INTESTINAL ADENOMAS OF ENDOMETRIAL TYPE

THEIR IMPORTANCE AND THEIR RELATION TO OVARIAN HEMATOMAS OF ENDOMETRIAL TYPE (PERFORATING HEMORRHAGIC CYSTS OF THE OVARY) *

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In a recent article I stated that I [1] believed that perforating hemorrhagic (chocolate) cysts of the ovary were hematomas of endometrial type, and that at the time of the perforation of the cyst some of the epithelium lining it might be carried with the contents of the cyst into the peritoneal cavity. This epithelium might become lodged on the surface of the peritoneum, soiled by the contents of the cyst, and there develop into adenomas of endometrial type. The adenomas arising from the implantation of this epithelium might be small and quiescent, or they might become invasive, giving rise to so-called adenomyomas of the part invaded. I compared the conditions arising from the perforation of these cysts with the implantations of ovarian papilloma and cancer resulting from the rupture or perforation of an ovarian tumor containing these growths. These cysts were described as developing most frequently in women between 30 years of age and the menopause. In the forty-nine cases studied up to this date (Nov. 25, 1921) only four patients were under 30 years of age, the youngest being 23 (the other three were 28). I have encountered only one instance in a patient after the menopause. In this case the remains of an undoubted ovarian hematoma of endometrial type, with its associated implantation adenomas, were found.

The size of these hematomas was described in the previous paper as being usually between 2 and 4 cm. in diameter, occasionally less

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1. Sampson, J. A.: Perforating Hemorrhagic (Chocolate) Cysts of the Ovary, Arch. Surg. 3:245-323 (Sept.) 1921.

than 2 cm. and also occasionally larger than 4 cm.   Since I have learned to recognize the early stages in the development of this condition and likewise some of the later stages in their retrogression, I have been able to detect specimens which previously would have been overlooked.   I would modify the foregoing statement in regard to their size by adding that they are often so small and inconspicuous that they may be easily missed both at the time of the operation and in the pathologic laboratory.   The hemorrhage or pigmentation, the result of previous hemorrhage, in the ovarian tissue about the smaller cysts or extending into their lumina will usually call one's attention to an abnormal condition of the ovary.   The histologic examination of this area will show whether or not a gland, tubule or small cyst of endometrial type is present.

In discussing the frequency of this condition, I stated that during the year, May 1, 1920, to May 1, 1921, I had found perforating hemorrhagic cysts of the ovary in fourteen of 178 patients between 30 and 50 years of age who had had an abdominal operation for some disease of the pelvic organs.   Since I have learned to recognize the earlier and also the later stages of this condition, I have reviewed some of the questionable specimens removed during that year and have been able to add four more cases to the fourteen.   During the last six operative months, I have encountered nineteen cases of perforating hemorrhagic cysts of the ovary in my practice.   The amount of my operative work has not increased and I do not believe the frequency of this condition has; but I am better able to recognize it, both during the operation and in the systematic study of the specimens afterward.   It is a common condition, probably present in from 10 to 20 per cent. of women between 30 years of age and the menopause who require an abdominal operation for some disease of the pelvic organs.

At operation the cyst or ovary is usually adherent, and in freeing it the "chocolate" contents escape because a previous perforation, which has been sealed by whatever structure the ovary or cyst has become adherent to, is reopened or the cyst is torn.   Adhesions and other signs of implantation are present if a perforation has occurred, and these vary greatly in location and extent.   They are found where the contents from the perforation of such a cyst would be likely to fall, as in any of the natural pockets and folds of the pelvis and on any of the structures situated in the pelvis at the time of perforation and especially in the bottom of the culdesac.   One would suppose that the rectum, sigmoid, terminal loop of the ileum and the appendix would frequently be invaded by these adenomas.   This is true as will be shown later in this communication.

THE INCIDENCE OF ADENOMAS OF ENDOMETRIAL TYPE OF
THE INTESTINE AND THEIR RELATION TO OVARIAN
HEMATOMAS OF ENDOMETRIAL TYPE

My attention was first directed to a so-called adenomyoma of the intestine in the year 1909 (Case 1). February 10 of that year, I operated on a woman, 36 years of age, the preoperative diagnosis being a tubal inflammatory disease of the left side and a weakened pelvic floor. On exposing the pelvic contents, the left ovary was found to be cystic and densely adherent. I removed the left tube and ovary and then noticed that there was an indurated area in the wall of the sigmoid, just below the pelvic brim, which was diagnosed
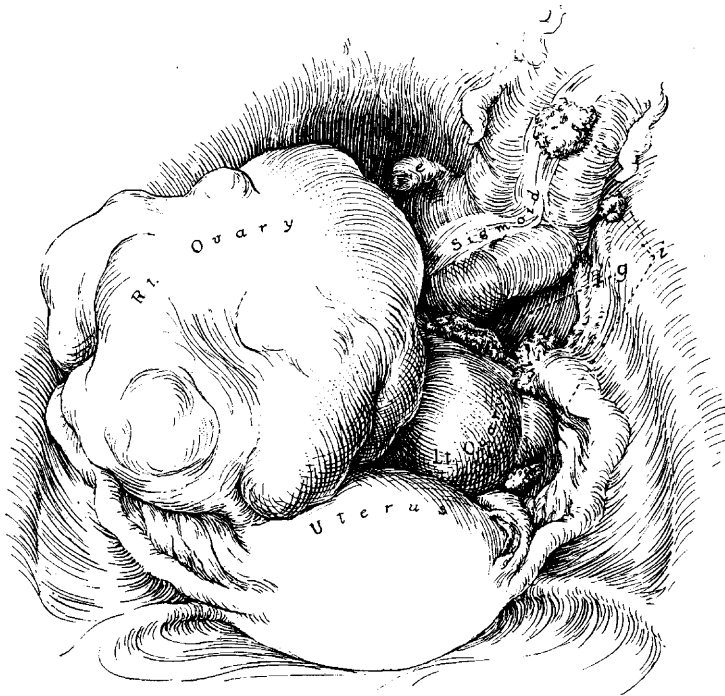

Fig. 1.—Implantation carcinoma of the sigmoid secondary to the perforation of a carcinomatous cyst of the right ovary; bilateral ovarian carcinoma. View of the pelvic contents from above; × ⅔. The implantations (*i*) are shown on the anterior surface of the sigmoid, its mesentery, on the posterior surface of the left broad ligament, and also involving an epiploic appendage (*e*). The growth (*g*) on the surface of the left ovary may have been an implantation from the right ovary or a direct extension through the wall of the left ovary. A perforation had occurred through the lateral and lower wall of the right ovarian cyst and this had been sealed by the pelvic wall, to which it had become adherent. The left ovarian tumor, about as large as the right, filled the culdesac and only a small portion of it is shown in this illustration. Compare Figure 2.

as a carcinoma of this part of the bowel. About 8 cm. of the intestine, including this area, was resected and the intestine was repaired by an end-to-end anastomosis. A section of the intestine showed a typical adenoma of endometrial type, apparently invading the sigmoid from its serous surface (Fig. 46). The cystic ovary was not examined microscopically and no mention was made in the operative notes of the presence of an ovarian hematoma. In only one of the twenty-three cases reported in my recent paper was a portion of the intestine removed (Case 19 of that series and Case 2 of the present series). The histologic findings in the section of the sigmoid removed in this case are shown in Figure 42 and are similar to those found in the preceding one. With my present knowledge of the subject, I believe that had I examined carefully the portions of the intestine in the pelvis in the twenty-three cases mentioned above and had it

Fig. 2.—Bilateral ovarian carcinoma with perforation of the right carcinomatous ovarian cyst and implantations on the posterior layer of both broad ligaments, the fallopian tubes and the posterior wall of the uterus. Posterior view of the uterus, tubes and ovaries shown in Figure 1; × ½. The implantations (*i*) on the posterior layers of the broad ligaments are shown (Compare with Figs. 13 and 19). The implantation involving the distal portion of the right tube had penetrated the wall of the tube and is protruding through its fimbriated opening (*c*). Implantations (*imp.*) are present on the posterior wall of the uterus (Compare with Figs. 13 and 28). The growth (*g*) was referred to in Figure 1. In places the carcinoma resembled an adenocarcinoma of the uterine mucosa. Some of the cells were ciliated. I believe this tumor may have arisen from misplaced "endometrial" epithelium in the ovary, just as ovarian hematomas of endometrial type arise from this epithelium. Ovarian carcinomas with their secondary peritoneal implantations are a well recognized pathologic entity and also a well recognized clinical entity which can often be diagnosed prior to operation.

