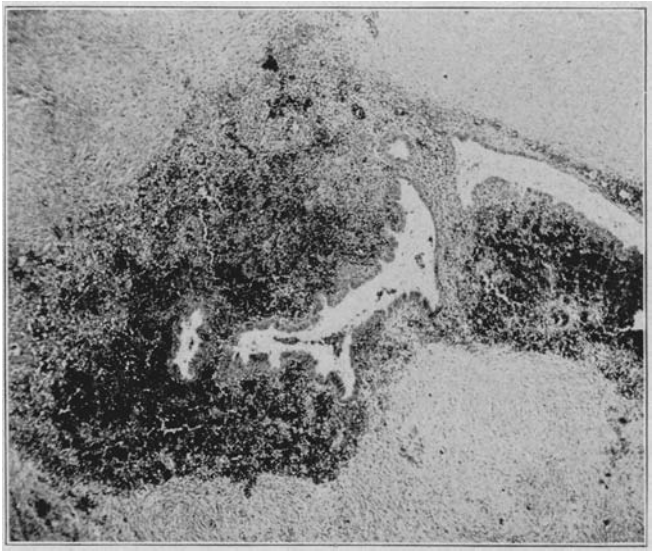

Fig. 30 (Case 13).—Photomicrograph of a portion of the small pocket shown at *e* (Fig. 28). The pocket is lined by columnar epithelium with extensive "premenstrual" hemorrhage in the underlying stroma (appearing black). The pocket is lined by tissue of endometrial type.

I do not know whether or not there is a third group of "adenomyoma" arising from misplaced endometrial tissue in the uterine wall or by invasion from "without" from other sources than the ovary.

Granted that these ovarian hematomas may give rise to secondary growths of adenoma of endometrial type in the pelvis, this question naturally arises, Are all ectopic pelvic adenomas of endometrial type secondary to a similar condition in the ovary? I cannot answer this question. The origin of "adenomyoma" of the uterus from the mucosa of the uterine cavity has just been mentioned. Do we find these

hematomas of the ovary in all other instances of ectopic pelvic adenoma of uterine type? In the thirteen cases of ectopic adenoma reported in this paper, hematoma of the ovary or ovaries in various stages of development and retrogression were found in all, and also in the four patients operated on by me during the month of May of this year and not included in this report. During the year, May 1, 1920, to May 1 1921, I operated on two patients with pelvic adenoma of endometrial type without gross evidence of hematoma of the ovaries. In both instances, a small area of thickening of the peritoneum was found in the culdesac. In this area, small cysts were present which were lined by columnar epithelium and a stroma resembling endometrial tissue—conditions similar to that shown in Figs. 71, 72 and 74. There was a puckered area on the lateral surface of one of the ovaries in

Fig. 31 (Case 13).—Photomicrograph of a dilated "gland" of endometrial type in the periphery of the ovary just above the pocket *e* (Fig. 28). Premenstrual hemorrhage (*H*) is present in the stroma about the "gland." All the "endometrial" tissue in the ovary had apparently reacted to the "menstrual" impulse.

each case, which on microscopic section showed a space in the periphery of the ovary lined by columnar epithelium and stroma resembling endometrial tissue. These spaces of endometrial type could be interpreted as the remains of an "endometrial" hematoma in which nearly complete retrogression had occurred or "endometrial" pockets or clefts which had functioned, namely, had menstruated, and the secondary pelvic adenomas had arisen from them. From my studies, I am inclined to consider them possibly as either one or the other of these. It is also possible that their origin was independent of the ovaries.

A review of the reported cases of ectopic "adenomyoma" in the literature is of little value in determining their relation to ovarian hematomas as the writers were especially interested in the "adeno-

myoma" and probably paid very little attention to the condition of the ovaries unless they were strikingly abnormal. Sammelink and Joslin de Jong's case (reported by Lockyer and already referred to) in which the "adenomyoma" of the uterus had "invaded" the ovary would admit of a reverse interpretation and also a similar case (Case 6) reported by Cullen.[10] In Mahle and MacCarty's [13] case of "adenomyoma" of the sigmoid from the Mayo Clinic, "tarry" cysts of both ovaries were found. In the description of Cullen's [14] reported cases of "adenomyoma of the rectovaginal septum" an occasional reference is made to the fact that a "corpus luteum cyst" was found in one or both ovaries (four of his eighteen cases). Further studies alone will determine to what extent ovarian hematomas are responsible for the development of pelvic adenoma of endometrial type and by them we will also be able to

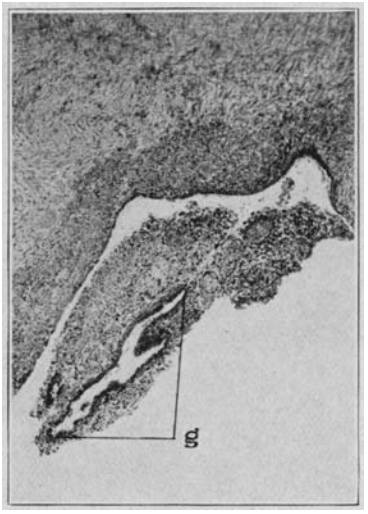

Fig. 32 (Case 13).—Photomicrograph of a "gland" of endometrial type in hemorrhagic tissue about the site of perforation *p* of the cyst shown in Figure 28. Such a gland as this might become detached during "menstruation" and, escaping into the culdesac, give rise to a secondary growth of endometrial type.

determine which lesions are caused by the epithelial tissue carried with the contents of the cysts and which ones by the irritating action of the contents aside from this epithelial tissue. There is such a great variation both in the invasiveness of the pelvic adenomas and also in their finer histologic appearance that one wonders whether they are all the same. These are all problems for further study.

13. Mahle, A. E., and MacCarty, W. C.: Ectopic Adenomyoma of Uterine Type (A Report of Ten Cases), J. Lab. and Clin. Med. **5**:218-228 (Jan.) 1920.

14. Cullen, T. S.: Adenomyoma of the Rectovaginal Septum, J. A. M. A. **62**:835-839 (March 14) 1914; Adenomyoma of the Rectovaginal Septum, ibid. **67**:401-406 (Aug. 5) 1916; Bull. Johns Hopkins Hospital **28**:343-349 (Nov.) 1917, and Footnote 10.

CLINICAL FEATURES OF TWENTY-THREE CASES

As has been mentioned earlier in this paper, this condition is a disease which develops during the menstrual life of women, especially from 30 years of age until the menopause. Only two of the patients were under 30, the youngest being 26. None had passed the menopause. The oldest was 47 years old. Twelve of the patients were from 30 to 40 years of age and nine from 40 to 47 years, inclusive. The age incidence corresponds to that of myoma of the uterus.

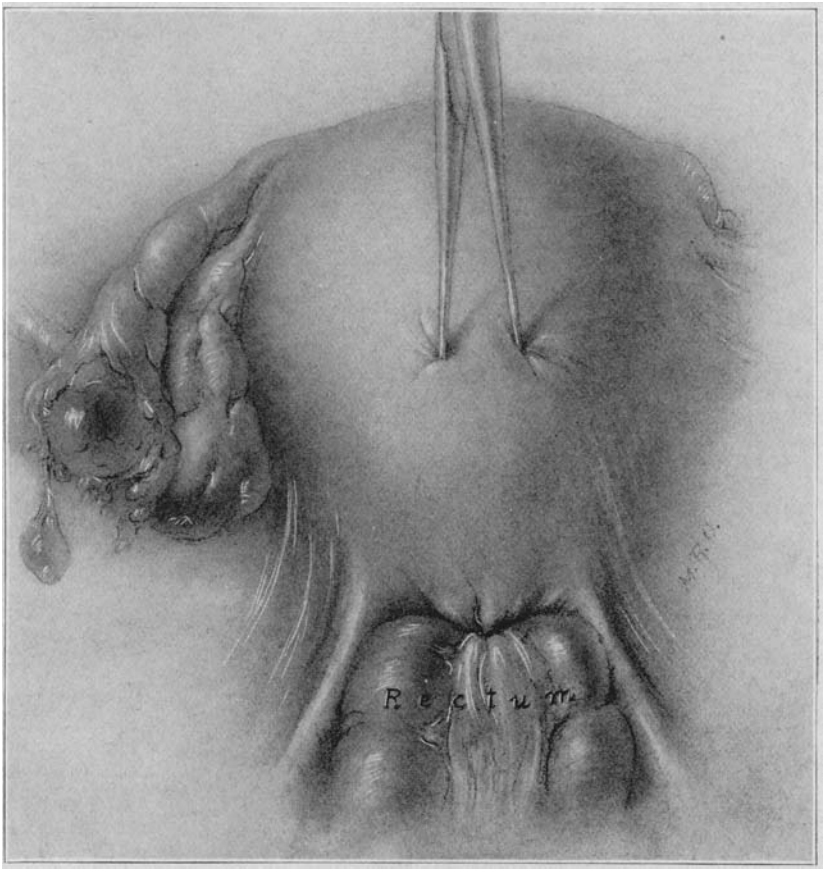

Fig. 33 (Case 13).—Condition found at the second operation, March 21, 1921. On drawing the uterus upward, the anterior wall of the rectum is carried with it as it is fused with the posterior wall of the cervix (Fig. 34).

Of the married women, fifteen in number, nine had never been pregnant. Of the six who had borne children, only three had had more than one. The shortest time that had elapsed since childbirth in any of these cases was five years. It would seem that this condition is likely to occur in women who were sterile; or if they had borne children, there was a subsequent history of sterility probably in part due to the age of the patient.

The most important factors in the origin of the subjective symptoms in these cases are the extent and situation of the adhesions and also other pelvic diseases which may be present. In some instances, other pelvic diseases are the more important conditions and in other cases the condition resulting from these cysts may predominate.

We are likely to find associated with these cysts any pelvic condition occurring in women from 30 years of age to the menopause. There are two possible exceptions in which a common age incidence does not

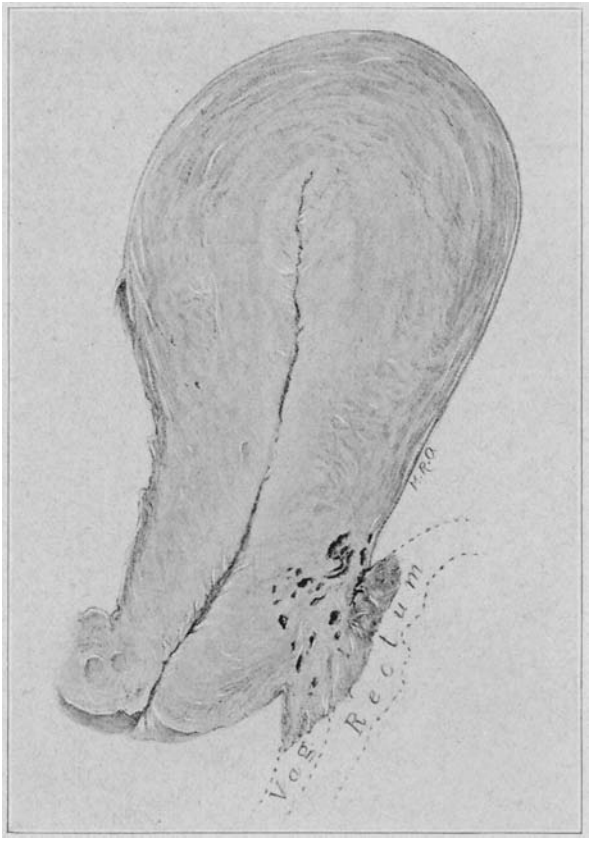

Fig. 34 (Case 13).—Adenoma of endometrial type involving the posterior wall of the cervix and the adjacent wall of the rectum. Sagittal section of the uterus removed at the second operation. The bottom of the culdesac has been obliterated by the adhesions resulting from or associated with the adenomatous growth and fusing the anterior rectal wall to the posterior wall of the cervix and the vagina. The adenomatous spaces have extended about half way through the cervix toward the cervical canal and have only slightly invaded the rectal wall and the vagina.

hold true; these cysts are more common in women who have not borne children, nine to six in the fifteen married women; they are apparently rare in women who have had salpingitis, a common condition in women over 30 years of age and also a common cause of sterility.

In not a single instance of the twenty-three cases reported in this paper was there any gross evidence of a recent or an old inflammatory disease of tubal origin; the fimbriated extremities of the tubes in all cases appeared normal and whatever adhesions were present about the tubes were of extratubal origin, that is, from the contents of the cyst.

The age incidence is that of uterine myomas which we would expect to find present in a large percentage of the cases; and this is true. Uterine myomas of varying size and numbers were found in ten of the twenty-three cases. In eight of these they were small and insignificant; in the other two they were larger (Cases 8 and 22) and gave rise to the tumor or condition for which the operation was undertaken. Even in these two cases the myomas were of secondary importance to the

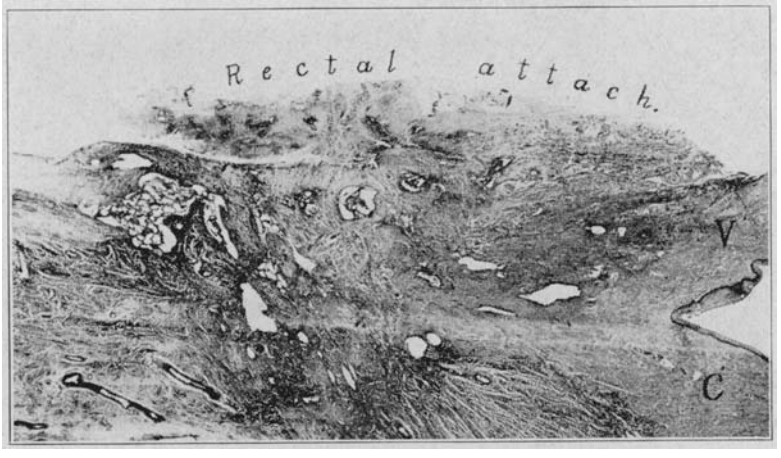

Fig. 35 (Case 13).—Stained longitudinal section of the posterior wall of the cervix (× 5) shown in Figure 34. The growth has extended about half way through the cervical wall and has only slightly invaded the rectum and vagina. Many varieties of adenoma and adenocystoma of endometrial type are present, as, areas resembling normal endometrium, glandular hypertrophy, small cysts with low, cuboidal, or columnar epithelium with, and without, a stroma between the epithelium and the underlying cervical tissue. No connection between the cervical mucosa and the adenoma was found.

adhesions resulting from the hemorrhagic cyst. Cancer of the uterine cervix was found once, and the condition resulting from the hemorrhagic cysts in this case was of minor importance (Case 20). Retroflexion or retroversion of the uterus was found in eleven instances, and in ten of these, adhesions between the uterus and the rectum were found. The condition under consideration must be looked on as a cause of adherent retroverted or retroflexed uterus, especially when the adhesions are situated between the rectum and the uterus.

The hemorrhagic cysts were usually small, from 2 to 4 cm. in diameter, only four were larger than 4 cm., the largest being approximately 9 cm., so the size rarely contributes to the subjective symptoms.

Also whether they are unilateral or bilateral probably has little bearing on these symptoms except as bilateral cysts may contribute to sterility. They were bilateral in eight of the twenty-three cases.