been possible to examine histologically the portion of the rectum which was adherent to the posterior wall of the cervix and uterus, adenoma of endometrial type would have been found in a large percentage of these cases. In the nineteen cases of ovarian hematomas in which I have operated since the above mentioned series, adenoma of endometrial type, involving some portion of the intestinal tract, was found in eight instances; and I believe that had it been feasible to examine histologically the portion of the rectum adherent to the cervix or uterus in some of the others adenoma invading the rectum
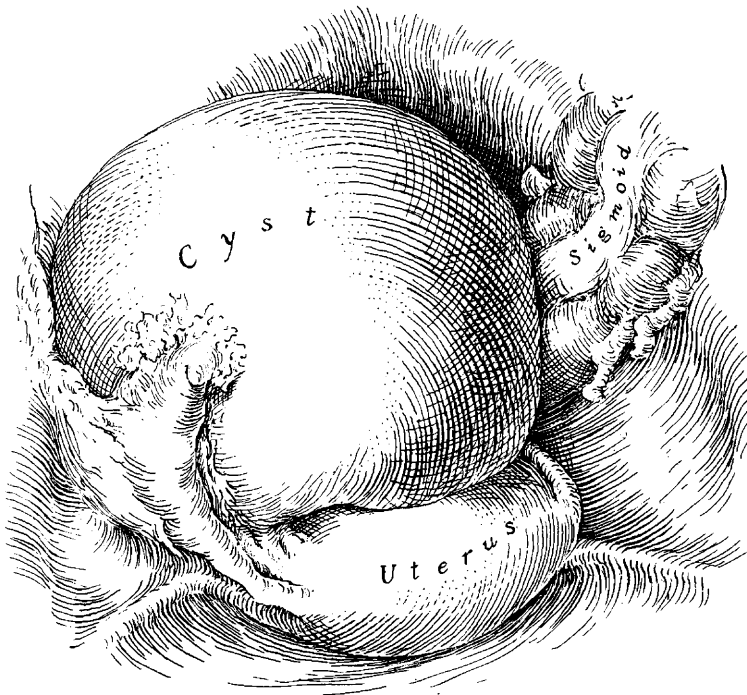

Fig. 3 (Case 4).—Perforated hematoma (hemorrhagic cyst) of endometrial type of the right ovary. View of the pelvic contents from above; × ⅔. The ovarian cyst filled the pelvis. A perforation had occurred through the lower wall of the cyst and this had been sealed by the posterior surface of the right broad ligament to which it had become adherent. On freeing the right ovary, the cyst was torn or the perforation reopened and a large amount of "chocolate" fluid escaped. Compare Figure 4.

would have been found in some of these. This small series of nineteen cases suggests that implantation adenoma of endometrial type of some portion of the intestinal tract may be present in at least one half of the cases of perforated ovarian hematoma of endometrial type with peritoneal implantations. If this type of ovarian hema-

toma occurs in from 10 to 20 per cent. of women between 30 years of age and the menopause that require an abdominal operation for some pelvic disease, then endometrial adenoma of the intestines is quite a common condition. On account of its frequency, pathologic and clinical importance, it deserves a greater recognition than has

Fig. 4 (Case 4).—Implantation adenoma (of endometrial type) of the sigmoid, posterior surface of the uterus, left tube and left ovary; and a large hematoma (of endometrial type) of the right ovary with evidence of a previous perforation. Condition found at operation after ligating and cutting the ovarian vessels and drawing the uterus upward and forward; ×⅚. An indentation of the sigmoid with thickening of its wall is shown at *c* (Compare Fig. 5.) A hemorrhagic cyst on the surface of the mesentery of the sigmoid with induration of the underlying tissue is indicated at *a* (Compare Fig. 8). The epiploic appendages (*b*) are thickened and contracted (Compare Figs. 6 and 7). The perforation *p* in the hematoma of the right ovary is shown and also implantations (*t*) in the left tube. The distribution of the involvement of the sigmoid is similar to that shown in Figure 1. For a description of the right ovarian cyst and the implantations on the posterior surface of the uterus and tube, compare Figures 9, 10, 11 and 12.
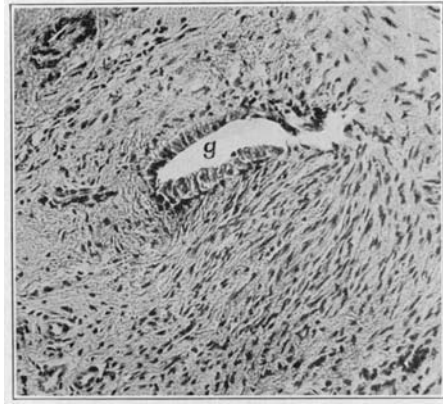
Fig. 5 (Case 4).—Adenoma (of endometrial type) in the wall of the sigmoid. A small wedge-shaped piece was excised from the indurated wall of the sigmoid shown at *c*, Figure 4. Photomicrograph shows a glandlike space (*g*) lined by columnar epithelial cells resembling those of the endometrium.

Fig. 6 (Case 4).—Adenoma (of endometrial type) of an epiploic appendage. Cross section, ✕ 10, of one of the epiploic appendages shown at *b*, Figure 4. The adenoma has apparently invaded the appendage in the depression indicated by the arrow and has extended through the appendage appearing on the opposite side as an endometrial polyp (*e*). The marked increase in the connective tissue about the adenoma may be noted.

been accorded it in the past. The question naturally arises, Do all cases of this type of adenoma of the intestines arise from the implantation of the epithelial contents of a perforated ovarian hematoma of endometrial type? The twelve cases of this type of intestinal adenoma which I have studied were all associated with an ovarian hematoma (not positively proved in one case) and could have arisen from them. The ovarian hematomas may be very small (Fig. 52), and in the retrogressive changes due to repeated hemorrhage and loss of their epithelial lining, the remains of the smaller ones may become very inconspicuous (Fig. 51), or they may even entirely disappear. For these reasons it is difficult to rule out the ovary as a source of the
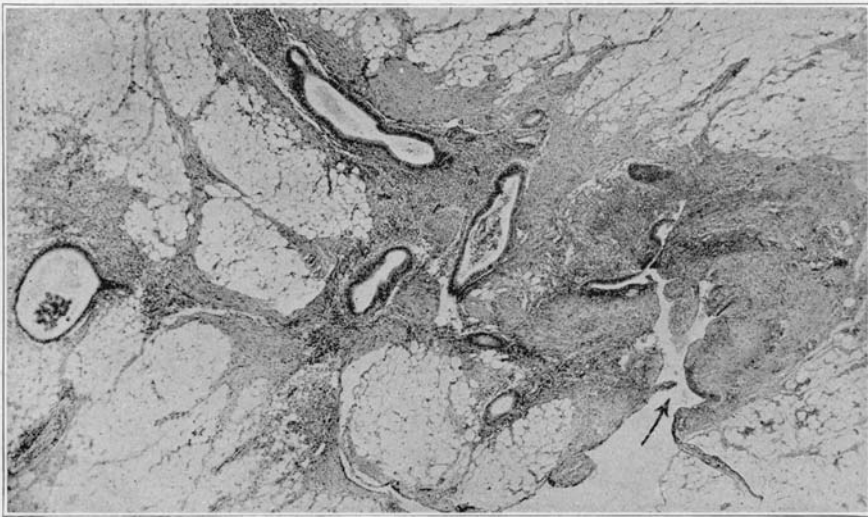

Fig. 7 (Case 4).—Photomicrograph of adenoma (of endometrial type) of an epiploic appendage at the apparent portal of invasion. The arrow indicates the portal of invasion. The appearance of the tissues at this place suggests that the epithelium originally implanted on the appendage had died out; this, together with the increase in the connective tissue, causes the retracted condition. The glandlike spaces and tubules are lined by columnar epithelium similar to that found in the endometrium and also that lining the perforated ovarian hematoma (Fig. 11).

implantations, even though the ovaries appear normal. However, I believe that they may also arise from a source other than ovarian hematomas, as will be discussed later in this paper.

PATHOLOGIC ANATOMY

Implantation carcinoma of the various organs and structures of the peritoneal cavity is well recognized both by pathologists and clinicians and likewise the important part played by ovarian carci-

noma as a source of these implantations. Implantation adenomas of endometrial type are analogous to those of carcinoma, and I believe that ovarian hematomas of endometrial type with perforation are a frequent, possibly the principal, source of these implantations. The implantations, as in those of ovarian carcinoma, are found where the contents escaping from the perforation of such a hematoma would be likely to fall, as on any of the structures found in the pelvis and especially in the culdesac. As already stated, we would expect that the portions of the intestinal tract normally found in the pelvis would often
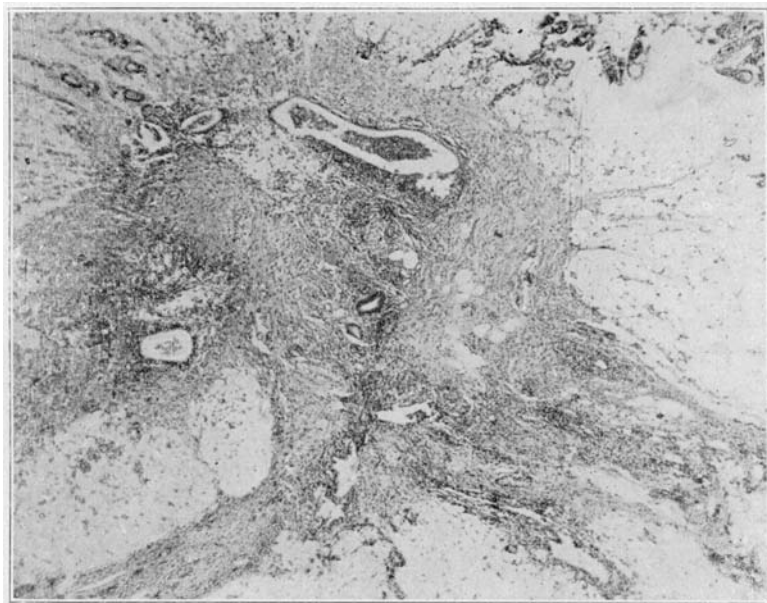

Fig. 8 (Case 4).—Implantation adenoma (of endometrial type) invading the mesentery of the sigmoid. I believe the hemorrhagic bleb (Fig. 4 *a*) was encysted menstrual blood from the underlying adenoma which is shown in this photomicrograph. The glandlike structures are of endometrial type, with evidence of hemorrhage (menstrual) into the tissues about them and into the lumina of some of the glands. The reaction of the surrounding tissue is similar to that shown in Figure 7.

be the seat of these implantations. I believe that implantations are often present on the rectum, sigmoid, small intestine and appendix. In the twelve cases reported in this communication the rectum and the sigmoid, including the epiploic appendages and their mesentery, were involved in eight, the appendix in four and the small intestine in two. It is interesting to note that of the eight instances of implantation on the sigmoid and rectum the ovarian hematoma was situated in the left ovary in six; while of the four instances of implantation on the
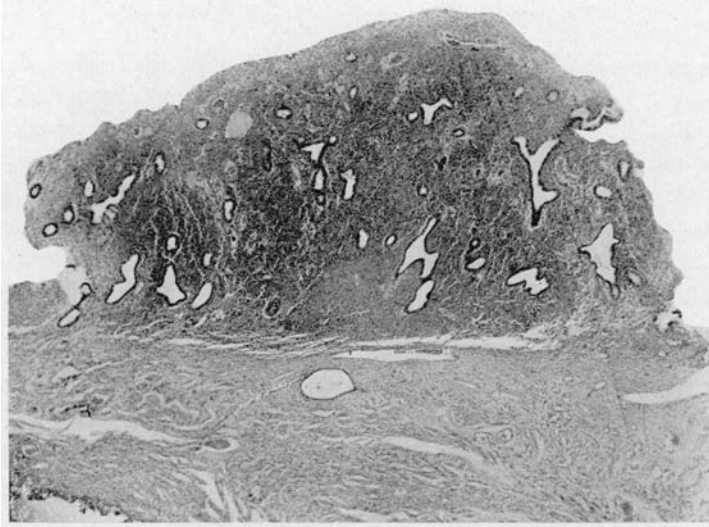
Fig. 9 (Case 4).—Photomicrograph of an implantation adenoma (of endometrial type) on the surface of the left tube (Fig. 4 *t*). Histologically, it resembles normal endometrium. It is analogous to the implantation carcinoma shown in Figure 2.
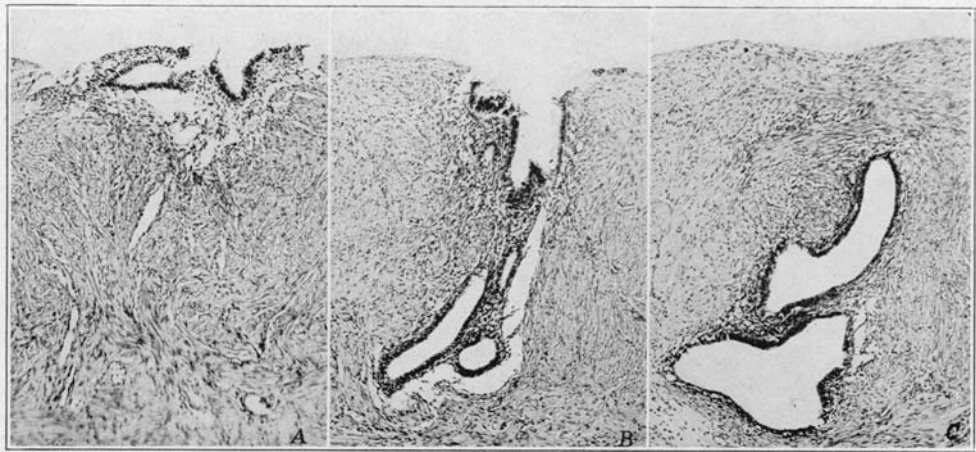

Fig. 10 (Case 4).—The invasion of the posterior uterine wall from the implantation of adenoma (of endometrial type) on its surface (Fig. 13 *c*). Photomicrographs of serial sections (some sections purposely not shown): *A* shows the adenoma on the surface: *B*, its invasion of the uterine wall, and *C*, tubules or glands in the uterine wall beyond the implanted area giving rise to a so-called adenomyoma of the uterus. I believe that this adenoma of the uterus did not arise from the direct invasion of the uterine mucosa of the uterine cavity or from developmental inclusions of müllerian epithelium or from a metaplasia of the peritoneal mesothelium; but I believe it arose from the implantation of epithelium from the lining of a hemorrhagic cyst of the ovary which had perforated (Compare Figs. 11 and 12).

appendix the ovarian hematoma was situated in the right ovary in all four. This suggests that while the intestinal implantations from either ovary may be general in their pelvic distribution the portion of the intestine usually situated near that ovary is more likely to be involved.

The character of the lesions varies greatly; most of them are insignificant and chiefly of histologic interest, but even these carry with them the possibility of invasion, coupled with that of function, namely, periodic hemorrhage (menstruation). The menstrual blood may be unable to escape and is retained in the tissues surrounding the adenoma or in its lumen. In other instances the menstrual blood escapes into the peritoneal cavity, possibly carrying with it epithelial cells which may give rise to further implantations, just as the implantations arose from the original source. The adenoma then may spread
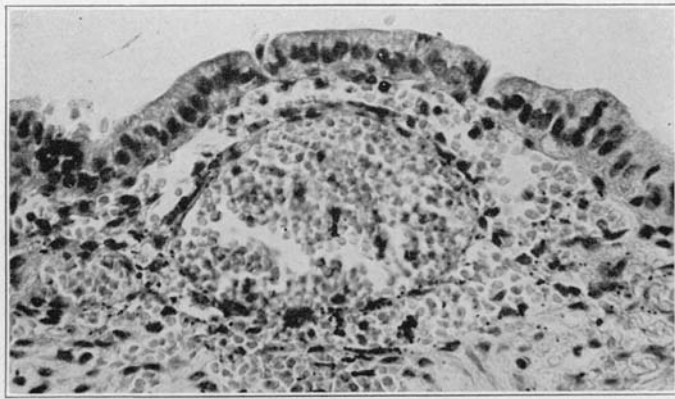

Fig. 11 (Case 4).—Photomicrograph of a section of the wall of the perforated hematoma (of endometrial type) of the right ovary. The cyst or hematoma is lined by cuboidal to columnar epithelium, with evidence of hemorrhage into the underlying ovarian stroma just as in menstruating uterine mucosa. Histologically, the epithelium lining the hematoma is similar to that lining the glands and tubules in the implantations. The escape of this blood into the cavity of the hematoma would carry with it some of the overlying epithelium (absent in places), and the escape of the contents of the cyst through the perforation might carry some of these epithelial cells into the peritoneal cavity; and wherever they might lodge peritoneal implantations might arise just as in ovarian carcinoma. I believe this was the origin of the majority (possibly all) of the implantation adenomas shown in the illustrations of this case.

from the implantations both by growth by continuity and by implantations. In other instances, the implantation adenoma is of great clinical importance, that is, when it involves some portion of the intestinal tract in such a way as to interfere with its function. The disturbance of function is then a mechanical one, as in carcinoma, namely, that

of obstruction, and the obstruction in endometrial adenoma may be due to three factors: first, the constriction of the lumen of the bowel by the growth and especially by the marked hypertrophy of the tissues surrounding the adenoma (Fig. 54); second, by kinking the intestine, evident in Figure 4, and third, by the accumulation of menstrual blood in the adenoma causing hematomas (Fig. 42). The symptoms of obstruction may be more marked during the menstrual period, as at that time more blood may escape into the adenoma situated in the wall of the intestine (Cases 2, 4 and 8). The various lesions found in the intestinal tract are similar to those implanted on other pelvic structures, such as the uterus with its adnexa and

Fig. 12 (Case 4).—Photomicrograph of the cyst wall showing an extensive stromal hemorrhage with loss of some of the surface epithelium which has been carried by the hemorrhage into the cavity of the cyst and into the peritoneal cavity through the perforation. A gland (*g*) of endometrial type is present in the stroma.

ligaments. The latter are much easier to study histologically, as they may be more safely removed. The implantation begins with the deposit of epithelium on the peritoneal surface of these structures. This epithelium sinks into the underlying tissues, and, true to its type, forms glands and tubules as shown in the previous communication. In some instances, a localized growth of endometrial mucosa arises like a polyp which may be sessile or pedunculated, simulating the polyps found in the uterine cavity. In other instances the tubules invade the underlying tissue with very little evidence of the growth

on the surface. The epithelium originally implanted may "die out" or may be covered with adhesions so that in some of the older lesions it may be impossible to determine the exact site of the original implantation. The tubules often burrow through the tissues in many directions and the portal of entry, if still present, may only be determined by cutting many sections, or better still by cutting serial sections (Fig. 10).