The situation and extent of the adhesions may or may not contribute to the subjective symptoms as in patients with adhesions due to other conditions. The menstrual history varied greatly. Painful menstruation was a symptom in eleven cases, while on the other hand, twelve of the patients menstruated without any pain. When one considers the many factors causing or contributing to dysmenorrhea,

Fig. 36 (Case 13).—Photomicrograph of a portion of the posterior wall of the cervix showing the invasion of the adenoma into the cervical tissues from the peritoneal surface of the cervix, i. e., from "without."

it is often difficult to determine the part played by any pathologic condition found in a single case. I believe adhesions due to these hemorrhagic cysts may cause painful menstruation, especially as in Cases 2, 4, and 22 in which the dysmenorrhea was of recent development and had increased in severity. The amount of the menstrual flow varied greatly in the cases in this series. It was moderate or scanty in fifteen, profuse in six and intermenstrual bleeding occurred

in two. In the six with profuse menstruation, intramural myomas were found in three; in two of which they were small, in two of the others a retroflexed uterus and hemorrhagic cyst were the only pathologic conditions present. In the sixth case, there was an extensive adenoma of the posterior uterine wall apparently not connected with the uterine mucosa. Of the two with intermenstrual bleeding, one had a cancer of the uterine cervix, in the other the pathologic conditions

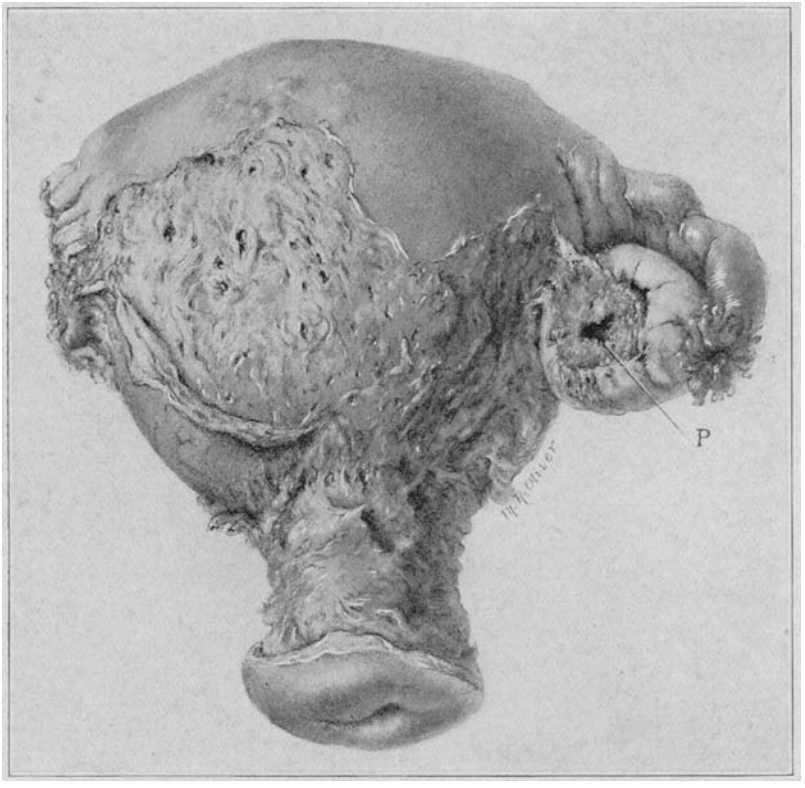

Fig. 37 (Case 15).—Perforating hemorrhagic cyst of the right ovary with diffuse superficial adenoma of endometrial type of the posterior uterine wall which had fused with the anterior wall of the rectum and the bottom of the culdesac. Posterior view of the uterus, right tube and ovary (natural size). The ovary had been freed at operation from the posterior surface of the uterus to which it was adherent. It is shown partially collapsed with a raw area and perforation in the center of it. The greater portion of the posterior wall of the uterus, represented by the large raw area, was adherent to the rectum and bottom of the culdesac. The small dark depressions and areas represent adenomatous tissue (blebs) (Fig. 41) which had been exposed or torn in freeing the uterus from the rectum and bottom of the culdesac and the ovary. The small elevations on the surface of the fundus above the large raw area represent superficial subperitoneal adenomatous blebs which had not been ruptured.

found were an adherent retroflexed uterus, bilateral ovarian hemorrhagic cysts and a small intramural myoma. It is very difficult to decide whether or not these cysts cause profuse or irregular (too frequent) menstruation.

Eight of the twenty-three patients did not have pain as a leading symptom. In three of these the adhesions were very extensive. Fifteen, however, did have pain. In three of these, the pain was probably due to trouble with the appendix. In the other twelve cases, the adhesions resulting from the ovarian cysts or cyst were the apparent cause of the pain. The pain varied in severity and location as does pain due to adhesions from any other cause. There is usually nothing characteristic about the pain present in this condition nor is there necessarily any relation between the extent of the adhesions and the severity of the pain. Only one patient gave a history of an acute onset with symptoms of peritonitis (Case 2). In all the others the onset was gradual. Four of the patients suffered greatly from constipation which amounted to partial obstruction in one instance (Case 19).

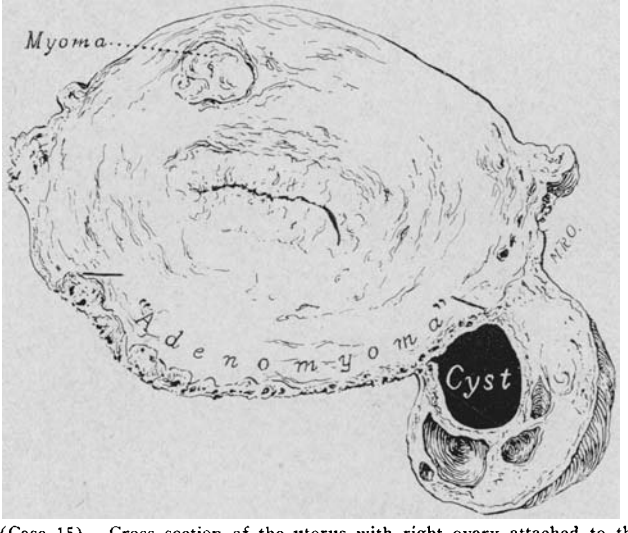

Fig. 38 (Case 15).—Cross section of the uterus with right ovary attached to the posterior uterine wall. The perforation in the ovary had been sealed by its attachment to the posterior wall of the uterus. The adenoma apparently beginning in the right ovarian cyst had extended across the entire posterior surface of the uterus at this level. There is a reaction of the uterine tissue about the glandular areas forming an "adenomyoma." Sections made through the entire uterine wall showed that the adenoma had invaded it only for the distance indicated in the illustration, and that none was found between this area and the uterine cavity.

Of the twenty-three patients, six presented symptoms due to other conditions and the hemorrhagic cysts were accidental findings. In seventeen of the twenty-three cases, the prominent symptom or symptoms were probably due to the cysts themselves or adhesions resulting from them. In twelve of the seventeen, pain was the one symptom from which the patient sought relief, in three increasing constipation, in one uterine bleeding and in one sterility.

SUMMARY OF CLINICAL FEATURES

The age at which such cysts with their sequelae occurs is usually between 30 years and the menopause.

There is often a history of sterility or of no children in several years. Sometimes there are not any subjective symptoms referable to this condition. If painful menstruation results, it is of the acquired variety, of recent development and may be progressive in severity.

If pain is present, it is not characteristic but varies in character as does pain associated with pelvic adhesions due to other conditions.

Sometimes constipation, worse at the menstrual period, is a suggestive symptom (Case 19). The symptoms of the advanced cases with narrowing of the lumen of the intestine are similar to those of intestinal obstruction due to other causes such as malignancy.

The physical signs vary greatly. If the cysts are small and adherent to the posterior surface of the uterus it may be difficult or impossible to detect them. If they are adherent to the posterior layer of the broad ligament or the side of the pelvis they are more readily palpated and

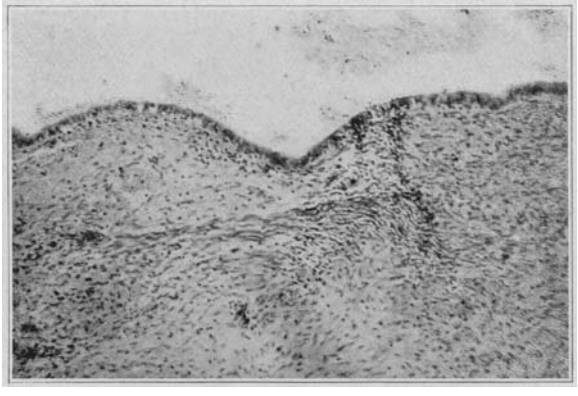

Fig. 39 (Case 15).—Photomicrograph of the wall of the hemorrhagic cyst shown in Figure 38. The entire cyst cavity is lined by a single layer of cuboidal or columnar cells with an underlying vascular stroma.

simulate adherent cystic ovaries or hydrosalpinx due to pelvic peritonitis of tubal origin. If the cysts are of medium size or larger and their adhesions are extensive the condition may simulate a malignant ovarian cyst (Case 9). The palpatory findings in the culdesac, when present, are the most characteristic physical signs. The uterus is often retroflexed or retroverted and adherent and the degree of adenomatous growth in the culdesac varies greatly in character in different cases. When slight, it is impossible to detect it. The involvement may be localized or diffuse. If localized, the area of induration may be flat or nodular, in the median line just behind the cervix or laterally in the region of the uterosacral ligaments. The induration is usually low down, but occasionally may be higher up. Sometimes it is best

detected on vaginal palpation and at other times felt best through the rectum. The diffuse and extensive involvement of the culdesac simulates the implantation of ovarian cancer or papilloma in this situation. The implantation from the latter source, however, is usually more extensive and much thicker.

The extensive involvement of the rectogenital space by "adenomyoma" is well described by Lockyer [8] in his excellent work on fibroids and allied tumors and by Cullen [10] in his published cases of "adenomyoma of the rectovaginal septum."

From this it can be seen that it is possible to make a tentative and often a probable diagnosis in a large percentage of the cases prior to operation. As we may diagnose a papillomatous or malignant ovarian cyst by palpating a cystic pelvic tumor which is usually

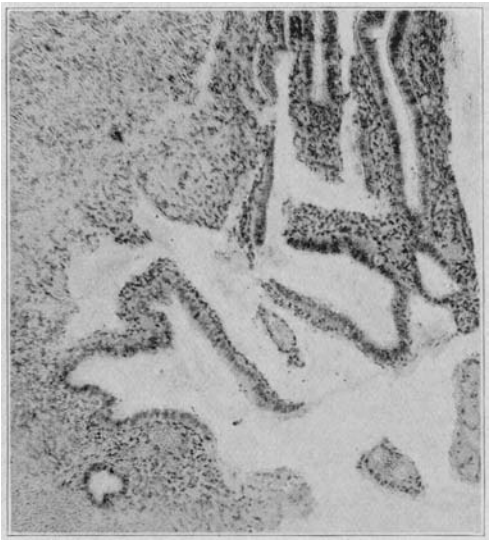

Fig. 40 (Case 15).—Photomicrograph of a cleft in the ovary near the site of perforation of the cyst. The cleft is lined by tissue of endometrial type resembling the normal endometrium more closely than that lining the cyst.

adherent and in addition find "involvement" of the culdesac due to the implantation of the growth in that situation, in like manner we are often able to diagnose this type of ovarian cyst with its secondary involvement of the culdesac. It differs from the malignant growth in that the ovarian tumor is usually much smaller, the culdesac involvement usually less and more localized, appearing as a nodule of localized thickening. The general clinical picture also is not that of malignancy.

TREATMENT

The operative treatment of any pelvic condition must be determined by many factors, such as the pathologic condition present, the age of

the patient, her desire for conservative surgery, the results of the operative treatment of similar conditions and especially the natural course of the disease when no operation was performed. There are obviously two pathologic conditions to treat, the one present in the ovary or ovaries, and the secondary adhesions in the pelvis which are often associated with an adenoma of endometrial type, the latter varying greatly in the degree to which it has invaded the tissues and organs involved.

One would suppose that with the establishment of the menopause ovarian function would cease and that then the tissues of endometrial type, wherever situated, would not only cease to grow but would actually atrophy. I believe this is the rule; undoubtedly, there may be

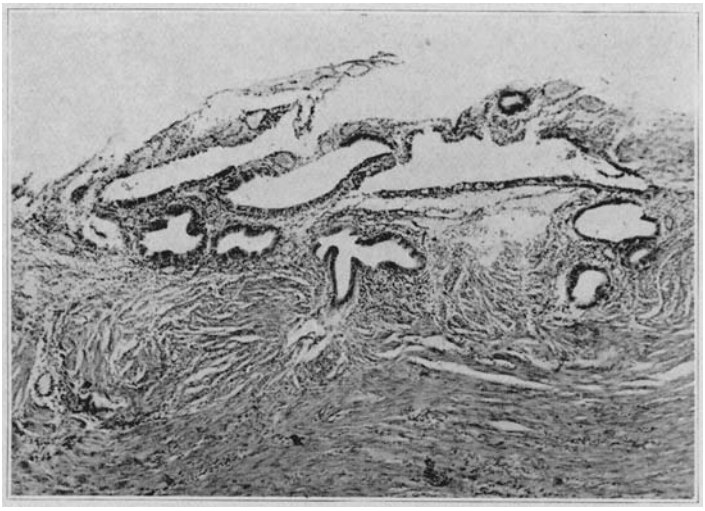

Fig. 41 (Case 15).—Photomicrograph of a section of the posterior uterine wall showing adenoma of endometrial type on its surface similar to that shown in Figure 24 (Case 21). As indicated, it is beginning to invade the uterine wall. The process in the ovarian hematoma, in the clefts of the ovary about the site of perforation, and the posterior surface of the uterus are the same, namely, an invasive adenoma of endometrial type. Apparently, the uterine involvement is secondary to the ovary by direct extension or implantation from the epithelial contents of the cyst.

an occasional exception. I have never found one of these cysts or a pelvic adenoma of endometrial type in a woman after the menopause.

To remove the pelvic adenoma and disregard the ovarian condition would be to leave the original growth behind, and furthermore, the persistence of the ovarian function might increase the growth of secondary pelvic adenomas not removed. *Certainly we would not sanction the surgical judgment of the operator who removed the secondary peritoneal implantations of ovarian papilloma or cancer and did not remove the primary ovarian tumor.* The conditions are analogous except that fortunately the adenoma of endometrial type

is only rarely sufficiently invasive to cause serious damage to the parts involved. By referring to the report of the cases in this article, one may see that various operations have been performed.

In some of the conservative operations, only the diseased portions of one or both ovaries have been removed (Cases 14 and 16). In others, one tube and ovary have been removed without excising the pelvic tissue in which adenoma was probably present (Cases 9, 10, 11 and 13). In still others, the entire uterus was removed, leaving behind one tube or ovary or a portion of an ovary and pelvic tissue was removed at the same time, which showed adenoma of endometrial type (Cases 15, 18 and 21). In the last group of cases, adenomatous tissue was undoubtedly left in the pelvis.

Fig. 42 (Case 15).—Sagittal section of the pelvis showing the relation of the "adenomyoma" to the uterus, rectum and vagina prior to the operation. The adenoma involves the superficial portion of the posterior uterine wall and has united it to the anterior wall of the rectum and posterior wall of the vagina. The upper part of the vagina has been pulled away from the rectum by the retroflexion. One can see how the adenoma would easily grow down between the rectum and vagina, invade the vaginal wall, and present in the vaginal vault behind the cervix, as in Figure 52 (Case 23).

In one of these conservative cases, a second operation has been necessary (Case 13); and in this instance, the adenoma in the culdesac had increased in size in less than a year's time and necessitated a radical operation. I believe that some of the other cases, in which I have employed conservative surgery, may later require secondary radical operations as Cases 10 and 11. Casler's [9] case already referred to is an extreme example of the possible result of conservative surgery in these cases. Only the end-result in a large number of cases of

conservative ovarian surgery will show whether or not it is justifiable. Even if it proves to be justifiable, I am sure that an occasional patient will require a secondary radical operation. It is possible that the rupture of the cyst at operation may "infect" the pelvic tissues with the epithelial contents of the cyst and that the retained ovary or ovaries may stimulate it to further growth.

I have never resorted to the extremely radical operations, as in cancer of the uterine cervix, and even in these operations it may be

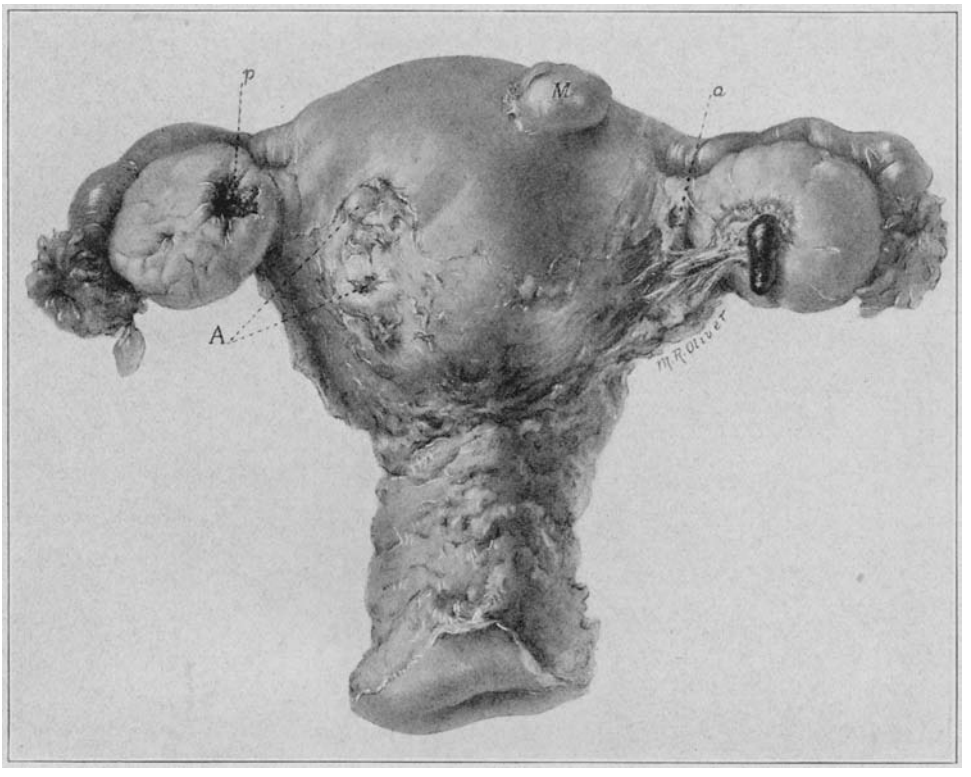

Fig. 43 (Case 17).—Perforating hemorrhagic cysts of both ovaries with discrete "adenomyomas" of the posterior wall of the uterus. Posterior view of the uterus, tubes and ovaries (natural size). At operation both ovaries were adherent to the posterior surface of the uterus. The left ovary is partially collapsed, due to the escape of the contents of the cyst; the raw area with perforation in the center is shown. The contents of the hematoma of the right ovary was thicker than that of the left and is indicated as oozing from the perforation. At and about the surface of the uterine wall which was adherent to the left ovary can be seen slight elevations (*A*) which proved to be superficial "adenomyomas" (Fig. 46). Adenoma of endometrial type was found developing between the adherent right ovarian ligament and the surface of the uterine wall at *a*, Figure 45. Sections were taken from other portions of the uterine wall and adenoma was not found.

impossible to remove all of the adenomatous growth. In the radical operations which I have employed, I have removed the entire uterus with both ovaries, and in freeing the uterus from the rectum, I have purposely kept close to the uterus, undoubtedly sometimes leaving adenoma in the rectal wall. In freeing the cervix laterally, I have

kept close to it, in one case intentionally leaving adenoma in the broad ligament because it was too extensive to remove (Case 12). Only the end-results of a large number of cases will show whether or not this type of radical operation is the one of choice. Undoubtedly, in any type of operation, no matter how radical, adenomas may sometimes be left in the pelvis, but with the removal of all ovarian tissue, I believe it will usually cease to grow and may atrophy (Cases 2, 3, 6 and 12).

In one instance (Case 19), I removed the entire uterus, both tubes and ovaries, a portion of the sigmoid; and in this case, adenoma was undoubtedly left in the anterior wall of the rectum and a distinct nodule in a portion of the sigmoid was not removed. I am anxiously awaiting the end-result in this case. So far she has been completely relieved and feels perfectly well.

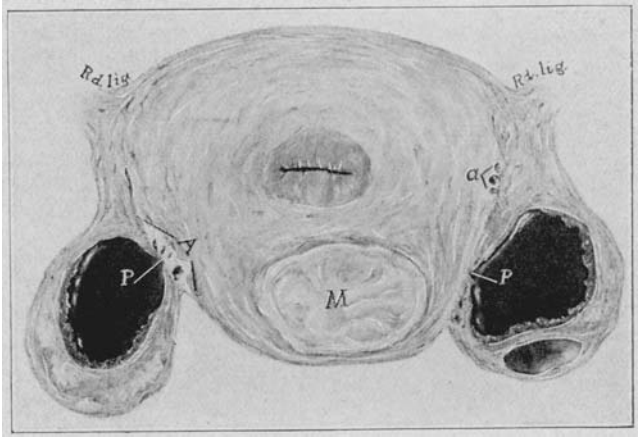

Fig. 44 (Case 17).—Cross section of the uterus and ovaries showing their relation prior to the operation (natural size). The ovaries are adherent to the posterior surface of the uterus at the site of perforation. The deeper portions of the ovarian cysts were lined by a wavy pigmented layer without an epithelial covering, while the proximal portions (toward the perforations) were lined by low, cuboidal and columnar epithelium, i. e., possibly a secondary "epithelialization" from the surface or periphery of the ovary about the site of perforation or regeneration of the epithelial lining of the cyst after hemorrhage, as in Figure 17. Adenomas of endometrial type were also present in the periphery of the ovary. Discrete superficial adenomyomas (*A*) are situated in the posterior uterine wall beneath the adherent left ovary at the site of perforation (Fig. 46), and adenoma of endometrial type is found developing between the right ovarian ligament and the uterine wall at *a* and invading the latter (Fig. 45).

There seems to be a great variation in the degree of "invasiveness" of the secondary pelvic deposits which is often evident in the individual case at operation. My present plan is to employ ovarian conservatism (excising the portion of the ovary or ovaries involved) or removing only the apparently diseased ovary in patients who desire to have the ovarian function maintained but only if the invasion of the pelvic tissues by the adenoma is slight. I am anxiously waiting to see

whether the end-results will justify this stand. I am inclined to believe that ovarian conservatism is a rather dangerous experiment. In all other cases, either when ovarian conservation is not strongly desired or when the pelvic growth is apparently actually invasive, I believe that all ovarian tissues should be removed and as much as possible of the pelvic growth with it. We must not lose sight of one fact, and that is that for many years we have been operating on these patients without realizing the exact nature of the disease. On the whole, the results have usually been quite satisfactory because the growth is usually only mildly invasive. With a better knowledge of this subject and by following up our cases, we should soon be able to determine the proper treatment of this condition

REPORT OF CASES

CASE 1.—*Perforating hemorrhagic cysts of both ovaries; multiple leiomyomas of the uterus; dense adhesions in the culdesac uniting the anterior rectal wall to the supravaginal portion of the cervix and the lower portion of the uterus. The induration of the anterior rectal wall was so great as to simulate malignancy.*—Mrs. M. G., aged 46, complained of an abdominal tumor, of six

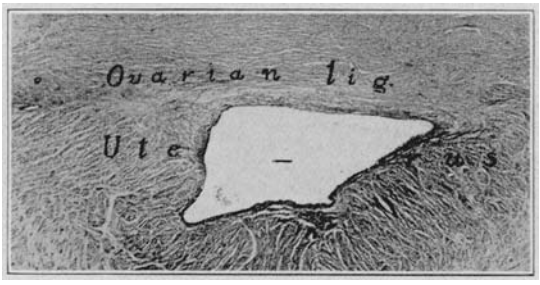

Fig. 45 (Case 17).—Photomicrograph of adenoma of endometrial type developing between the adherent right ovary and the uterus (Figs. 43 and 44). The adenoma can be seen sinking into the uterine wall.

months' duration, and constipation. She had never been pregnant; menstruation had been more profuse lately but regular and without pain. Pelvic examination revealed an adherent irregular "uterine" tumor, extending half way to the umbilicus. The preoperative diagnosis was a multinodular myomatous uterus, associated with pelvic adhesions, probably of tubal origin.

Operation at the Albany Hospital, March 5, 1910, demonstrated a multinodular myomatous uterus with adherent bilateral hemorrhagic ovarian cysts. Further details of this case have already been described in the text of the article in the section on incidence. The ovarian cysts and posterior wall of the uterus were not examined microscopically.

CASE 2.—*Perforating hemorrhagic cysts of both ovaries; "adenomyoma" of the posterior wall of the uterus, adherent to and invading the anterior wall of the rectum.*—Miss B. K., aged 37, complained of profuse menstruation and indefinite pains in the lower abdomen. The menstruation was regular, profuse,

more so lately, and accompanied with severe pain. Pelvic examination revealed the uterus to be slightly enlarged and apparently adherent, with "inflammatory masses" on each side. Preoperative diagnosis was a myomatous uterus (probably an intramural myoma) with chronic "inflammatory disease" of the tubes and ovaries.

At operation at the Albany Hospital, March 27, 1912, an enlarged uterus was found adherent to the rectum with adherent moderate sized ovarian cysts. On freeing the latter, "chocolate" fluid escaped. The uterus was freed from the rectum with great difficulty. The appendix, both tubes, ovaries and uterus were removed. The tubes appeared normal, both ovaries had been converted into cysts approximatey 4 and 6 cm. in diameter. They were not examined microscopically. The posterior portion of the posterior wall of the uterus was occupied by an "adenomyoma" which apparently was not continuous with the mucosa of the uterine cavity. The "adenomyoma" had "extended through" the uterine wall posteriorly and apparently had actually invaded the anterior wall of the rectum (Fig. 64). In freeing the uterus from the rectum, some of the growth was probably left attached to, or in, the rectal wall. The patient made a satisfactory convalescence and has remained well even though it is doubtful whether all the adenomatous tissue was removed at operation.

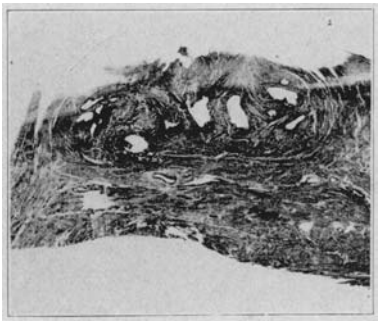

Fig. 46 (Case 17).—Enlargement (× 5) of "adenomyoma" situated in the posterior wall of the uterus beneath the adherent left ovary (Figs. 43 and 44). Several sections were made of the posterior uterine wall and adenoma of endometrial type was found only in the portions of the uterine wall to which the ovaries were adherent, suggesting an intimate relation between the adenoma of endometrial type of the ovary and that developing in the uterine wall.

CASE 3.—*Perforating hemorrhagic cysts of both ovaries; adherent retroflexed uterus; adenoma of endometrial type invading the posterior wall of the uterus and uniting it with the anterior wall of the rectum.*—Mrs. C. A. D., aged 37, complained of pain of one year's duration in the left side of the lower part of the abdomen. She had been in bed ten days at the onset of the pain. The diagnosis of "peritonitis" was made at that time. She had been married eleven years, had two children, 10 and 8 years of age, and no miscarriages. The menstruation was regular, moderate and normal, the last flow being a week before the operation. Pelvic examination revealed the uterus to be retroflexed, adherent, with probable cystic inflammatory masses on each side. Preoperative diagnosis was an adherent retroflexed uterus with bilateral hydrosalpinx or adherent cystic ovaries.

At operation at the Albany Hospital, April 26, 1912, an adherent retroflexed uterus was found with adherent cystic ovaries. On freeing the latter, "chocolate"

fluid escaped. The uterus was freed from the rectum with difficulty. The appendix, both tubes and ovaries and the uterus were removed. The tubes appeared normal; each ovary contained a hematoma, the one in the left ovary being the larger (about 3 cm. in diameter). Histologically, the epithelial lining of the cysts was for the most part lacking. When present, it was low, cuboidal, resting on ovarian tissue without any intervening stroma. In a few places in the cyst wall, definite glandlike structures, lined by columnar cells similar to uterine glands, were found. The lower portion of the posterior wall of the uterus and the supravaginal portion of the cervix were invaded by an adenomatous growth of endometrial type. The depth of the invasion was not more than 4 or 5 mm. (Fig. 63). In places, there was a reaction of the tissues of the uterine wall forming a definite nodule, i. e., an "adenomyoma." The patient made a satisfactory convalescence and has remained well.

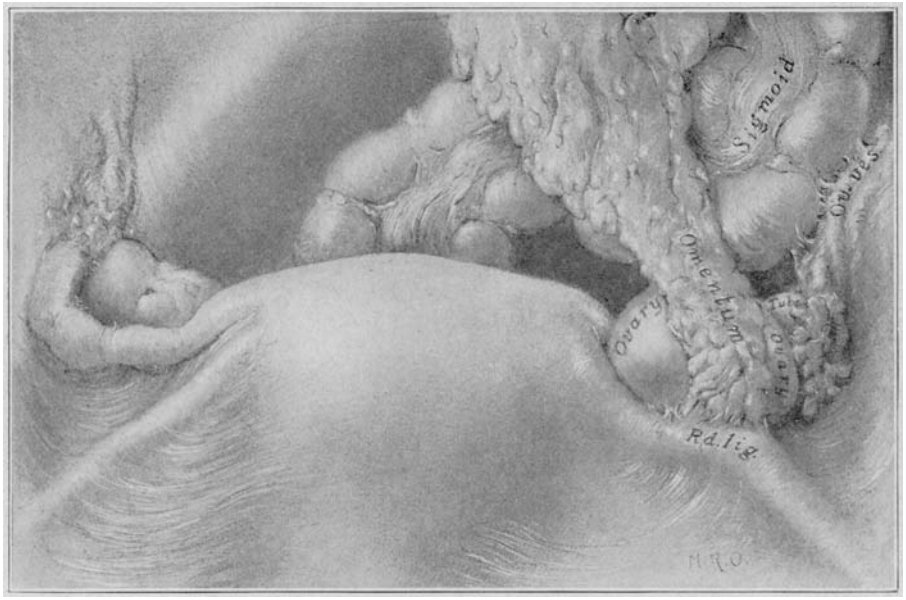

Fig. 47 (Case 23).—Perforating hemorrhagic cyst of the left ovary; adherent retroverted uterus; adenoma of endometrial type of the culdesac invading the posterior wall of the cervix and extending through the vagina and presenting as a hemorrhagic cyst in the vaginal vault. View of pelvic contents from sketch made at the operation (slightly reduced in size). The uterus was retroverted, the ovary drawn up over the left tube and adherent to the round ligament. The tip of the omentum was also adherent to the ovary and the round ligament at this point. The right tube and ovary were apparently normal. On freeing the omentum, "chocolate" fluid escaped from the perforated ovarian cyst, the perforation having been sealed by the omentum and round ligament.

CASE 4.—*Perforating hemorrhagic cyst of the left ovary; multinodular myomatous uterus; submucous "adenomyoma" of the right uterine cornu; dense adhesions in the culdesac uniting the posterior wall of the uterus to the rectum.*—Miss E. D. W., aged 40, complained of severe dysmenorrhea of four months' duration, especially in the left side, and some pain in the same side for a week after the menses had ceased. The menstruation was regular, moderate, free from pain until the last four months; since then there has been severe pain as noted above. Pelvic examination demonstrated the uterus to be irregularly enlarged and apparently adherent. Preoperative diagnosis was an adherent myomatous uterus.

Operation at the Albany Hospital, Oct. 11, 1917, revealed the uterus to be irregularly enlarged with an adherent ovarian cyst, approximately 6 cm. in diameter on the left side. On freeing the latter, "chocolate" fluid escaped. The uterus was adherent to the rectum. The appendix, both tubes, ovaries and the entire uterus were removed. The tubes appeared normal, the right ovary was cystic, the left was converted into a hemorrhagic cyst. There were multiple leiomyomas in the uterus and an "adenomyoma" in the right uterine cornu (Fig. 15). Sections of the left ovary were not satisfactory and none were made of the posterior uterine wall to determine whether or not adenomyoma of endometrial type was present. The patient made a satisfactory convalescence and has remained well.

CASE 5.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus; tip of the appendix adherent to the cyst.*—Miss G. D., aged 28, complained of two "attacks of appendicitis," the first one three months ago and the last one a month ago. She was in bed about a week with each

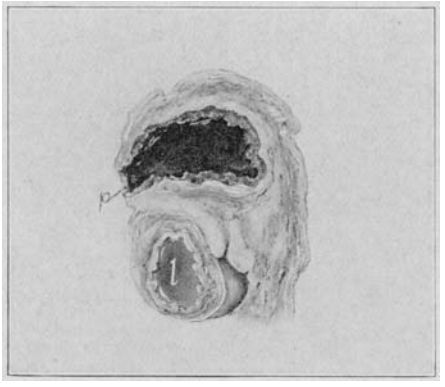

Fig. 48 (Case 23).—Cross section of the ovary shown in Figure 47 (natural size). The ovarian hematoma is for the most part lined by a single layer of columnar cells with a vascular underlying stroma (Fig. 49). In places where the epithelium is absent, a thick layer filled with pigmented cells is present, evidence of a previous stromal hemorrhage. A corpus luteum (*L*) is situated near the ovarian hematoma as in Figure 16 (Case 21).

attack. The menstruation was apt to be two or three days late and slight in amount; there was slight pain and the last flow was a week before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, with an adherent cystic mass in the right side of the pelvis. The preoperative diagnosis was adherent retroflexed uterus with adherent ovarian cyst.