I have made the following classification of these implantations. It is somewhat artificial, as all gradations between the groups may
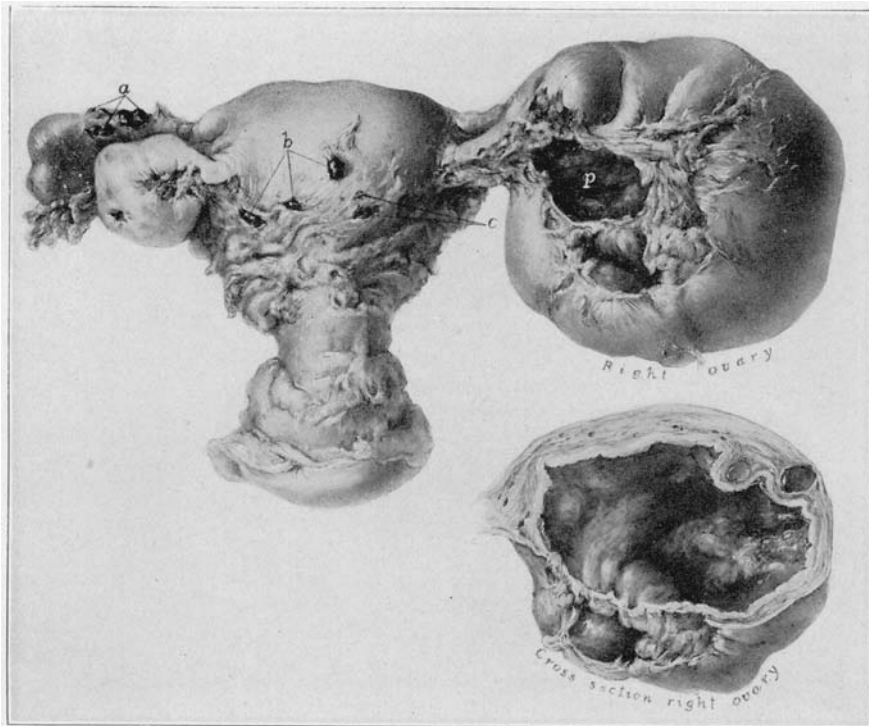

Fig. 13 (Case 4).—Perforated hematoma (of endometrial type) of the right ovary, with implantation adenomas (of endometrial type) on the posterior surface of the left tube (*a*), the uterus (*b* and *c*), the left ovary and the sigmoid, including its mesentery and epiploic appendages (Fig. 4). Posterior surface of the uterus and tubes and under surface of the ovaries; × ⅔. Compare with Figure 2. A perforated hematoma (of endometrial type) of the ovary with its peritoneal implantations is a pathologic entity as definite as that of ovarian carcinoma with its implantations and also a clinical entity which can often be diagnosed prior to operation (Compare histories of Cases 4, 8, 10, 11 and 12).

be found and more than one group may be present in the same case: (1) surface and superficial implantations; (2) implantations developing between adherent folds of peritoneum or other adherent structures,

well seen in the culdesac between the rectum and uterus (pocketed implantations); (3) the deep invasion of the adenoma into the underlying structure.

1. Surface and Superficial Implantations: These probably form the largest group.

(*a*) The most frequent lesion in this group is the presence of subperitoneal glands and tubules of endometrial type, usually with evidence of hemorrhage into the surrounding tissue or into the lumen of the glands or tubules. The surface of the intestine or structure
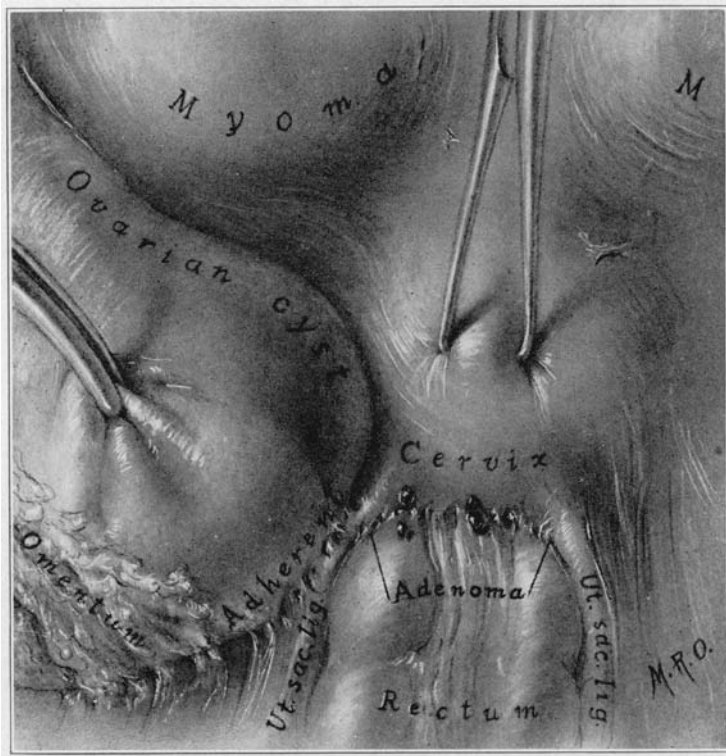

Fig. 14 (Case 5).—Implantation adenoma (of endometrial type) in the culdesac, fusing the posterior wall of the cervix to the anterior wall of the rectum and superficially invading both the cervix and the rectum; a large hematoma (of endometrial type) of the left ovary with evidence of a previous perforation; multiple leiomyomas of the uterus. Condition found at the operation (natural size). The cervix is drawn upward by a tenaculum, showing the rectum fused to the cervix and carried with the latter in a characteristic manner. Small pigmented blebs were present on the posterior surface of the cervix and the anterior wall of the rectum along the line of their fusion. The ovarian cyst is shown adherent to the bottom of the pelvis and the tip of the omentum was drawn down by these adhesions. When the cyst was freed, its wall was torn or the perforation was reopened and a large amount of chocolate fluid escaped.
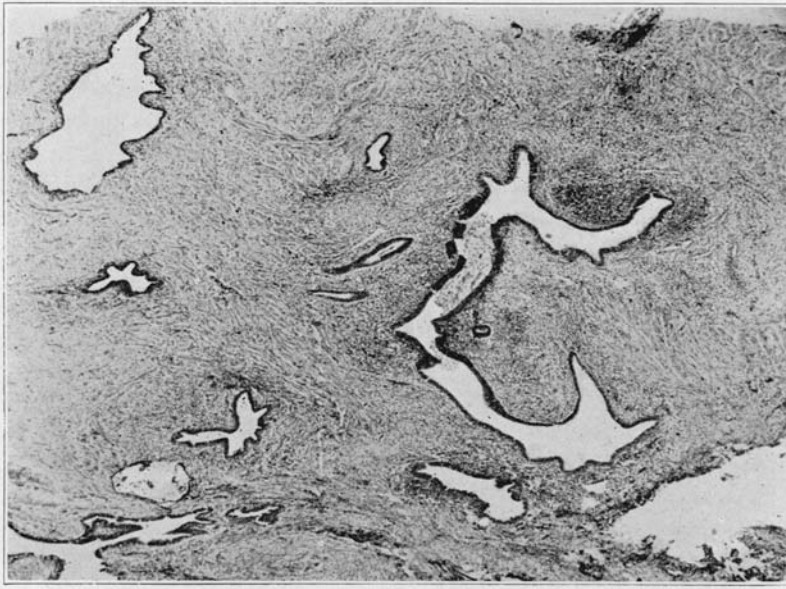
Fig. 15 (Case 5).—Photomicrograph of a section from the posterior wall of the cervix showing the collapsed glands and dilated tubules of endometrial type which prior to the operation were filled with retained blood (menstrual).
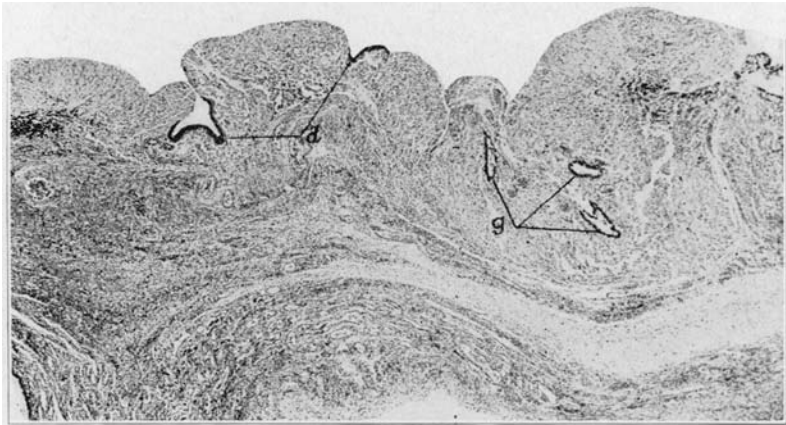

Fig. 16 (Case 5).—Photomicrograph (low power) of a portion of the wall of the ovarian hematoma near its hilum. This shows that the surface epithelium is for the most part lacking. Some of the epithelium, however, is still present in depressions (d); and glandlike structures (g) are also situated in the deeper portions of the ovarian tissue lining the hematoma. Histologically, these structures are similar to uterine glands and also to the glandlike structures shown in Figure 15. Epithelium was found only in sections taken from the upper part of the hematoma.

involved is thickened and the brown pigmented dots (1 to 2 mm. in diameter) and larger elevated areas due to the above mentioned menstrual hemorrhage may be easily detected at operation (Figs. 19, 20, 21 and 22).