Operation at the Albany Hospital, Feb. 7, 1918, revealed an adherent retroflexed uterus, with an adherent ovarian cyst on the right side. The appendix dipped into the pelvis and was adherent by its tip (Fig. 11). On freeing the cyst, "chocolate fluid" escaped. The appendix, right tube and ovary were removed and the uterus was suspended. Only one section from the ovarian cyst was made for microscopic diagnosis; this showed a cyst with its wall lined by low and cuboidal epithelium. No sections were taken from the posterior wall of the uterus to see whether or not adenoma of endometrial type was present.

CASE 6.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus; "adenomyoma" of posterior uterine wall; gallstones.*—Mrs. J. A. J., aged 45, complained of indigestion and attacks of pain in the upper right abdomen. She had been jaundiced four weeks before. There were no definite symptoms referable to the pelvic condition. She was not constipated. She had had one child—13 years old. The menstruation was regular but scanty; there was no pain; the last flow was a week before the operation. The pelvic examination showed the uterus to be enlarged, retroflexed and adherent. The preoperative diagnosis was gallstones and an adherent myomatous uterus.

Operation was performed at the Albany Hospital June 13, 1918. A median incision was made and the gallbladder palpated and gallstones felt. The appendix was then removed. The uterus was enlarged, retroflexed, and densely adherent to the rectum. On freeing the right ovary "chocolate" fluid escaped. Both tubes and ovaries and the entire uterus were removed. An incision was then made over the gallbladder, and it was removed. Both tubes were normal,

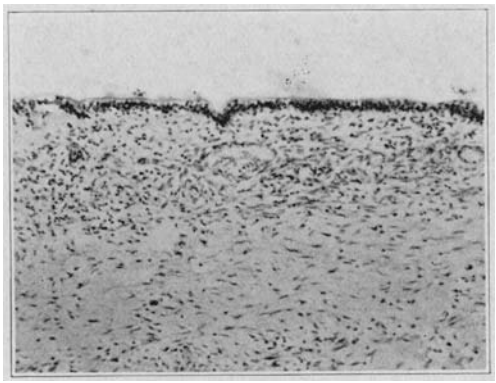

Fig. 49 (Case 23).—Photomicrograph of the wall of the cyst from the portion lined by columnar epithelium with an underlying vascular stroma similar to Figure 19 (Case 21), and Figure 39 (Case 15).

the left ovary was normal, the right ovary contained a hemorrhagic cyst about 2.5 cm. in diameter. There was a superficial "adenomyoma" of the posterior wall of the uterus which had "united" it to the anterior wall of the rectum. The exact depth of the invasion or the involvement of the uterus wall was not determined. The hemorrhagic cyst was lined by low, cuboidal and columnar epithelium, the columnar predominating. There was a vascular subepithelial stroma, containing evidence of old and recent hemorrhages and an occasional gland, which resembled a uterine gland. The patient made a satisfactory convalescence and has remained well.

CASE 7.—*Perforating hemorrhagic cysts of both ovaries; multiple ovarian hematomas; small leiomyomas of the uterus, adhesions between the posterior uterine wall and the ovaries.*—Mrs. X. W., aged 35, complained of uterine bleeding which had occurred six times in the last twelve weeks. She had never been pregnant; the menstruation was regular, moderate and normal until the last three months. Since then it had been more profuse and frequent and had been accompanied with pain. Pelvic examination showed the uterus to be

slightly enlarged, and apparently irregular in consistency, with inflammatory masses on either side. Preoperative diagnosis was a myomatous uterus with bilateral "chronic pelvic peritonitis."

Operation at the Albany Hospital, Nov. 10, 1918, revealed both ovaries to be cystic and adherent to the posterior surface of the uterus. Small myomas were present in the uterus. On freeing the ovaries, "chocolate" fluid escaped. The appendix, both tubes and ovaries and the entire uterus were removed. The tubes appeared normal, both ovaries contained multiple hematomas from 1 to 1.5 to 4 cm. in diameter. Histologically, the hematomas represented various stages in the life cycle of "luteal" hematomas. In one cyst, an adenoma of endometrial type was found. Sections were made from the portion of the posterior uterine wall which was adherent to the ovaries and adenoma of endometrial type was not found. The patient made a satisfactory convalescence and has remained well.

CASE 8.—*Perforating hemorrhagic cyst of the left ovary; multiple leiomyomas of the uterus; dense adhesions between the posterior uterine wall and*

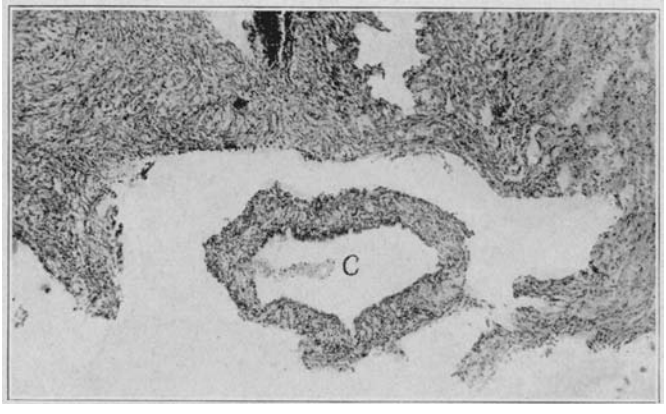

Fig. 50 (Case 23).—Photomicrograph of a small "cyst" partially detached from a pocket in the periphery of the ovary near the site of perforation (lower power than the preceding illustration). This cyst is lined by columnar cells surrounded by a cellular stroma and resembles the "cyst" on the surface of the round ligament (Fig. 70, Case 22). Both are apparently cysts of "endometrial" type.

the rectum.—Mrs. S. K., aged 46, complained of pain in the left side of the lower abdomen for ten years. She had never had any children but possibly had a miscarriage eighteen years ago. The menstruation was regular, without pain; but it had been very profuse for the last year, lasting from five to seven days. The last menstrual flow was two weeks before the operation. Pelvic examination showed the uterus to be irregularly enlarged and apparently fixed in the pelvis. Preoperative diagnosis was a myomatous uterus with pelvic adhesions.

Operation at the Albany Hospital, Jan. 16, 1919, revealed a multinodular myomatous uterus, pushed forward by a densely adherent left sided ovarian cyst about 8 cm. in diameter (Fig. 14). The right tube and ovary were normal. On freeing the ovarian cyst, a large amount of "chocolate" fluid escaped. The adhesions between the uterus and the rectum were very dense, and the two were separated with great difficulty. The appendix, both tubes, ovaries and

uterus were removed. Only one section was made from the cyst and that was unsatisfactory. Sections were not made from the posterior portion of the uterine wall to determine whether or not adenoma of endometrial type was present.

CASE 9.—*Perforating hemorrhagic cyst of both ovaries; dense adhesions in the culdesac uniting the anterior rectal wall to the supravaginal portion of the cervix and the lower portion of the uterus: postoperative hernia following the incision and drainage of appendiceal abscess twelve years previously.*—Mrs. C. J. H., aged 26, complained of pain in the right side. She had been married one and a half years and had not been pregnant. Menstruation was regular, normal, moderate in amount and not painful. The pain in the right side was of nine months' duration; at times it was severe enough to cause the patient to go to bed; she was not constipated. The pelvic examination showed the uterus to be of normal size and pushed forward by a "cystic" tumor extending nearly to the level of the umbilicus. The cyst appeared to be adherent. The preoperative diagnosis was an adherent ovarian cyst, probably a dermoid. On account of the adhesions, malignancy was also considered.

Fig. 51 (Case 23).—Photomicrograph of a peritoneal fold near the perforation of the cyst. This is an adenoma of endometrial type.

Operation at the Albany Hospital, March 17, 1920, revealed a left ovarian cyst about 9 cm. in diameter, posterior to the uterus and adherent to the posterior surface of the uterus and the anterior wall of the rectum (Figs. 12 and 13). On freeing it, a large amount of "chocolate" fluid escaped. A similar, but smaller, cyst was found in the right ovary. The appendix was removed; the hernia repaired; the left tube and ovary removed; the cyst excised from the right ovary and the uterus freed from the rectum and suspended. The tubes appeared normal. Histologically, the cysts were for the most part lined by epithelium of low to cuboidal type. Evidence of old and recent hemorrhages was found in the cyst wall. Tissue was not removed from the posterior wall of the uterus and the anterior wall of the rectum to determine whether or not adenomyoma of endometrial type was present. The patient made a satisfactory recovery and has remained well.

CASE 10.—*Perforating hemorrhagic cyst of the left ovary, adherent retroflexed uterus; acute appendicitis.*—Miss M. D., aged 34, was admitted to the Albany Hospital, May 8, 1920, with symptoms of acute appendicitis. Menstruation was regular, always profuse and accompanied by severe pain, especially in recent years; she often remained in bed for the first two days of the menstrual period. The last flow was two weeks before the operation. She

had had three "attacks of appendicitis" the first one in September, 1919, the second in December, 1919, and the third and present attack began the day before her admission to the hospital. The physical examination revealed tenderness and rigidity over the appendix; the uterus was retroflexed and adherent; the appendages on the left side were enlarged and adherent. The preoperative diagnosis was acute appendicitis, adherent retroflexed uterus, with adherent cystic ovary or hydrosalpinx on the left side.

Operation was performed on the day of admission. Through a median incision, the left ovary was found enlarged and adherent. On freeing the ovary, "chocolate" fluid escaped. The uterus was freed from the rectum, to which it was adherent, and suspended (Fig. 7). The appendix was also removed. Histologically the hemorrhagic cyst was lined by a single layer of low cuboidal or columnar epithelium, cuboidal predominating; there was in

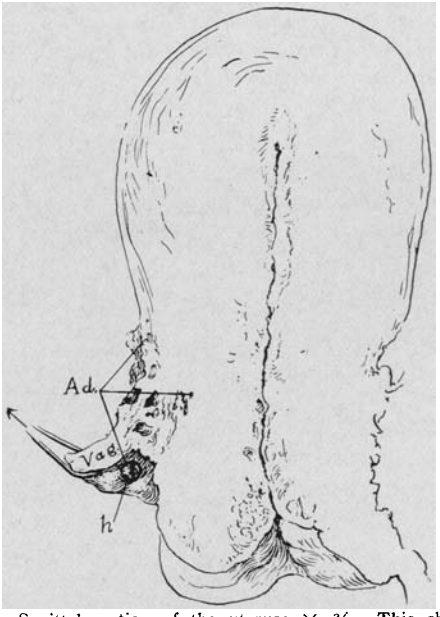

Fig. 52 (Case 23).—Sagittal section of the uterus; × ⅔. This shows the adenoma of endometrial type involving the posterior surface of the supravaginal portion of the cervix, invading the cervix and posterior vaginal wall at the cervicovaginal attachment and presenting in the posterior vault of the vagina as a small hemorrhagic cyst (*h*).

places a thin intervening vascular stroma between the epithelial lining and the ovarian tissue proper. Glandlike spaces lined by a single layer of columnar cells were found scattered through the cyst wall and were most numerous near the site of perforation (Fig. 9). A small "pocket" or cyst was situated lateral to the main cyst (Fig. 8). This pocket was lined by columnar epithelium accompanied by a definite underlying stroma, and in one place, there was a definite "endometrial" formation (Fig. 10). Evidence of old and recent hemorrhages were found in the cyst. Histologically, both cysts suggested that they were adenocystoma of the endometrial type. Tissues were not removed from the raw areas caused by freeing the adhesions to determine whether or not adenoma of endometrial type was situated in this area. The patient made a satisfactory surgical convalescence, but the dysmenorrhea has not been relieved

by the operation. I examined the patient in September, 1920, and could detect a definite small area of induration in the culdesac posterior to the cervix, which I believe is due to an adenoma of endometrial type in that situation.

CASE 11.—*Perforating hemorrhagic cyst of the right ovary, adherent to the side of the pelvis.*—Mrs. L. H., aged 30, complained of pain in the right side of the lower abdomen, especially during the menstrual period. The symptoms were of five months' duration. She had been married four years and had never been pregnant. Menstruation was regular, moderate in amount; she always had had some pain but this had been much worse for the last five months. The last flow was just passed. Pelvic examination showed the uterus to be normal in size and drawn slightly to the right side; the appendages on that side were apparently adherent. The preoperative diagnosis was "chronic pelvic inflammatory disease" probably of tubal origin.

Operation at the Albany Hospital, May 10, 1920, revealed the right ovary cystic and adherent to the side of the pelvis (Fig. 1). On freeing it, "chocolate" fluid escaped. The right tube, ovary and the appendix were removed. Histologically, the cyst for the most part lacked an epithelial lining, but when present, it consisted of a single layer of cells low to cuboidal in form (Fig. 3).

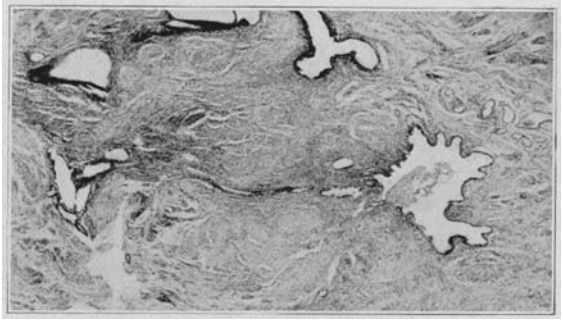

Fig. 53 (Case 23).—Photomicrograph of a portion of the cervix showing the "adenomyoma" with partially collapsed cavities which were filled with "menstrual" blood at the time of the operation.

In a few places, there was evidence of either old or recent hemorrhages in the wall of the cyst. Pockets or clefts were found in the ovary about the site of perforation. These pockets were lined by columnar cells with gland formation and a cellular stroma resembling endometrium (Fig. 4). The patient made a satisfactory recovery. I saw her June 16, 1921. She felt better than she did before the operation, but still had some pain in the lower abdomen. On examination, I found the left ovary to be enlarged and adherent to the side of the pelvis and a small area of induration in the culdesac. I believe that she now has a perforating hemorrhagic cyst of the left ovary with adenoma of endometrial type in the culdesac and may later require another operation.

CASE 12.—*Perforating hemorrhagic cysts of both ovaries, diffuse adenoma of endometrial type involving the posterior uterine wall, the anterior rectal wall and extending laterally into both broad ligaments.*—Mrs. T. H., aged 36, complained of increasing constipation of six months' duration but no pain or other discomfort. She had one child 6 years old. This was the only pregnancy. The menstruation was normal and moderate; there was no pain.

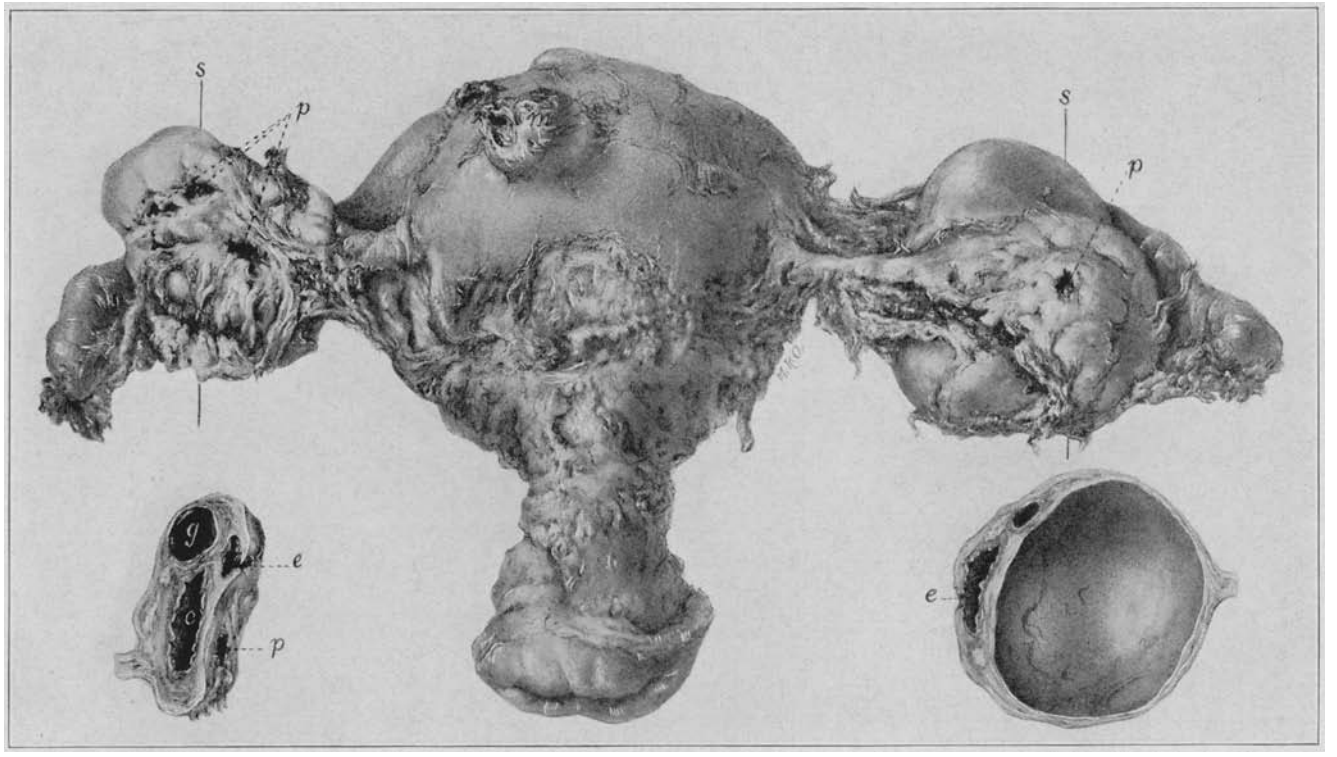

Fig. 54 (Case 19).—Perforating hemorrhagic cysts of both ovaries, adherent retroflexed uterus, small subserous leiomyoma, diffuse adenoma of endometrial type invading the posterior wall of the uterus and also probably the anterior wall of the rectum, adenoma of endometrial type of the sigmoid. Posterior view of the uterus, tubes and ovaries, the latter turned upward showing the perforation (*p*) on the lateral surface of the left ovary and the under surface of the right (natural size). Cross section of the left ovary shows *c*, the hematoma of "endometrial" type (Fig. 57), with perforation at *p*. The small pocket *e* is lined almost entirely with "endometrial" tissue (Fig. 58). The cyst *g* is a graafian follicle hematoma. The cross section of the right ovary shows a small hematoma *e* lined by "endometrial" tissue. The larger cavity is a graafian follicle cyst.

The last flow occurred four days before the operation. Pelvic examination showed the uterus to be slightly enlarged and fixed in the pelvis; there was induration in the culdesac, most marked high up, with distinct bulging into the rectum; this was best detected by rectal palpation. The preoperative diagnosis was dense pelvic adhesions (chronic pelvic peritonitis) with the possibility of implantation of cancer in the culdesac or cancer of the rectum at the junction of the rectum and the sigmoid.

At operation June 8, 1920, both ovaries were enlarged, cystic and adherent. On freeing them, "chocolate" fluid escaped. The uterus was fused to the rectum, with marked induration in both broad ligaments. The diagnosis was evident at the operation, that is, the adhesions and the induration of the broad ligaments were due to an adenoma of endometrial type. The appendix, both tubes and ovaries and the uterus were removed (Fig. 60). The uterus was freed from the rectum with great difficulty, and at the close of the operation,

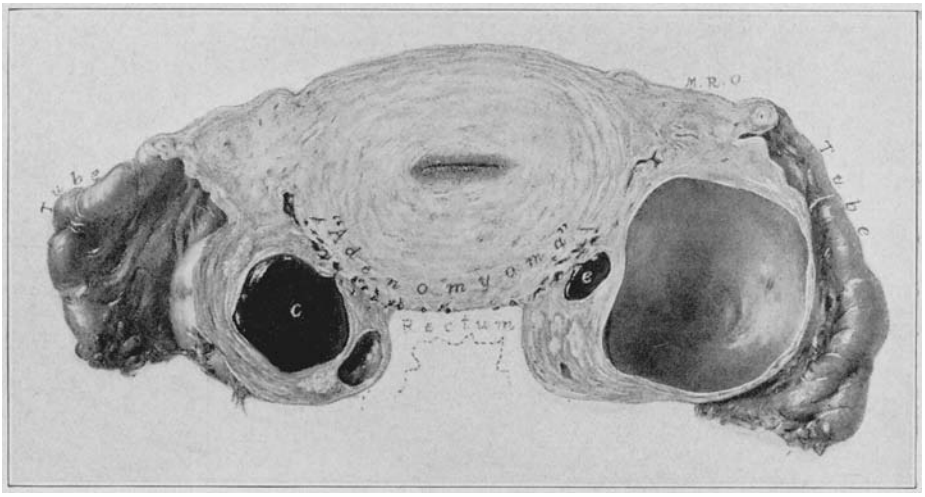

Fig. 55 (Case 19).—Cross section of the uterus and ovaries (natural size) indicating the condition found at operation. Both ovaries were adherent to the posterior surface of the uterus thus sealing the perforations. The adenoma had spread over the surface of the uterus and was just beginning to invade it (Fig. 59). The relation of the rectum to the uterus is indicated by the dotted lines. The larger hematoma, *c*, of the left ovary is shown in longitudinal section, and also the smaller one, *e*, of the right ovary, with the graafian follicle cyst lateral to it. Sections of the uterine wall failed to show any "endometrial" tissue between the superficial growth on its posterior surface and the mucosa of the uterine cavity.

the rectal wall still felt indurated especially over the area marked *x* in Figure 62. Undoubtedly, adenoma was left behind in the anterior wall of the rectum and in the broad ligament. Histologically the cyst of the right ovary was for the most part lacking in an epithelial lining, when present it was low or cuboidal. Columnar epithelium resembling that of the endometrium was found in clefts and pockets in the surface of the ovary about the site of perforation. Adenoma of endometrial type was found invading the posterior uterine wall and giving rise to a definite "adenomyoma" (Figs. 61 and 62). Sections between the "adenomyoma" and the uterine cavity did not show any connection between the two. The patient made a satisfactory recovery and has remained well. There has not been any evidence of an extension of the growth of the adenoma, undoubtedly left in the pelvis and in the anterior wall of the rectum. The patient was examined May 23, 1921. A slight area of induration, about the

size of the end of the examining finger, was palpated in the anterior wall of the rectum. The rectal mucosa was freely movable over it. This area of induration was definitely smaller than at the time of the operation.

CASE 13.—*Perforating hemorrhagic cyst of the right ovary; adenoma of endometrial type invading the posterior wall of the cervix, the vagina and the anterior wall of the rectum.*—Miss E. H., aged 30, complained of severe dysmenorrhea and marked constipation. The menstruation was regular, moderate in amount, always painful, but worse lately. The last flow occurred four weeks before the first operation and the patient was due to menstruate the day of the operation. Pelvic examination showed the uterus to be in normal position with a small definite localized area of induration just back of the cervix. The end of the examining finger just about covered the area which could be detected better on rectal palpation. To the right of this area and above could be felt an adherent cystic mass. The preoperative diagnosis was a

Fig. 56 (Case 19).—Enlargement (× 5) of the upper portion of the left ovary showing the collapsed hemorrhagic cyst *C* (Fig. 57), the endometrial pocket *E* (Fig. 58) and small fragments *M*, loosely attached to the surface of the ovary. These fragments contained "glands" of endometrial type, and should they become dislodged and escape into the peritoneal cavity might give rise to secondary growths of adenoma.

probable perforating hemorrhagic cyst of the right ovary with adhesions in the culdesac.

Operation at the Albany Hospital, June 28, 1920, revealed the left tube and ovary apparently normal. The right ovary was prolapsed and adherent to the side of the pelvis. The lower portion of the culdesac was obliterated by adhesions (Fig. 27). As the patient was very anxious for conservative surgery, I removed only the appendix, the right tube and ovary. Histologically the ovarian cyst was lined by a single layer of cuboidal to columnar epithelium with an underlying vascular stroma into which there was marked hemorrhage, i.e., "premenstrual" hematoma. Glandlike structures resembling uterine glands were present in the wall of the cyst near the site of perforation

(Fig. 29) and also on the surface of the ovary about this site (Fig. 32). Lateral to the cyst was a pocket lined by columnar cells of endometrial type with stroma and recent hemorrhage (Fig. 30). The patient made a satisfactory convalescence. Pelvic examination made before the patient left the hospital showed the same nodule posterior to the cervix, and I realized that it was probably due to adenoma of endometrial type. I saw her again in November, 1920. She had not improved, if anything the menstrual pain was worse. On examination, I found the pelvic condition about the same as before leaving the hospital except the nodule in the culdesac seemed a little larger. The patient was anxious to avoid another operation and decided to wait. She was seen again in March, 1921, and the history was the same as before. On examination, the induration in the culdesac seemed definitely larger.

A second operation was performed March 21, 1921, three weeks after the last menstrual period. On drawing the uterus forward, the anterior wall of the rectum was carried with it in a very characteristic manner (Fig. 33). The culdesac was obliterated to the level of the uterine origin of the uterosacral ligaments, the anterior wall of the rectum having become fused with the supra-

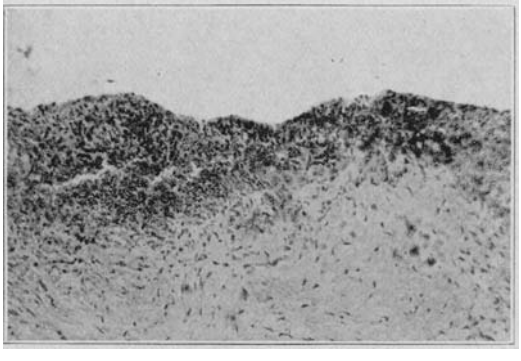

Fig 57 (Case 19).—Photomicrograph of a portion of the wall of the hematoma *C*. The cyst is lined in part by a single layer of epithelium, cuboidal and columnar (columnar epithelium is present in the center of the illustration). Recent hemorrhage is present in the subepithelial stroma, and to the right, the epithelial lining is lacking. The patient was operated on the "last" day of the menstrual period. Compare with Figure 29 (Case 13) when the patient was operated on the day that menstruation was due.

vaginal portion of the cervix up to this point. The rectum was freed from the posterior wall of the cervix, and the entire uterus and the remaining ovary were removed. The patient made a satisfactory convalescence. Histologically an adenoma of endometrial type was found invading the posterior wall of the cervix and to a lesser degree the vagina and the anterior wall of the rectum (Figs. 34, 35 and 36).

CASE 14.—*Perforating hemorrhagic cysts of both ovaries, adherent retroflexed uterus.*—Mrs. H. H., aged 31, complained of sterility. She had been married three years and had never been pregnant. The menstruation was occasionally irregular, extending over the usual period, from seven to ten days; it was always profuse; the last menstrual flow was two weeks before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, as were also the appendages on both sides. There was a slight

degree of induration in the culdesac. The preoperative diagnosis was an adherent retroflexed uterus and possibly bilateral, perforating hemorrhagic cysts of the ovaries.

At operation at the Albany Hospital, July 6, 1920, the uterus was found to be retroflexed and adherent. Both ovaries were cystic and adherent; in freeing the latter, "chocolate" fluid escaped. The tubes appeared normal. The cysts were excised from the ovaries; the appendix removed and the uterus suspended and also curetted. Histologically the cysts were lined by a single layer of epithelium, low, cuboidal and columnar. In some places the epithelium rested directly on the ovarian tissue; in other places there was an intervening vascular cellular stroma; glandlike structures were also present and the histologic picture in some areas of the cyst wall resembled endometrial tissue. Subepithelial hematomas were also present. The patient made a satisfactory convalescence.

Fig. 58 (Case 19).—Photomicrograph showing the type of tissue lining the "pocket" *e* of the left ovary. One would think it had been removed from the mucosa of the uterine cavity.

CASE 15.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus, with a diffuse adenoma of endometrial type superficially involving the greater portion of the posterior wall of the uterus which was densely adherent to the bottom of the culdesac and rectum; intramural leiomyomas.*—Miss M. D., aged 39, complained of uterine bleeding and diarrhea of about six months' duration. The menstruation was regular until about six months before the operation. Since that time the patient had been flowing profusely, without any pain, every two weeks, and it often lasted a week. Diarrhea was of the same duration as the increased menstrual flow with watery bowel movements without pain or blood. Pelvic examination showed the uterus to be retroflexed, slightly enlarged, irregular and adherent. The appendages were not palpated on either side. The preoperative diagnosis was an adherent retroflexed myomatous uterus.

At operation at the Albany Hospital July 12, 1920, the uterus was found retroflexed and densely adherent to the rectum and the bottom of the culdesac (Fig. 42). The left tube and ovary were apparently normal. The right ovary was adherent to the posterior surface of the uterus (Fig. 38). On freeing it, "chocolate" fluid escaped. The appendix, right tube and ovary and the entire uterus were removed. Histologically the ovarian cyst was lined by a single layer of cuboidal to columnar epithelium resting in a cellular vascular stroma (Fig. 39). Recent hemorrhage was present in this stroma. In places, glandlike structures were present which resemble uterine glands. Epithelial tissue was found in the pockets in the surface of the ovary about the site of perforation, which even more closely resembled typical endometrium (Fig. 40). A diffuse adenoma of endometrial type (Fig. 37) had superficially invaded the greater portion of the posterior uterine wall, being present in the area of the uterine wall to which the ovary was adherent at the site of perforation and spreading over the entire area which was adherent to the bottom of the culdesac and the rectum and extending beneath the uterine serosa above this area, forming small blebs.

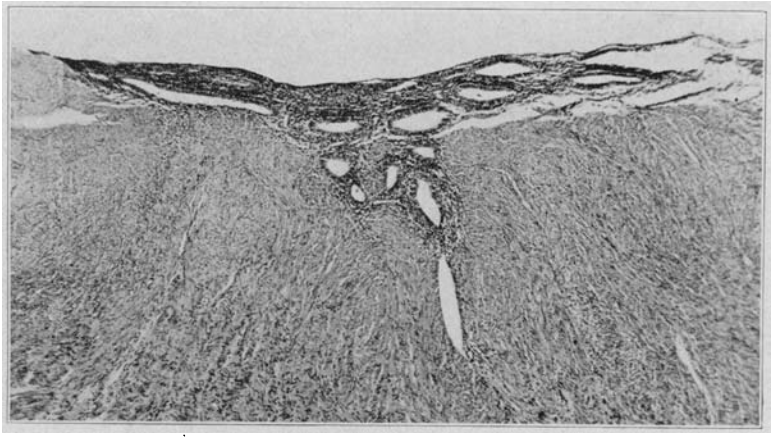

Fig. 59 (Case 19).—Photomicrograph (lower power) of a portion of the posterior wall of the uterus situated just beneath the adherent left ovary. The adenoma resembles a broad headed tack with a short point pushed into (invading) the uterine wall. The tissue lining, the hematoma *c*, the pocket *e* and that shown in this illustration all represent the same process as altered by physical conditions.

Histologically the lining of the hemorrhagic cyst, the tissues in the ovarian clefts about the site of perforation and the diffuse growth involving the posterior surface of the uterus were similar, except that in the ovary it was an adenocystoma of endometrial type with the cystoma feature predominating while in the uterus the adenomatous feature prevailed. The patient made a slow but satisfactory recovery, but died about six months later. The cause of death was not determined.

CASE 16.—*Perforating hemorrhagic cyst of the left ovary, retroflexed uterus; slight adhesions about the left ovary; chronic appendicitis.*—Mrs. J. W., aged 31, complained of pain in the right side in repeated attacks during the last ten years. She had one child, 5 years old, and possibly had a miscarriage one and one-half years ago. The menstruation was always profuse and painful. Pelvic examination showed the uterus to be retroflexed but freely movable. The preoperative diagnosis was chronic appendicitis and retroflexed uterus.