(*b*) Endometrial tissue on the surface of the intestine including polyps. The epithelium deposited on the peritoneal surface may form typical endometrial tissue. The growth is often small and insignificant and at times typical endometrial polyps may develop (Fig. 33 and 49).
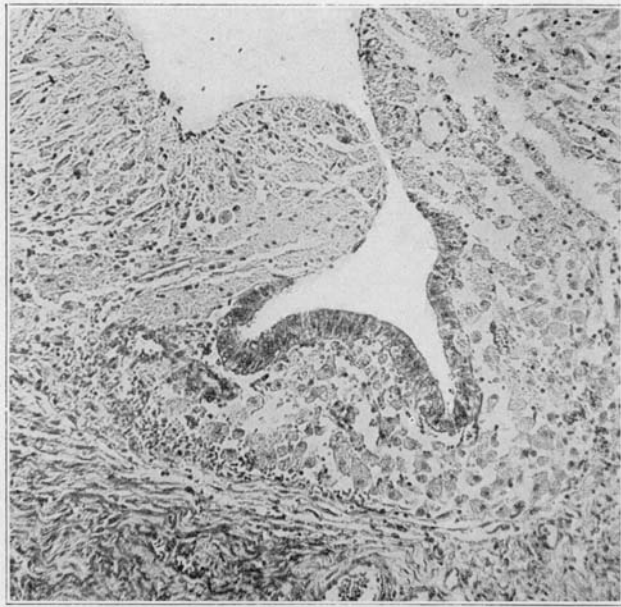

Fig. 17 (Case 5).—Photomicrograph (high power) of one of the depressions with an epithelial lining shown in Figure 16. It is lined by low to columnar epithelium of endometrial type, the columnar epithelium prevailing. The tissue surrounding this depression is composed mostly of pigmented cells of the type of endothelial leukocytes which formed the greater part of the lining of the hematoma.

(*c*) Larger subperitoneal hematomas, a later stage of the lesion mentioned in *a,* may arise from the retention of the menstrual blood in the lumen of the dilated glands or tubules (Figs. 37 and 38).

(*d*) Blood escaping from these implantations may become encysted and form small hemorrhagic blebs (Fig. 26).

2. Implantations Developing Between Adherent Folds of Peritoneum or Other Adherent Structures (Pocketed Implantations): The parts involved become fused, and on separating them the surface of

the freed structures often presents a characteristic "pitted" appearance, due to the exposure of the endometrial tissue in the pockets between the adhesions or in the tissues of the organ invaded (Figs. 27, 28, 29 and 30).

3. The Deep Invasion of the Adenoma into the Underlying Structures: The tubules may worm their way into the tissues of the
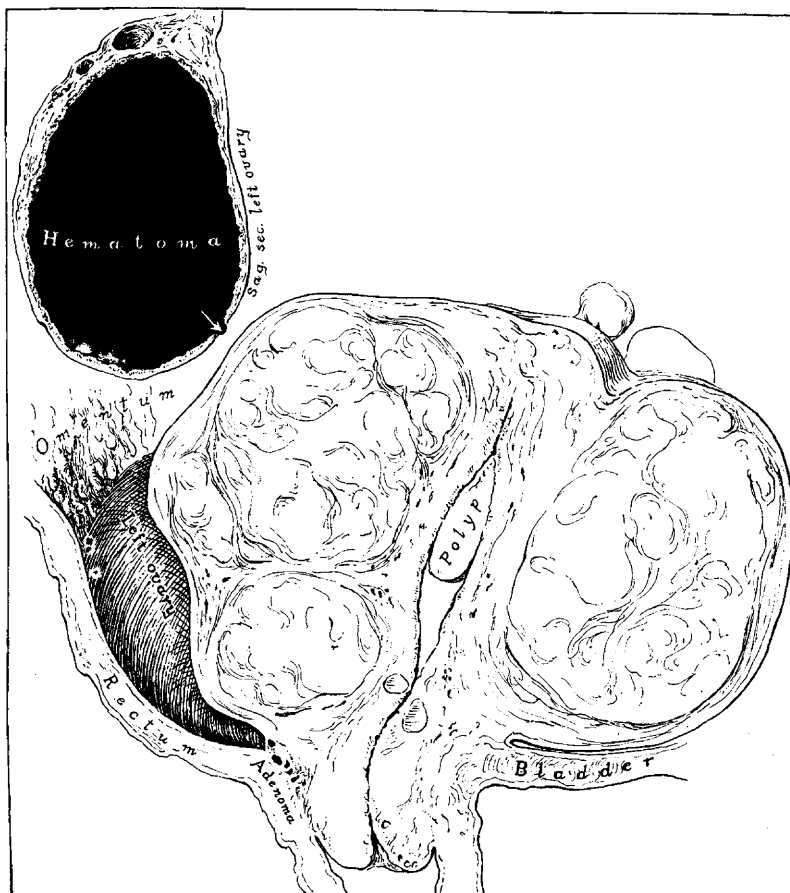

Fig. 18 (Case 5).—Sagittal section of the myomatous uterus and adjacent pelvic structures indicating the condition present prior to the operation. The adenoma of endometrial type is shown fusing the cervix to the rectum and superficially invading these structures. The ovarian hematoma or hemorrhagic cyst is shown both in situ and also in sagittal section, with evidence of a previous perforation, indicated by the arrow. The diagnosis is evident—an ovarian hematoma of endometrial type with perforation and the escape of some of its epithelium into the culdesac and the subsequent growth of this epithelium giving rise to an adenoma of endometrial type in this situation as in an ovarian carcinoma with perforation.
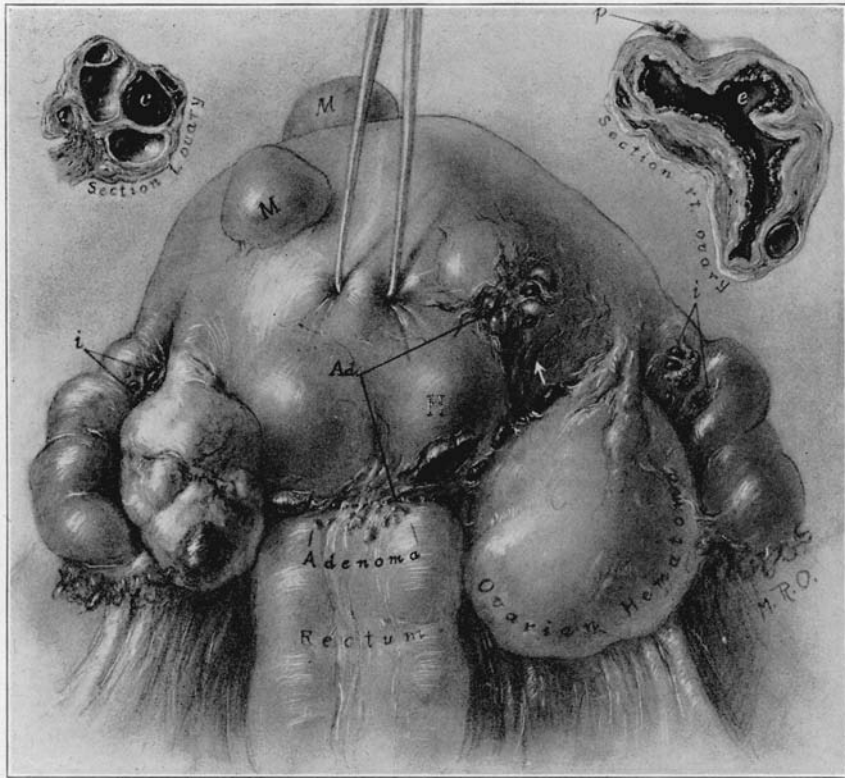
Fig. 19 (Case 10).—Implantation adenoma of endometrial type of the rectum, rectovaginal septum, mesentery of the appendix, epiploic appendage of the sigmoid, tubes, posterior layers of both broad ligaments, posterior uterine wall; hematoma of endometrial type of the left ovary (not perforated) and of the right ovary perforated, multiple leiomyomas. Posterior view of the uterus and appendages as they appeared at the operation; $\times \frac{5}{6}$. The ovaries are also shown in cross section. On drawing the uterus upward, the rectum is carried with it because it is fused to the posterior wall of the cervix and the lower portion of the body of the uterus. The characteristic lesions are shown on the wall of the rectum above its fusion with the uterus. Implantation adenoma of the uterus is shown at *Ad*; at *H* an endometrial hematoma is situated in the uterine wall (Fig. 23). The implantations (*i*) are shown on the posterior surface of both broad ligaments. The left ovary was not adherent and a non-perforated hematoma of endometrial type is shown in the cross-section of this ovary at *c*. The right ovary was densely adherent to the posterior surface of the uterus. When it was freed, "chocolate" fluid escaped, because a previous perforation had occurred (indicated by arrow and *p*). The right ovary is shown in cross-section (collapsed); compare Figure 24.
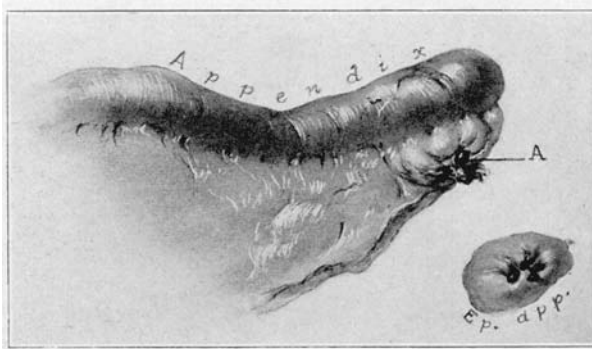
Fig. 20 (Case 10).—Appendix and portion of an epiploic appendage of the sigmoid (natural size). An implantation adenoma of endometrial type is present in the mesentery of the appendix at *A* (Compare Fig. 21). The appearance of the characteristic lesions of the epiploic appendage is shown in *Ep. app.* (Compare Fig. 22).

Fig. 21 (Case 10).—Cross-section of the appendix and its mesentery through the adenoma with hemorrhage (*h*) into the tissue about it (Compare Fig. 20 *A*). Histologically, it is similar to those shown in Figure 22. *L* is a small lymph node.

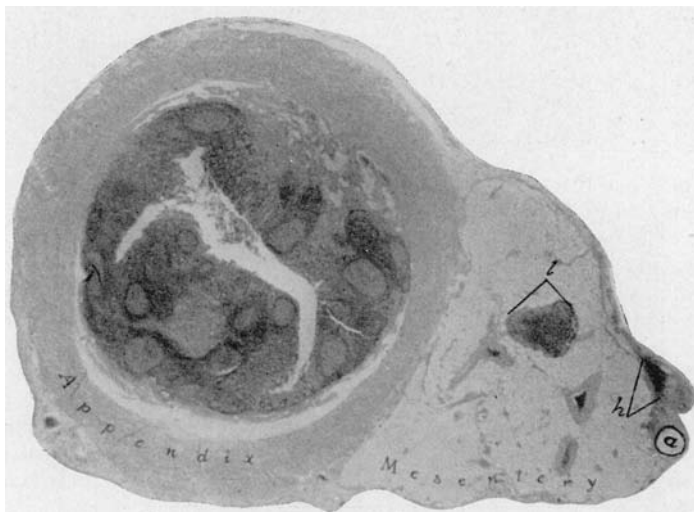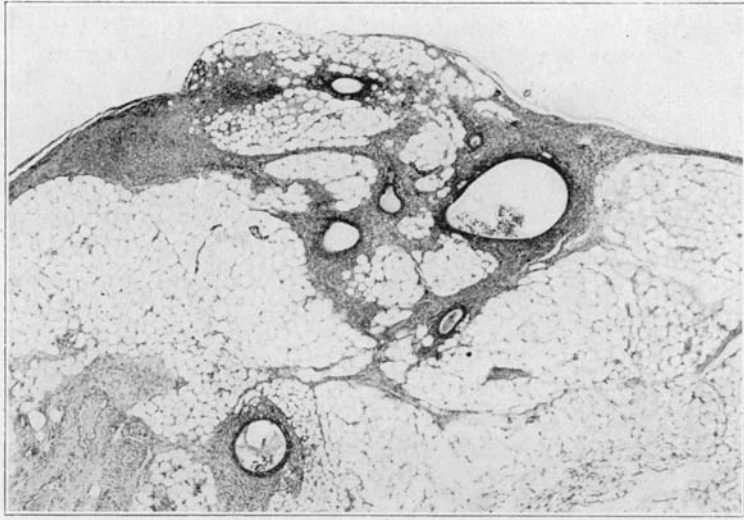Fig. 22 (Case 10).—Photomicrograph of a section of the epiploic appendage shown in Figure 20. This shows a characteristic lesion with evidence of hemorrhage in the lumen of the dilated glands and also in tissue about them, thus causing the pigmented elevations shown in Figure 20.
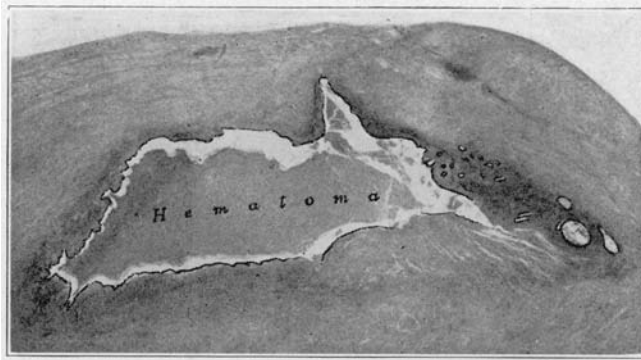
Fig. 23 (Case 10).—Hematoma of endometrial type in the posterior uterine wall at *H*, Figure 19. I believe it arose from an implantation adenoma of endometrial type as shown in Figure 10, and that the blood is menstrual. What is the source of the implantation adenomas shown in this and previous illustrations of this case? They could have arisen from the perforated hematoma of the right ovary shown in Figure 19 (Compare Figure 24).

intestine often associated with a marked thickening of the muscle and connective tissue (Figs. 6, 54 and 55). At other times there is very little reaction. Many varieties of "endometrial" tissue and its derivatives are found, such as glands and tubules, with and without a characteristic uterine stroma, dilated tubules with flattening of the epithelium (Figs. 42 and 43), miniature uterine cavities (Fig. 43), hematomas due to the retention of menstrual blood (Figs. 42 and 46) and structures resembling the mucosa of the fallopian tube.

The invasion of the rectum is usually associated with a thickening of the rectal wall easily detected on rectal palpation. Sometimes the growth extends downward, between the rectum and the vagina, forming a tumor mass also easily felt on both vaginal and rectal
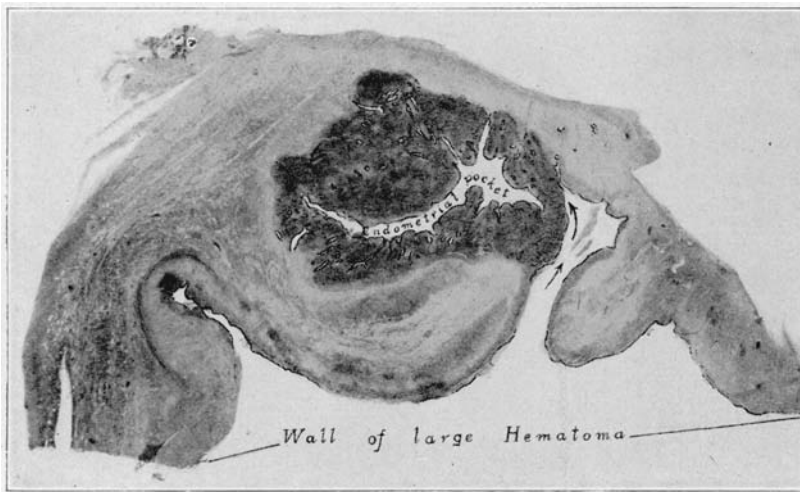
Fig. 24 (Case 10).—Section of the wall of the perforated hematoma of the right ovary through the pocket *c*, Figure 19. It is lined in places by epithelium of endometrial type, some of which has been carried away by the underlying hemorrhage and out through the perforation into the peritoneal cavity, thus giving rise to the implantations. The pocket is lined by endometrial tissue as characteristic as that lining the uterine cavity.

palpation (Fig. 25). The involvement of the sigmoid may be superficial, as shown in Figures 26 and 32, and already discussed. When the invasion is deep, it may cause an indentation of the wall of the sigmoid, with or without characteristic gross lesions on the surface (Figs. 4, 27 and 41). The condition may sometimes closely simulate carcinoma. The implantation may involve the epiploic appendages; they may become thickened and contracted, sometimes "curled up" (Figs. 4 and 6). Two epiploic appendages may become adherent to each other, as though tied together (Figs. 37 and 39). The epiploic

appendages may furnish a portal of entry to the invasion of the sigmoid, as suggested in Figures 42 and 46. The vermiform appendix may be invaded from implantations on its surface (Figs. 47 and 48), its mesentery (Figs. 20 and 21) and at the junction of its mesentery with the appendix (Figs. 50 and 56).

Two instances of invasion of the small intestine are reported in this series, one from implantation on the peritoneal surface, fusing the adjacent walls of the loop and invading it (Figs. 53 and 54).

Fig. 25 (Case 10).—Condition prior to the operation, as seen in sagittal section of the uterus and adjacent structures; $\times$ ⅔. The implantation adenoma lodging and growing in the culdesac has invaded both the uterus and the rectum, fusing these parts, and has extended downward between the rectum and the vagina to the right of the cervix (the perforated hematoma was in the right ovary) forming a tumor which could be distinctly felt before operation both on vaginal and rectal palpation.

The second was by direct extension from an implantation on the surface of the uterus, which became adherent to a loop of the small intestine and superficially invaded the intestine but more extensively invaded the uterus, forming an "adenomyoma" (Figs. 59 and 60).