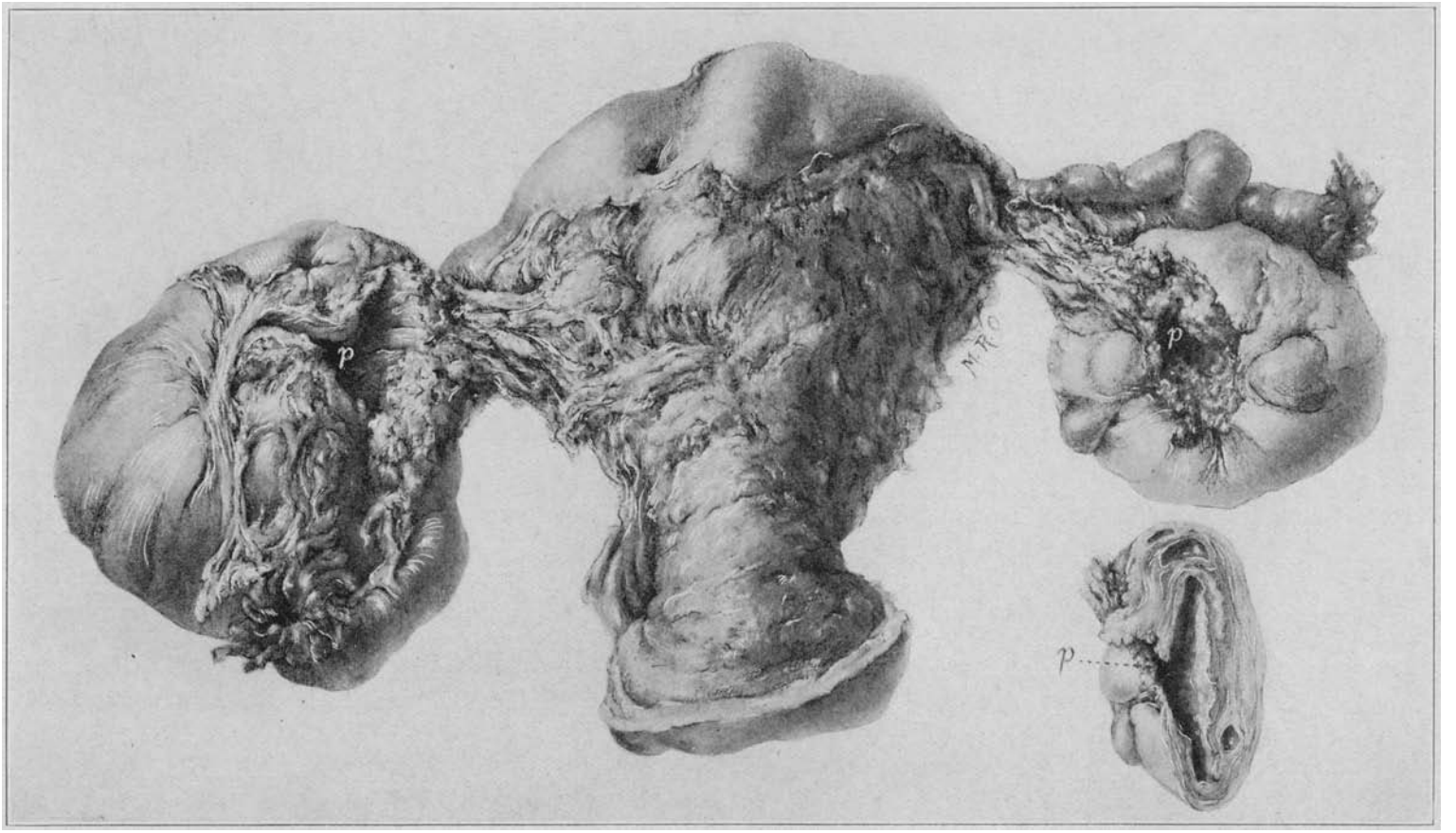

Fig. 60 (Case 12).—Perforating hemorrhagic cysts of both ovaries; adenoma of endometrial type of the posterior uterine wall uniting it to the rectum and extending laterally into both broad ligaments. Posterior view of the uterus, tubes and ovaries (natural size). The uterus was separated from the rectum with great difficulty and purposely some of the uterine tissue was left attached to the anterior wall of the rectum; hence the rough and ragged appearance of the uterus. The left ovary contains a graafian follicle cyst about 6 cm. in diameter with a smaller perforating hemorrhagic cyst on its lateral surface. The right ovary contains a collapsed hemorrhagic cyst perforating on its under surface. Histologically, the right cyst was the exact counterpart of the condition shown in Figures 3 and 4 (Case 11), namely, a hematoma of probable endometrial type in which recognizable "endometrial" tissue was found only in pockets in the periphery of the ovary about the perforation.

At operation at the Albany Hospital Oct. 28, 1920, the appendix which was adherent was removed. The uterus was retroflexed but freely movable. The left ovary was cystic and adherent. On freeing it, "chocolate" fluid escaped. The hematoma was excised from the left ovary, and the uterus suspended and curetted. Histologically, the cyst was lined by a single layer of cuboidal epithelium. Pockets of clefts were found in the ovary about the site of perforation which were lined by columnar epithelium with gland formation resembling endometrium. The patient made a satisfactory recovery and has remained well.

CASE 17.—*Perforating hemorrhagic cysts of both ovaries; adherent retroflexed uterus; multiple small leiomyomas; discrete superficial "adenomyomas" in the posterior uterine wall where the left ovary was adherent at the site of its perforation and adenoma beneath the adherent right ovary.*—Mrs. C. A. P.

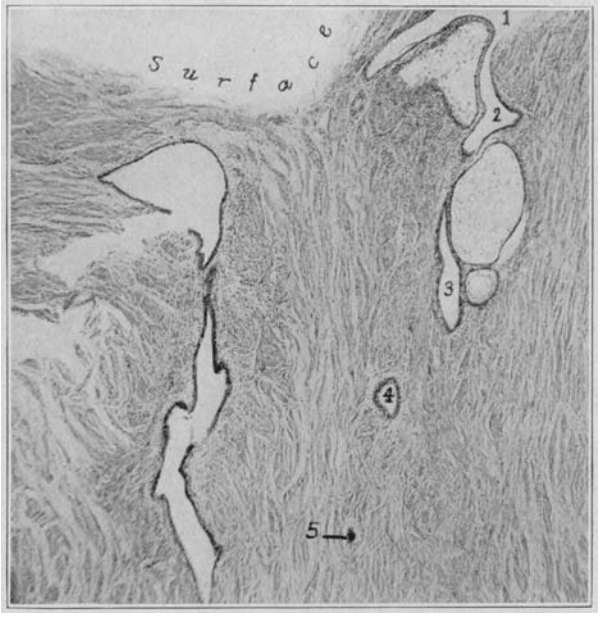

Fig. 61 (Case 12).—Photomicrograph of a portion of the posterior wall of the uterus beneath the attachment of the right ovary. The adenoma has invaded the uterus from the peritoneal surface like a long pointed crooked tack in which the head had probably been torn off during the operation. Compare with Figure 59 (Case 19).

aged 38, complained of uterine bleeding. She had been married eight years but had never been pregnant. The menstruation was regular, painless and always profuse, but more so lately. There had been irregular "spotting" for the last nine months. Pelvic examination showed the uterus to be retroverted, irregular in outline and apparently adherent. The appendages were not palpated. A slight area of induration could be palpated in the culdesac, apparently in the posterior wall of the uterus. It was detected best on rectal palpation. The preoperative diagnosis was an adherent retroverted uterus with small myomas.

At operation at the Albany Hospital Dec. 7, 1920, the uterus was found to be retroverted and adherent. Both ovaries were cystic and adherent to the posterior surface of the uterus. On freeing the ovaries, "chocolate" fluid

escaped. The appendix, both tubes and ovaries and the entire uterus were removed (Fig. 43). The tubes were normal. Histologically both hemorrhagic cysts contained a pigmented wavy "luteal" layer with evidence of "regeneration" of the epithelial lining of the cysts from the periphery of the ovary at the site of perforation. In the clefts in the ovary were areas of epithelial cells resembling endometrium. The area (Fig. 44) of the posterior uterine wall which was adherent to the left ovary showed a discrete nodule of "adenomyoma" (Fig. 46). Adenoma of endometrial type was found beneath the adherent right ovary (Figs. 44 and 45). The patient made a satisfactory convalescence and has remained well.

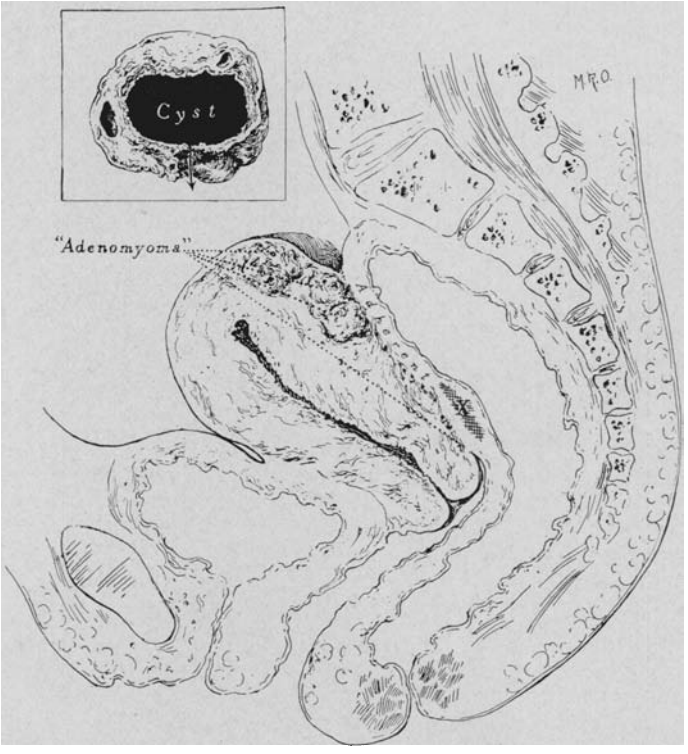

Fig. 62 (Case 12).—Sagittal section of the pelvis showing relation of the "adenomyomatous uterus" to the rectum prior to the operation; × ½. The adenoma arising in the culdesac "due to the escape of the contents of the cyst" has invaded the posterior wall of the uterus forming a definite "adenomyoma" of the fundus and uniting the uterus to the rectum and superficially invading that organ. The area marked *x* indicates a distinct nodule felt in the anterior rectal wall prior to, and also during, the operation. This nodule or thickening was not removed. The rectal mucosa over it was freely movable, and I believe it is a nodule of adenomatous tissue in the rectal wall. It is interesting to await its ultimate fate; so far it has not caused any trouble.

CASE 18.—*Perforating hemorrhagic cyst of the right ovary; multiple small leiomyomas of the uterus; adhesions between the uterus and the rectum with adenoma of endometrial type involving the posterior wall of the uterus and also the posterior surface of the right broad ligament.*—Mrs. H. K., aged 37, complained of marked constipation. She was married but had never been pregnant. The menstruation was regular, moderate and painless. Pelvic examination showed the uterus to be irregularly enlarged and adherent,

with an area of marked induration in the culdesac between the uterus and the rectum. This induration was very evident on rectal palpation and had led to a previous diagnosis of possible malignancy by another physician. The appendages on the left side were enlarged and cystic; those on the right were not palpated. The preoperative diagnosis was perforating hemorrhagic cyst of the left ovary with culdesac adhesions and adenoma of the endometrial type.

Operation at the Albany Hospital Dec. 8, 1920, revealed the uterus irregularly enlarged by multiple leiomyomas and the left ovary enlarged with multiple retentive cysts but freely movable. The right ovary was normal in size and adherent to the side of the pelvis. On freeing it, "chocolate" fluid escaped. The tubes appeared normal. The appendix, the left tube and ovary, the right tube, the greater portion of the right ovary and the entire uterus were removed. Microscopically, the cyst in the right ovary was lined by a single layer of epithelium of low and cuboidal type with a very vascular underlying stroma. In places the cyst wall suggested the remains of a "luteal" layer. Pockets or clefts were found in the ovary about the site of perforation. These pockets were lined by columnar epithelium with gland formation and a stroma resembling endometrium. Similar tissue was also found on the posterior surface of the right broad ligament. Not enough tissue from the uterus was examined to determine the extent of the adenoma involving its posterior surface. Only one section was made from this area; adenoma was found in this section but unfortunately the entire specimen was not saved for further sections. The patient made a satisfactory convalescence except for a slight infection of the lower end of the abdominal incision. The end-result of saving ovarian tissue in this case will be watched with interest.

CASE 19.—*Perforating hemorrhagic cysts of both ovaries; diffuse adenoma of endometrial type involving the posterior wall of the uterus, the anterior wall of the rectum, both broad ligaments and forming two separate nodules in the sigmoid ("adenomyoma" of the sigmoid).*—Mrs. J. W., aged 45, complained of marked constipation with attacks of obstruction beginning two years before the operation and gradually increased in severity. She had two children, the youngest 6 years old. The menstruation was regular, moderate and without pain until the last two years. During this time pain had been present, increasing in severity, and the flow had been decreasing in amount. The patient was operated on the last day of the flow. It is of great interest to note that the attacks of the most marked constipation occurred with the menstrual period. These had been especially bad during the last year. The pain was so severe the patient had to remain in bed; the abdomen often became distended, and sometimes there were nausea and vomiting. Bowel movements were obtained only with the greatest difficulty. No blood was ever observed in the evacuations. The abdomen remained tender for about a week after the cessation of the flow. Pelvic examination showed the uterus to be irregular, adherent and retroverted. The appendages were not palpated. Rectal palpation confirmed these findings. No localized induration was detected in the culdesac. Roentgenograms following a barium enema were made but no definite point of obstruction was found. The preoperative diagnosis was an adherent myomatous uterus with possibly a malignant growth of the sigmoid. The true condition was not considered.

At operation at the Albany Hospital Feb. 17, 1921, the uterus, containing small leiomyomas, was found retroverted and adherent to the rectum. A small amount of "old blood" was found free in the pelvis. Both ovaries were cystic

enlarged and adherent to the posterior surface of the uterus. On freeing the ovaries, "chocolate" fluid escaped. Two definite puckered areas were found in the sigmoid. One area was situated just above the apparent rectosigmoidal junction and the other about 8 cm. above this one. The upper area was not involved in or continuous with the adhesions uniting the uterus to the sigmoid or those between the ovaries and the uterus. On palpating each of these puckered areas, a definite nodule could be distinctly felt, apparently projecting into the lumen of the sigmoid. The upper one was the larger. The correct diagnosis was now apparent. The appendix was first removed, then both tubes and ovaries and the entire uterus (Figs. 54 and 55). The separation of the uterus from the rectum was extremely difficult for apparently the growth had invaded it and also the broad ligament on both sides. The upper and larger nodule in the sigmoid was excised and an end-to-end suture of the intestine made. Histologically the larger cyst of the left ovary was in part lined by a single layer of epithelium, the cuboidal type predominating, with evidence

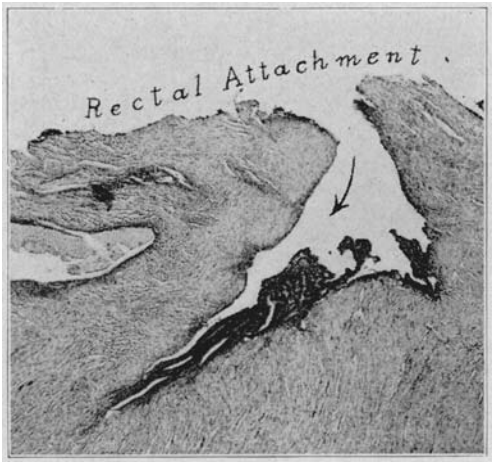

Fig. 63 (Case 3).—Photomicrograph of a section of the posterior wall of the uterus showing the ragged surface caused by freeing the uterus from its attachment to the rectum and also the apparent invasion of the uterine wall from its peritoneal surface (i. e., from "without") by adenoma of endometrial type. Perforating hemorrhagic cysts were present in both ovaries.

of recent hemorrhage into the underlying stroma (Fig. 57). Adenoma of endometrial type was found lining the smaller cyst or pocket (Fig. 58) and also on the surface of the ovary, between it and the uterus. The larger cyst of the right ovary was a graafian follicle cyst, but the smaller hemorrhagic cyst or pocket was lined by an adenoma of normal endometrial type; adenoma of endometrial type was found on the surface of the uterus superficially invading its posterior wall (Fig. 59). A similar adenoma was found invading the wall of the sigmoid on its peritoneal surface, extending through the entire wall into the submucosa. The patient made a satisfactory convalescence and has remained well. The end-result is awaited with great interest to determine the fate of the adenoma, undoubtedly still present in the sigmoid and the culdesac.

CASE 20.—*Perforating hemorrhagic cyst of the right ovary; multiple pelvic adenoma of endometrial type; cancer of the uterine cervix.*—Miss A. N., aged 41, complained of irregular uterine bleeding of three months' duration. The menstruation had been regular, moderate and painless. On account of the irregular uterine bleeding during the last three months, it was impossible to determine recent menstrual dates. There were no symptoms referable to the pelvic adenomas. Pelvic examination showed a friable everting growth occupying the vaginal portion of the cervix, especially the posterior lip. The uterus was freely movable, a definite nodule could be detected posterior to the cervix; this was more evident on the left side and best felt on rectal palpation. The preoperative diagnosis was everting type of cancer of the uterine cervix with possible extension posteriorly on the left side.

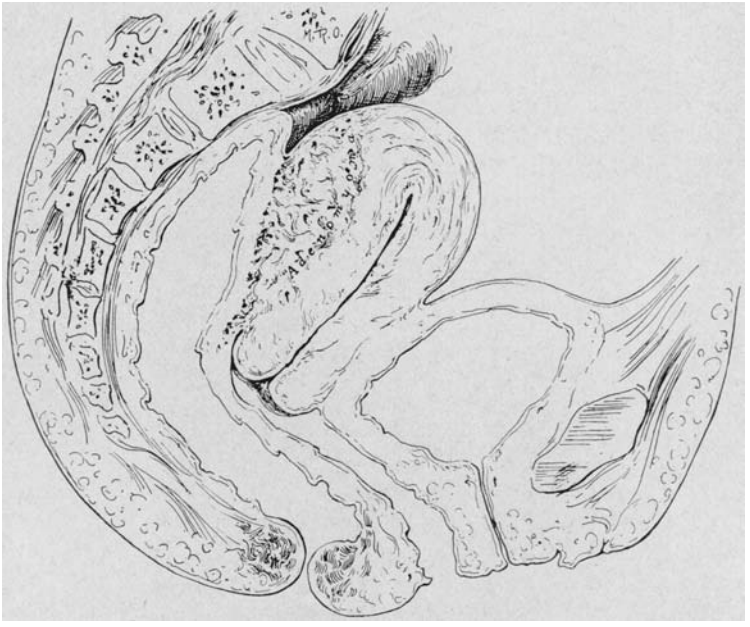

Fig. 64 (Case 2).—Perforating hemorrhagic cysts of both ovaries, diffuse "adenomyoma" of the posterior uterine wall which is fused with the anterior wall of the rectum. Sagittal section of the pelvis; × ½. The "adenomyoma" is apparently not connected with the mucosa of the uterine cavity. I believe this case represents an advanced stage of the conditions shown in the previous illustrations, namely, an "adenomyoma" of the uterus due to the invasion of the uterine wall by adenoma of endometrial type from the culdesac secondary to the escape of the contents of the hemorrhagic cysts into the pelvis.

At operation at the Albany Hospital March 1, 1921, the uterus was found to be freely movable, the right ovary was cystic and adherent to the posterior surface of the uterus. On freeing it, "chocolate" fluid escaped. The lower portion of the ureters and the bladder was freed, and the entire uterus was removed with a wide excision of the parametrium. The lymph nodes about the iliac vessels were also removed. Histologically, the cancer proved to be of the squamous cell variety; the lymph nodes removed did not show cancer. The right ovary contained a hematoma partly lined by the remains of a wavy pigmented layer and with an epithelial lining of the portion of the cyst wall

not occupied by the pigmented layer. Adenoma of endometrial type was also found in the periphery of the ovary about the site of perforation. Secondary adenoma of endometrial type was present in the culdesac just mesial to the left uterosacral ligament (Figs. 71, 72 and 74), in the surface of the posterior uterine wall where it was adherent to the ovary, and on the anterior surface of the uterus in the vesico-uterine fold of peritoneum, just beneath the left round ligament and also to the right of the median line (Fig. 73). The left ovary showed on its under surface a cleft lined by "endometrial" tissue. The patient made a satisfactory convalescence.

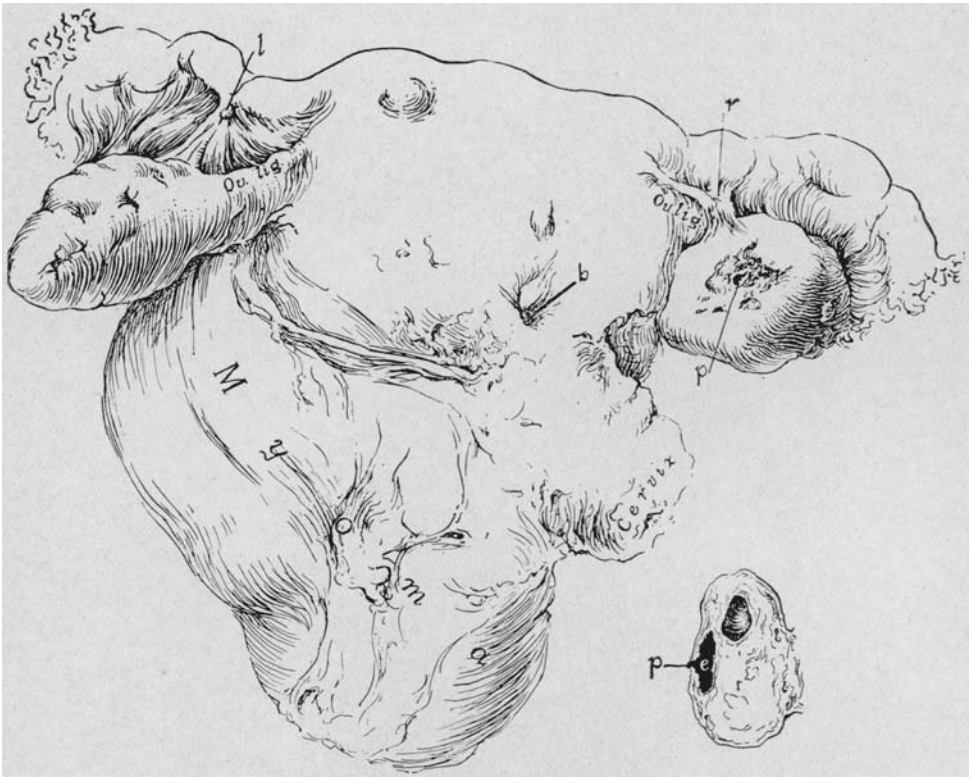

Fig. 65 (Case 22).—Perforating hemorrhagic cyst of the right ovary; multinodular myomatous uterus, deposits of adenoma (endometrial type) on the posterior and anterior surface of both broad ligaments and in the culdesac (the latter deposit not removed), multiple peritoneal blebs (adenomatous) on the anterior and posterior surfaces of the uterus and left broad ligament and in the vesico-uterine fold. Posterior surface of the uterus; × ⅔. The perforation *p* on the under surface of the right ovary is shown with raw area about it caused by freeing it from the posterior surface of the uterus to which it was adherent at *b*. The ovary is also shown in cross section. A hemorrhagic bleb with puckering of the tissue about it (excised for microscopic examination, but unfortunately lost) is indicated at *b*. A puckering of the right broad ligament between the tube and the ovarian ligament is shown—adenoma of endometrial type was found in this tissue (Fig. 67). A similar puckering is shown of the left broad ligament just beneath the tube, adenoma of endometrial type was also present here.

CASE 21.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus with diffuse adenoma of endometrial type involving the posterior surface of the uterus and the anterior wall of the rectum.*—Mrs. T. E., aged 44, complained of marked constipation, much worse at the menstrual

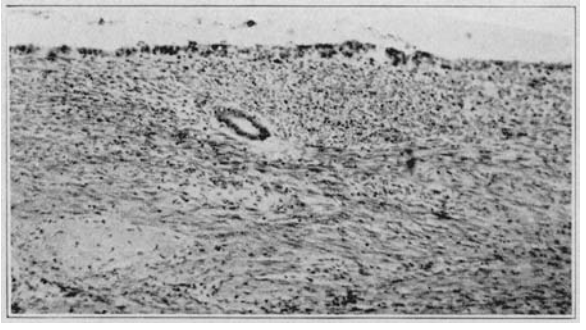

Fig. 66 (Case 22).—Photomicrograph of the wall of the ovarian hematoma showing that it is lined by a single layer of columnar cells with an underlying cellular stroma containing a "gland." It is a hematoma of "endometrial" type and the escape of its contents was the probable cause of the many adenomas of endometrial type found in the adhesions between the folds of peritoneum about the uterus and in the culdesac and also of some, and possibly all, of the peritoneal "blebs" on the surface of the uterus and its ligaments.

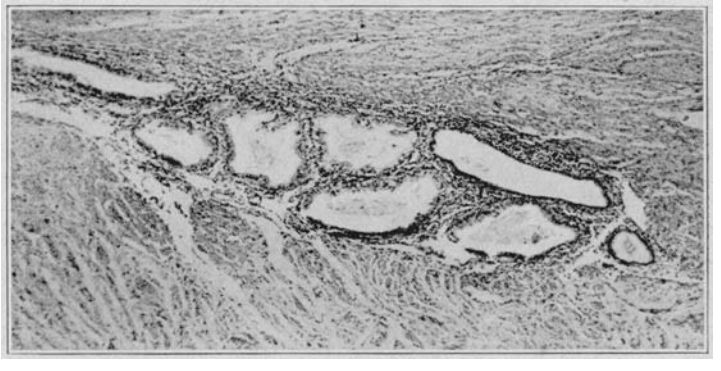

Fig. 67 (Case 22).—Photomicrograph of the puckered right broad ligament shown in Figure 65. Adenoma of endometrial type has developed between the adherent folds of the ligament.

period, especially the last year. She also had indigestion. She had been married six years and had never been pregnant. Menstruation was regular, moderate in amount, occasionally accompanied with slight pain. The constipation was much worse at that time. The last flow occurred two weeks before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, with a distinct area of induration back and above the cervix between the uterus and the rectum. The appendages were not palpated. Preoperative diagnosis was adherent retroflexed uterus, possible perforating hemorrhagic ovarian cyst with adenoma of the culdesac.

Operation was performed at the Albany Hospital March 21, 1921. A median incision was made; the gallbladder was palpated and a stone was felt. The uterus was retroflexed and adherent to the rectum. On drawing the uterus forward, the anterior rectal wall was carried with it. The right ovary was adherent to the side of the pelvis, directly over the course of the right ureter.

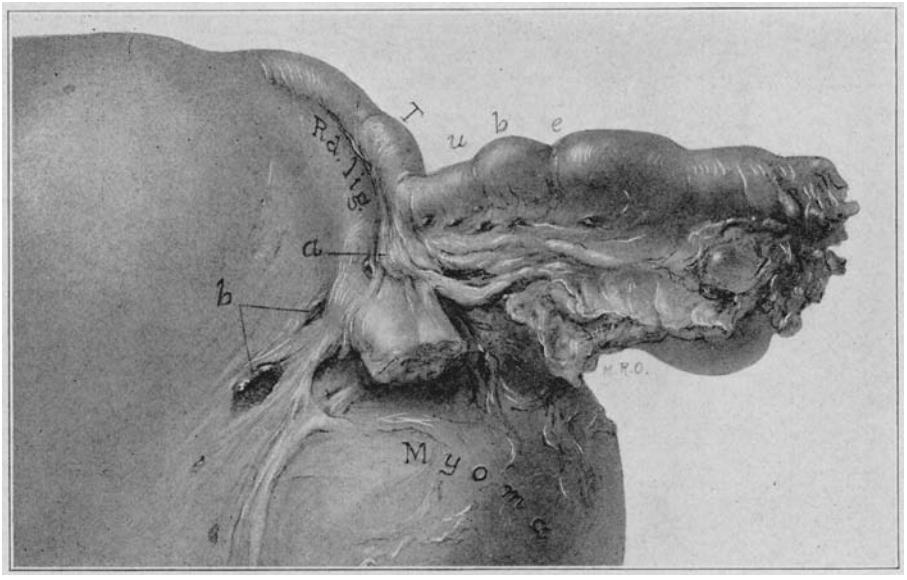

Fig. 68 (Case 22).—"Adenomyoma" of left round ligament with adhesions of the anterior layer of the broad ligament to it, multiple hemorrhagic peritoneal "blebs" (adenomatous). Anterior surface of the left uterine cornu, left tube and round ligament. The anterior surface of the broad ligament is puckered, drawn down and adherent to the round ligament (Fig. 69). The "blebs," many hemorrhagic, with puckering of the tissue about them are similar to the one shown in Figure 70.

On freeing the ovary, "chocolate" fluid escaped. The left ovary seemed normal. Both tubes appeared normal. The appendix, right tube and ovary and the entire uterus were removed (Fig. 16). The gallstone was removed and the gallbladder drained. The left tube and ovary were not removed because the patient was exceedingly nervous, and the ovary appeared normal. I am awaiting the end-results in this case with interest to see whether or not such ovarian conservatism is justifiable. I fully realized at the time that these cysts are often bilateral and that later she may have a similar condition in the left ovary with secondary growths in the pelvis, or the retention of the ovary may stimulate adenomatous deposits which may have been left in the pelvis

at the operation. Histologically the deeper portion of the ovarian cyst was lined by the remains of a pigmented "luteal" layer without an epithelial covering (Fig. 17). The portion of the cyst not occupied by the "luteal" layer was lined by a single layer of columnar epithelium with an underlying vascular stroma (Fig. 19). In the edges of the perforation and in the periphery of the ovary about the site of perforation were deposits of glandular tissue with cellular stroma closely resembling endometrium (Fig. 18). The histologic study of the entire ovary suggested that either the initial rupture of the cyst had been followed by its invasion by epithelium of endometrial type from the periphery of the ovary or else it represents the regeneration of the epithelial lining of an "endometrial" cyst after a hemorrhage. This epithelium extended through the perforation and was relining the cyst. At the same time the "luteal" layer was retrogressing (Fig. 20) and eventually the cyst might be converted into a cyst lined entirely by epithelium of the endometrial type. Adenoma of endometrial type was found in the tissue of the side of the pelvis which was adherent to the ovary at the site of rupture, also in a nodule in the vesico-

Fig. 69 (Case 22).—Photomicrograph of the left round ligament and the adherent broad ligament shown in Figure 68. Adenoma of endometrial type has developed in the peritoneal fold between the two ligaments 1, and has invaded the round ligament causing an "adenomyoma" of that structure.

uterine fold of peritoneum and over a large area of the posterior uterine wall (Figs. 21, 22, 23, 24 and 25) and the anterior wall of the rectum which were adherent to each other (Fig. 26). The patient made a satisfactory recovery.

CASE 22.—*Perforating hemorrhagic cyst of the right ovary; multiple leiomyomas of the uterus; multiple small adenomas of endometrial type on the posterior and the anterior surfaces of the broad ligaments.*—Mrs. A. D., aged 41, complained of pain in the left side, dysmenorrhea and constipation. She had had two children, 13 and 10 years of age. Menstruation was regular, moderate in amount and painless until three years ago. Pain had been present for three years, gradually increasing in severity so that she remained in bed for the first day of the flow. The last flow was three weeks before the operation. Pelvic examination showed an irregular, enlarged uterus with the largest nodule low in the pelvis and to the left side of the cervix. Movements of the uterus were restricted. Preoperative diagnosis was an adherent multinodular myomatous uterus.