Of great pathologic and clinical importance is the invasion of the lymph channels by endometrial polyps (Figs. 44 and 45). The latter suggests that metastases may arise and explains the origin of adenoma of endometrial type found in the groin and other places, just as metastases in such places occur in ovarian carcinoma. Such metastases may also arise from "adenomyoma" arising from the mucosa of the uterine cavity or the fallopian tube. In a case which I am studying at the present time, an "adenomyoma" was present in both the groin and the uterus.
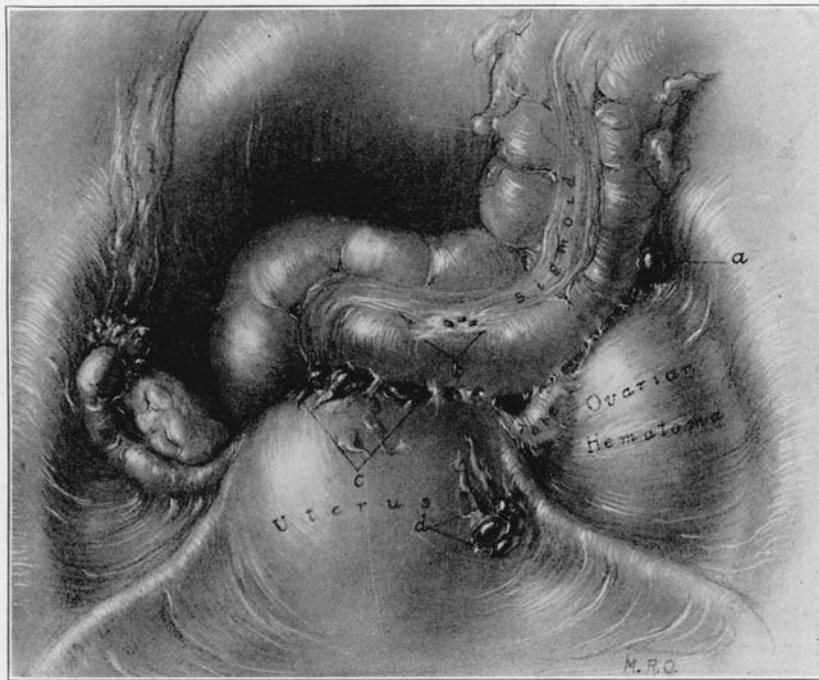
Fig. 26 (Case 8).—Implantation adenoma (of endometrial type) of the sigmoid, anterior and posterior surface of the uterus; large hematoma of endometrial type of the left ovary with evidence of a previous perforation, uterus retroverted, its posterior wall being adherent to the rectum and sigmoid. View of the pelvic contents from above; × ¾. The hemorrhagic bleb (a) on the mesentery of the sigmoid is similar to the one shown in Figure 4 and also to the ones indicated by the letters c and d of this illustration. An adenoma of endometrial type was present in the uterine wall beneath the blebs (c and d), and I believe the blebs were encysted menstrual blood from the adenoma implanted in these areas. The area on the sigmoid indicated by b was slightly elevated and contained small pigmented elevations, the latter probably due to retained blood in dilated tubules of endometrial type or hemorrhage into the tissues about these tubules as shown in Figure 22. The areas at a and b were not excised.

For further details in regard to the pathologic conditions arising from these implantations on the intestines, see the illustrations with their legends.

CLINICAL FEATURES OF INTESTINAL ADENOMAS OF
ENDOMETRIAL TYPE

These adenomas are analogous to the intestinal carcinomas resulting from the implantation of malignant epithelium directly on the surface of the intestine or the invasion of the intestine from an implantation on an adjacent structure. In ovarian carcinoma, with its secondary peritoneal implantations, the conditions resulting from these implantations may be of much greater pathologic interest and
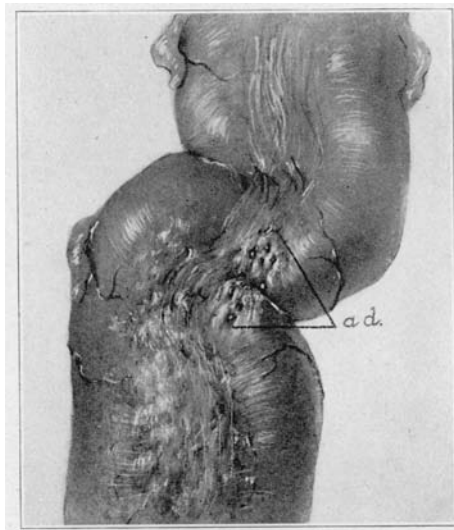
Fig. 27 (Case 8).—Implantation adenoma of the sigmoid (natural size). This was situated just back of the fundus of the uterus. The intestine is indented at this place (*ad*); its wall is thickened, and small pigmented pockets and slight elevations are present as in Figure 26 *b*. This area was not excised.

clinical importance than the primary growth in the ovary or ovaries, which is sometimes small. The first definite symptom arising from an ovarian carcinoma with its secondary implantations may be that of intestinal obstruction due to the occlusion of the lumen of the intestine invaded by the implantation. In other instances of peritoneal carcinoma, the involvement of the intestines is chiefly of histologic interest as compared with the primary growth. This is also true of ectopic pelvic adenomas of endometrial type. Fortunately, the latter are not so invasive as carcinoma; they grow more slowly, and their distribution is more limited. They differ from carcinoma in another interesting

feature: They may combine function with invasions; they may take part in menstruation. The escape of the menstrual blood from the implantation into the peritoneal cavity may cause other implantations and may give rise to pain during the menstrual period. The distention of hematomas with menstrual blood may also cause pain at that time; and if the hematomas are situated in the wall of the intestine, the impairment of its function may be more evident or only present during menstruation (Cases 2, 4, 8 and 10).

All implantation pelvic adenomas of endometrial type have certain clinical features in common. They usually manifest themselves in
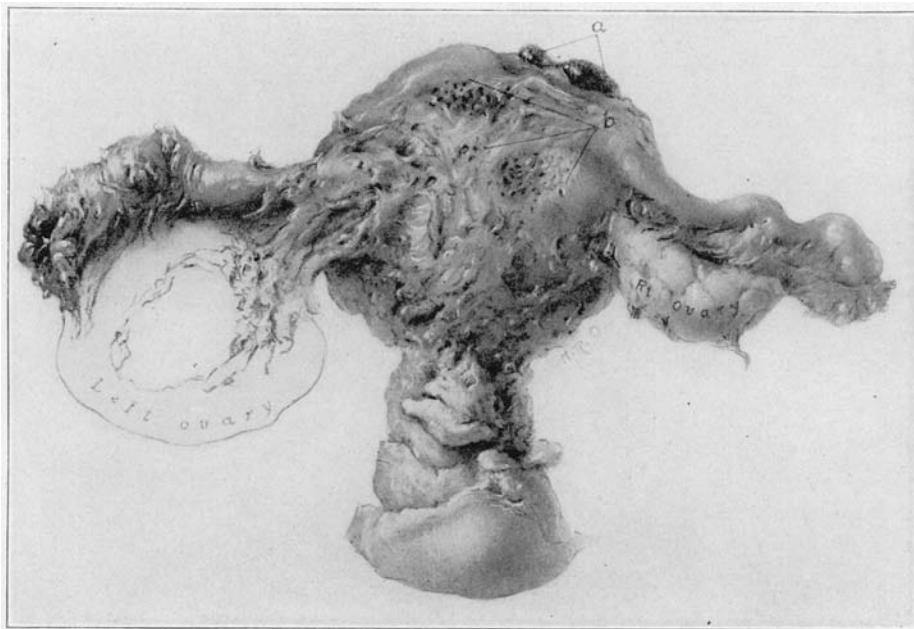
Fig. 28 (Case 8).—Perforated hematoma (of endometrial type) of the left ovary with implantation adenoma of the posterior uterine wall. Posterior view of the uterus, tubes and ovaries; × ¾. The uterus was densely adherent to the rectum and sigmoid and was separated from the latter with difficulty. When an attempt was made to free the left ovary, the wall of its hematoma was torn and a large amount of "chocolate" fluid escaped. The wall of the hematoma was so densely adherent to the sides of the pelvis that it was removed in fragments, hence the hematoma is indicated only in outline. Both tubes were apparently patent, and the left tube was covered with adhesions, probably due to the irritating action of the contents of the hematoma. Sections of the left tube showed, in places, implantation adenoma. The hemorrhagic blebs on the fundus at a are the same ones shown in Figure 26 b. The pitted appearance of the posterior wall of the uterus indicated by b is characteristic of implantation adenoma when involved adherent structures have been separated, thus exposing the adenoma in the depressions or pits between the adhesions (Compare Figs. 29 and 30).

women between 30 years of age and the menopause. They may occur in younger women but I have seen only one instance in a woman after the menopause. In this case the condition was apparently inactive. There is often a history of sterility in married women or of no pregnancies in several years. The latter condition may in part be due
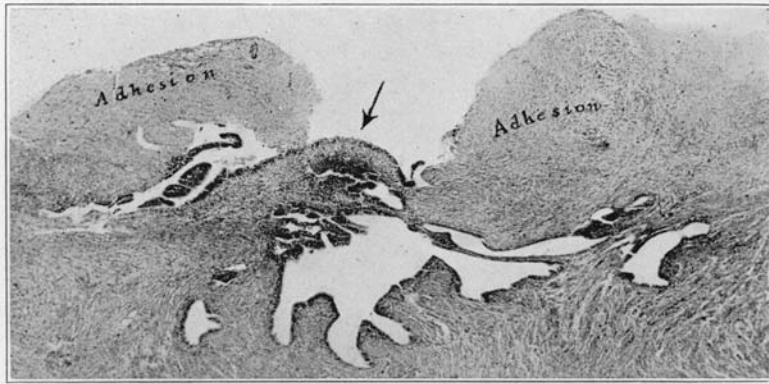
Fig. 29 (Case 8).—Implantation adenoma invading the wall of the uterus. Photomicrograph of a portion of the uterine wall through one of the pits. The arrow indicates the bottom of the pit between the adhesions. The adenoma on the surface of the uterus is here shown invading the wall of the uterus.
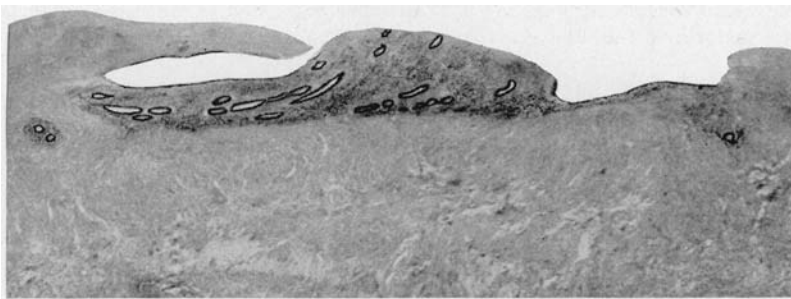
Fig. 30 (Case 8).—Implantation adenoma on the surface of the uterus. The photomicrograph shows a polypoid condition of the endometrium lining the bottom of a wide pit which has been exposed by freeing the uterus from the adherent sigmoid.