Operation at the Albany Hospital April 7, 1921, under nitrous oxid and oxygen anesthesia (patient was a diabetic), revealed a multinodular, myomatous uterus, with the largest nodule about 9 cm. in its greatest diameter, extending between the layers of the left broad ligaments. The right ovary was found adherent to the posterior surface of the uterus, and in freeing it, a small amount of "chocolate" fluid escaped. A small nodule with puckering of the surrounding tissue was found on the posterior surface of both broad ligaments between the ovaries and the tube, a similar nodule was also present in the culdesac (not removed). A small hemorrhagic bleb, about 6 mm. in diameter with puckering of the tissues about it, was found on the part of the posterior surface of the uterus which had been adherent to the right ovary at its site of perforation. Similar blebs were found on the anterior surface of the left broad ligament and about the round ligament. The left broad ligament was puckered and adherent to the round ligament drawing the tube down toward it (Fig. 68). The tubes, ovaries, uterus and nearly the entire cervix were removed (appendix removed at a previous operation). Histologically, the cyst of the

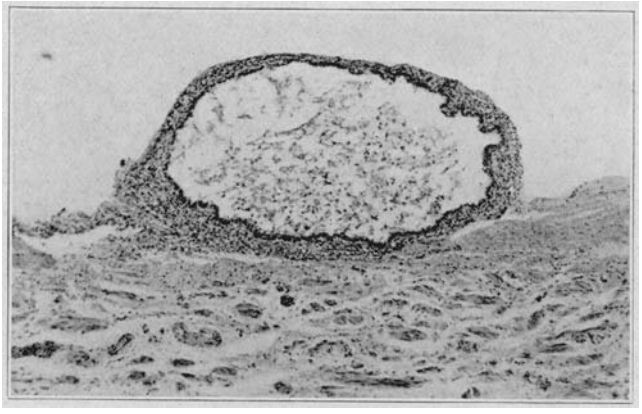

Fig. 70 (Case 22).—Photomicrograph (lower power than preceding) of one of the smaller peritoneal blebs or cysts shown in Figure 68. It is lined by columnar cells resting on a cellular stroma. Histologically, it is an "endometrial" cyst and similar to the cyst partially detached from the ovary shown in Figure 49 (Case 23). The other peritoneal cysts indicated in Figure 68 were examined microscopically and showed a similar condition. If these blebs are of endometrial type and are derived from the contents of the ovary, what is their development? Three possible explanations suggest themselves: first, from the deposit of epithelial cells from the ovary on the peritoneum and their subsequent development into a cyst as shown in Figure 22 (Case 21); second, a small cyst or dilated gland may have been detached from the ovary as shown in Figures 32 and 56 (*M*), and may be implanted on the peritoneum and then increase in size, and third, the "specific" irritation of the contents of the ovary caused a metaplasia of the peritoneal endothelium giving rise to a cyst of endometrial type.

right ovary was lined by columnar cells with a vascular stroma and in places gland formation. The histologic structure of this cyst was that of a cystoma of the endometrial type (Fig. 66). The nodules in the broad ligaments showed adenoma of endometrial type (Fig. 67), the one on the anterior surface of the left broad ligament had invaded the round ligament forming an "adenomyoma" (Fig. 69). The blebs were interesting in that they were lined by low, cuboidal and columnar epithelium with a vascular underlying stroma (Fig. 70). The supporters of the serosal origin of adenomyoma would probably interpret them as the development of adenomyoma from metaplasia of the peritoneal "endo-

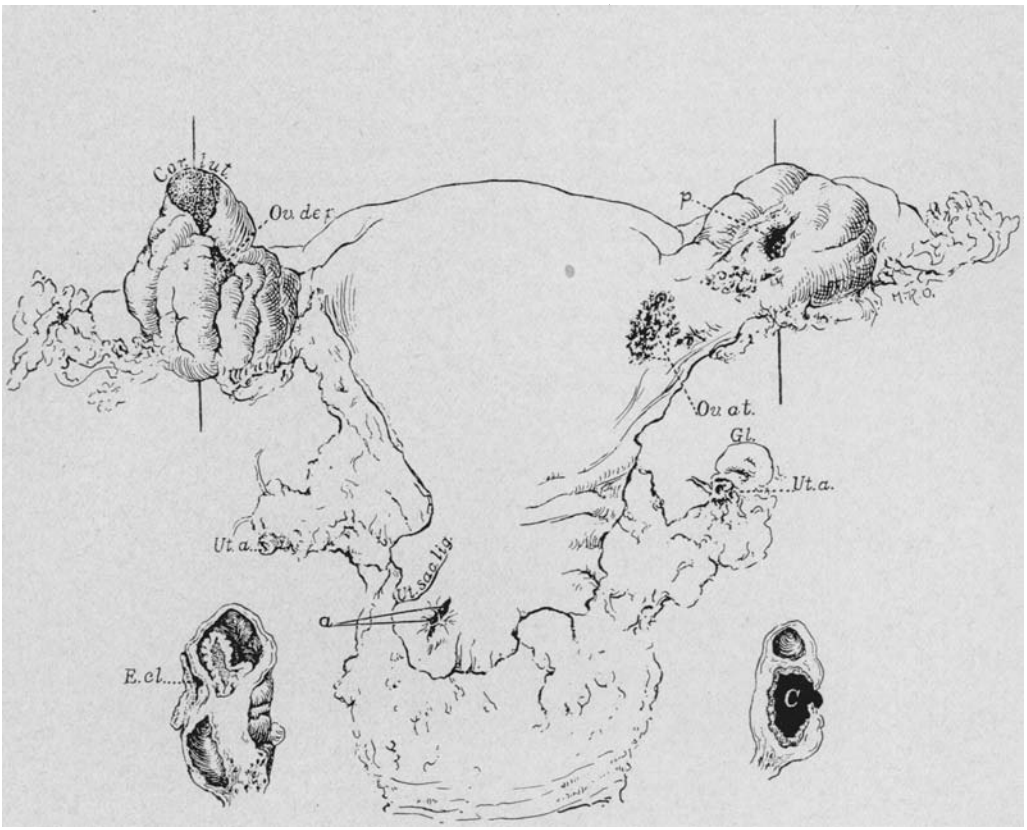

Fig. 71 (Case 20).—Perforating hemorrhagic cyst of the right ovary; adenoma of endometrial type near the left uterosacral ligament below the left round ligament and in the vesico-uterine fold; cancer of the uterine cervix. Posterior surface of the uterus, tubes and ovaries; × ⅔. The right ovary was adherent to the posterior surface of the uterus at *Ov.* Its perforation (*p*) is situated on the lateral surface. On the lateral surface of the left ovary is a small pigmented area *ov. dep.* beneath which is a space lined by columnar epithelium. *Gl.* represents a parametrial lymph node. Just mesial to the left uterosacral ligament is an indurated area with puckering of the peritoneum about it. Small pigmented cysts can be seen in this tissue (Figs. 72 and 74). Histologically, portions of the right ovarian hematoma, the epithelial cleft in the left ovary and the nodules near the left uterosacral ligament, left round ligament and in the vesico-uterine fold are similar, namely, adenocystomas of endometrial type, apparently primary in the ovaries with secondary deposits in the other places.

thelium." For further description of the findings in this case see the illustrations with their legends. The patient made a satisfactory recovery.

CASE 23.—*Perforating hemorrhagic cyst of the left ovary; adherent retroflexed uterus with adenoma of endometrial type involving the posterior surface of the cervix, uniting the latter to the bottom of the culdesac and the rectum and extending through the vaginal wall and presenting as a hemorrhagic cyst in the vaginal vault behind the cervix.*—Mrs. G. H., aged 47, complained of bearing down sensations. She had had four children, the youngest 10 years of age. Menstruation was regular, moderate in amount and painless. The last flow occurred two weeks before the operation. She was not constipated. Pelvic examination showed a weakened pelvic floor, uterus retroflexed and adherent, with a small nodule in the posterior vaginal vault just back of the cervix, and to the left of the median line. A definite nodular induration was felt in the bottom of the culdesac between the cervix and the rectum. The appendages on the right side felt normal, while the left appendages seemed enlarged and adherent. The preoperative diagnosis was an adherent retroflexed uterus, perforating hemorrhagic cyst of the left ovary and adenoma of endometrial type in the bottom of the culdesac and extending through the vaginal vault.

Fig. 72 (Case 20).—Indurated area mesial to left uterosacral ligament containing small cysts (Fig. 73). Note the puckering of the peritoneum about this area, see Figure 74. (I have not yet been able to demonstrate the development of this type of lesion as I have that shown in Figure 24.)

At operation at the Albany Hospital April 18, 1921, the uterus was found to be retroflexed and adherent The omentum was adherent to the left ovary and the left round ligament. The left ovary was cystic, drawn up over the left tube and adherent at the point of rupture to the left round ligament and omentum (Fig. 47). The right tube and ovary were freely movable. On drawing the uterus forward, the anterior wall of the rectum, which was adherent to the supravaginal portion of the cervix, was carried with it in a characteristic manner. On freeing the omentum and left ovary, "chocolate" fluid escaped (Fig. 48). The appendix, both tubes and ovaries and the entire uterus were removed, and the pelvic floor was repaired. Histologically, the ovarian cyst was in part lined by cuboidal and columnar epithelium, columnar predominating with a vascular underlying stroma (Fig. 49) and evidence of old and recent hemorrhages. In other places, there was a wavy membrane filled with pigmented cells lining the cavity and without an epithelial covering, the probable results of hemorrhage into the wall of the cyst. Sections through the posterior wall of the cervix

and the vagina showed that these structures were invaded by an adenoma of endometrial type (Fig. 53), which at the time of operation was found filled with old blood forming small cavities. Adenoma of the endometrial type was also found in a fold of the peritoneum about the left round ligament where the perforating cyst had been sealed (Fig. 51). Histologically, the process in the ovary, the fold of the peritoneum about the round ligament, the posterior wall of the supravaginal portion of the cervix and the posterior vaginal wall are the same, namely, an adenoma of endometrial type. The patient made a satisfactory recovery.

CONCLUSIONS

Perforating hemorrhagic cysts of the ovary occur most frequently in women between 30 years of age and the menopause. In the twenty-three cases reported in this paper, only two were under 30 and the oldest patient was 47. It is quite a common condition, probably occurring in nearly 10 per cent. of the women of these age limits who require abdominal operations for the relief of pelvic disease. During the year, May 1, 1920, to May 1, 1921, I found perforating hemorrhagic cysts of the ovary in fourteen of 178 patients between 30 and 50 years of age who had an abdominal operation for some disease of the pelvic organs.

The cysts are usually small, between 2 and 4 cm. in diameter, occasionally less than 2 and also occasionally larger than 4 cm. They are quite frequently bilateral, as in eight of the twenty-three cases.

At operation the cyst or ovary is found to be adherent, and in freeing it the "chocolate" contents escape because a previous perforation, which had been sealed by whatever structure the ovary had become adherent to, is reopened or the cyst is torn. Adhesions, due to the "irritating" action of the material which had previously escaped from the ovary, are always present, and these vary greatly in location, density and extent. They may be found in any of the natural pockets and folds of the pelvis where such material would be apt to lodge, and especially in the culdesac. When slight, they simulate the adhesions resulting from pelvic peritonitis of tubal origin; on the other hand, the adhesions in the culdesac may be accompanied by such a marked reaction as to resemble malignancy.

The histologic findings in these cysts vary in different specimens and in different portions of the same cyst. With my present knowledge of their life history, I prefer to state "possibilities" rather than make definite statements which may later prove to be incorrect. There may be several varieties of these cysts; but I am more inclined to believe that most of the apparently different kinds represent various stages in the development and retrogression of one type of cyst and the various phases in its "menstrual" cycle. The initial perforation may have

Fig. 73 (Case 20).—Adenoma of endometrial type in the vesico-uterine fold just below the left round ligament. Sagittal section of the uterus; × ⅔. *A* indicates the situation of a small pigmented nodule with puckering of the peritoneum about it. A similar nodule was present in the vesico-uterine fold to the right of the midline corresponding to *X* in the illustration. Histologically, these nodules were similar to the one near the left uterosacral ligament (Fig. 74).

Fig. 74 (Case 20).—Enlargement (× 10) of a stained section of the indurated area mesial to the left uterosacral ligament (Figs. 71 and 72). Cystlike cavities are present which are lined by tissue of endometrial type and with evidence of former hemorrhage as shown by pigmented cells in their walls.

been the rupture of an "endometrial," graafian follicle or atretic follicle hematoma; or following ovulation, an abnormal corpus luteum may have developed due to the invasion of "endometrial tissue" present at the site of rupture. One group of these perforating hemorrhagic cysts shows these conditions: A portion of the hematoma, usually the deeper, is lined by a "luteal" membrane the exact origin of which in some specimens is difficult to state. The rest of the cyst, usually toward the perforation, is apparently being relined by the invasion of epithelium, through the perforation, from epithelium situated in the periphery of the ovary at the site of rupture. This epithelial relining or regeneration is of endometrial type, both in structure and in function. With the advance of the epithelial invasion, the "luteal" membrane retrogresses, and eventually the entire cyst may be relined by this epithelial tissue. This group represents either the development of an "endometrial" cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it represents the regeneration of an "endometrial" cyst after a hemorrhage ("menstrual"). Another group apparently represents either an earlier or a later stage of the former. The cysts in this group are entirely lined with epithelium, low, cuboidal or columnar; all three types of epithelium are often present in the same cyst. Usually there is a vascular cellular stroma not unlike that of the endometrium, between the epithelium and the ovarian tissue, often with evidence of old and recent hemorrhage. This stroma varies greatly in thickness and in some instances may be very thin or lacking. Structures, like uterine glands, may be present in this stroma, and these are usually most numerous near the site of the perforation. The entire cyst is like the epithelial portion of the cysts described in the first group, and all gradations between the two groups may be found.

The exact counterpart of the epithelial lining of these ovarian hematomas may be found in the uterine hematomas often occurring in "adenomyoma" of the uterus and apparently due to the retention of menstrual blood. Tissue of endometrial type is also present in pockets in the periphery of the ovary about the perforation, and the tissue in these pockets may resemble normal endometrium more closely than that lining the hematoma in the same ovary. The histologic study of these hematomas shows that periodic hemorrhage similar to that of menstruation occurs. I have come to the conclusion that these ovarian hematomas are of endometrial type just as are the uterine hematomas found in "adenomyoma" of the uterus.

I have never found these cysts in women after the menopause and some of those which I have studied were small and apparently retrogressing rapidly. In two instances in which I found adhesions with adenoma of endometrial type in the pelvis, but no gross evidence of

these cysts in the ovaries, pockets were found in the periphery of the ovaries lined by columnar cells and a cellular stroma resembling endometrial tissue. I interpreted these pockets as the possible remains of a perforating hemorrhagic cyst in which nearly complete retrogression had occurred. For these reasons I have concluded that their life may sometimes be of short duration, and the "characteristic" adhesions resulting from them may persist long after the cyst has disappeared.

The adhesions form equally as interesting a pathologic study as the cysts themselves because adenoma of endometrial type is present in the tissues involved by the adhesions in a large percentage of the cases. I have studied histologically the tissues involved by the adhesions outside the ovary in fourteen of the twenty-three specimens, and adenoma of endometrial type was found in thirteen of these.

Some time, or possibly many times, in the life of these hematomas, material, including epithelial tissue and blood ("menstrual"), may escape into the peritoneal cavity from the hemorrhagic cyst or from the "endometrial" pockets in the ovary about the site of perforation and, lodging in the natural pockets and peritoneal folds of the pelvis, they may cause adhesions. Adenoma of endometrial type often develops between the adherent folds of peritoneum thus resulting. *These adenomas may be small, and quiescent or they may be invasive. If invasive they may cause "adenomyoma" of the uterus by invasion of the uterine wall from "without" or "adenomyoma" of the uterosacral ligament, round ligament, rectovaginal septum, rectum, sigmoid, etc., namely, whatever structure or organ is invaded by the adenoma arising from the "infective" contents of the cyst or ovary lodging on its surface.* The question naturally arises, In what way do the contents of the cyst or ovary cause the development of these adenomas? Is it due to some "specific" irritant present in the cyst contents which stimulates the peritoneal "endothelium"; thus causing a metaplasia and the development of "endometrial" tissue typical both in structure and in function? Some may assert that dormant "endometrial" epithelium may be present in the tissues soiled by the contents of the cyst and this is stimulated to further growth. *It seems to me that the condition found in many of these specimens is analogous to the implantation of ovarian papilloma or cancer on the peritoneal surface of the pelvis from the rupture of an ovarian tumor containing these growths.*

I offer the following data as evidence that perforating hemorrhagic cysts of the ovary are hematomas of endometrial type.

1. These hematomas, as the uterine mucosa, manifest their "activity" during the menstrual life of the patient.

2. Histologically, the epithelial lining of the ovarian hematomas is similar to that of the uterine hematomas, due to the retention of "menstrual" blood, often present in "adenomyoma" of the uterus.

3. Periodic hemorrhages occur in the ovarian hematomas which are similar in gross and histologic appearance to that of menstruating endometrium.

4. The "chocolate" contents of the ovarian hematomas resemble old menstrual blood.

5. In two patients operated on at the time of the menstrual period, one the day that menstruation was due (Case 13, Fig. 29), and the other the last day of menstruation (Case 19, Fig. 57), the histologic changes in the ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient.

6. The fact that material escaping from the ovarian hematomas may give rise to the development of adenoma of endometrial type in the tissues thus soiled is further proof that these hematomas contain "endometrial" tissue.

I cannot state that these ovarian hematomas of endometrial type are the only cause of ectopic pelvic adenomas.

Perforating hemorrhagic cysts of the ovary with their secondary peritoneal "implantations" are a pathologic entity as definite as that of ovarian papilloma and cancer. They are likewise a definite clinical entity which is capable of diagnosis before operation in a large percentage of the cases.

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