to the age of the patient, as these adenomas frequently occur in women in the latter part of the child-bearing age. Painful menstruation of the acquired variety, or increasing in severity, is quite a common symptom (Cases 2, 4, 5, 8 and 10). If pain is present, independent of menstruation, it is not characteristic but varies as does pain associated with pelvic adhesions due to other conditions. The symptoms for which the patient seeks relief may be due to some other

pelvic condition and the adenomas may be an accidental finding (Cases 1, 3, 5, 6 and 7). The implantation on, or the invasion of, the intestinal tract may be chiefly of histologic interest (Figs. 20, 32, 37, 47, 50 and 56) and does not cause any symptoms. When the growth in any way encroaches upon the lumen of the intestine, then symptoms
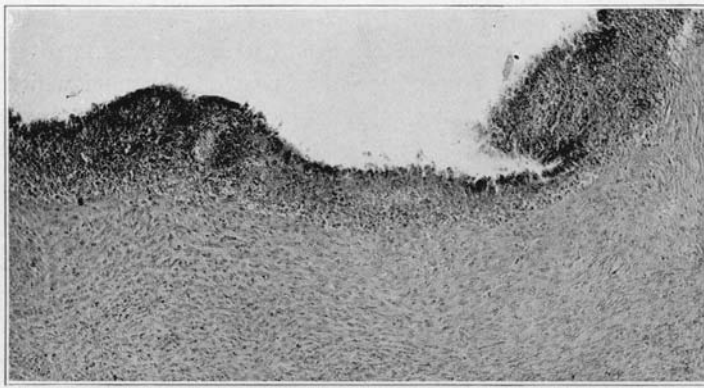
Fig. 31 (Case 8).—Photomicrograph showing the lining of the ovarian hematoma near the hilum of the ovary. Epithelium of endometrial type is still present in places; in other places it has been carried away by the underlying hemorrhage escaping into the cavity of the hematoma. The greater portion of the hematoma was lined by a pigmented layer of ovarian stroma (evidence of old hemorrhage), without an epithelial covering. Epithelium escaping through the perforation could have given rise to the implantations.
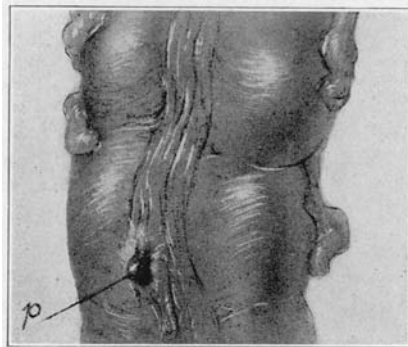
Fig. 32 (Case 11).—Uterine polyp *p* attached to the peritoneal surface of the sigmoid (natural size). Implantation adenoma of endometrial type (Compare Fig. 33).

arising from this may occur; and these may be more marked, or only present, during the menstrual period (Cases 2, 4, 8 and 10, Figs. 4, 25, 27 and 42). Marked constipation, partial obstruction, painful

bowel movements and pressure sensations in the rectum during the menstrual period, especially in women between 30 years of age and the menopause, are suggestive of this condition.

The physical signs vary greatly. The involvement of the intestine may be so slight or the lesion may be so situated that it cannot be detected prior to operation. The palpatory findings in the culdesac, when present, furnish the most characteristic physical signs. The uterus is often retroflexed or retroverted and adherent. It often contains leiomyomas. The palpatory findings of an adenoma which may be detected on digital palpation through the vagina or rectum depend on many factors, as its situation, extent and form. It may be localized
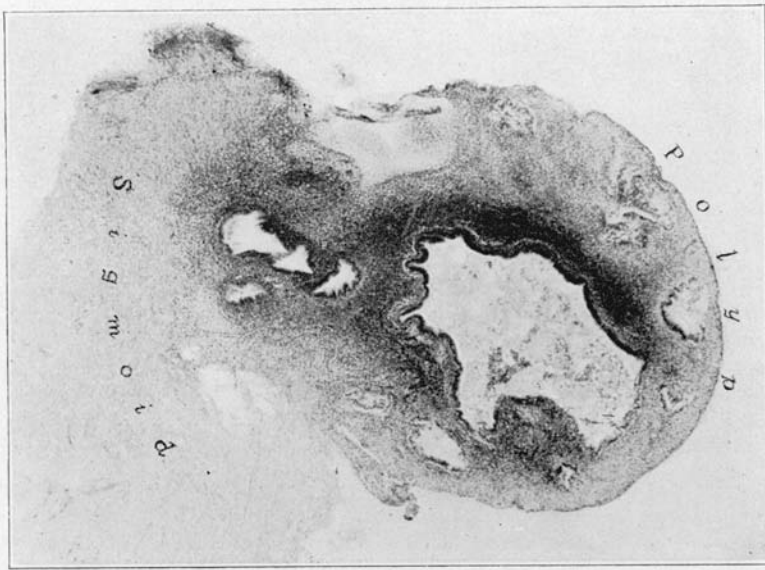

Fig. 33 (Case 11).—Photomicrograph of a longitudinal section of the polyp shown in Figure 32. Histologically, it is similar to a polyp arising in the uterine cavity. Where could it have come from? Compare Figures 35 and 36.

or diffuse, slight or extensive, smooth or nodular (shotted). If slight, the rectal involvement gives the impression of a slight thickening in the anterior rectal wall or a localized nodule without involvement of the rectal mucosa. In extensive cases it may simulate malignancy. Sometimes a condition which gives the impression of involvement of the anterior rectal wall proves at operation to be an invasion of the posterior wall of the cervix or uterus which is adherent to the rectum. In other cases the adenoma may extend down between the rectum and vagina forming a tumor in this situation (Fig. 25).

The ovarian hematoma, if large, may be readily detected and the condition may simulate an adherent or malignant ovarian cyst (Figs.

3 and 26). If smaller it may simulate, on palpation, adherent ovaries associated with the results of pelvic peritonitis. In other instances, the ovarian condition may be so insignificant that it cannot be detected prior to operation; it may also be easily overlooked at the time of the operation and even in the routine examination of the ovaries in the pathologic laboratory (Figs. 51 and 52). There is also the possibility that implantation adenoma of endometrial type may arise from other sources than ovarian hematomas, as will be discussed later.

The diagnosis of this condition prior to operation can usually be made in typical cases. The age of the patient, the acquired dysmenorrhea, the disturbance of intestinal function during menstruation, the
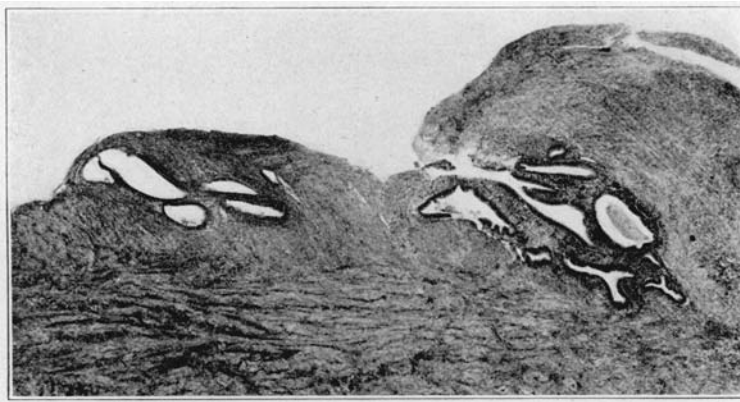
Fig. 34 (Case 11).—Photomicrograph of an implantation adenoma of endometrial type on the posterior surface of the uterus (Fig. 35 a). Histologically, it is endometrial tissue; similar implantations were also found on the anterior surface of the uterus. Where could they have come from? Compare Figures 35 and 36.

detection of a small adherent ovarian cyst or adherent ovary and the palpatory findings in the culdesac present a syndrome rarely furnished by any other condition. In a typical case or in those dominated by some other, and a more evident, condition, the pelvic adenoma is easily overlooked. Of the nineteen cases of ectopic pelvic adenomas in which I have operated since May 1, 1921, a correct preoperative diagnosis of the condition was made in ten and it should have been made in three others. In the remaining six the diagnosis could not have been made prior to operation as the adenomas were small and insignificant. Of the ten cases in the present series in which I operated, a correct preoperative diagnosis of the condition was made in five and should have been made in two others.

TREATMENT

The operative treatment of any pelvic condition occurring in women
who are still in the child-bearing age should be determined by many
factors, such as the pathologic condition, the desire of the patient for
conservative surgery, the results of the operative treatment of simi-
lar conditions and especially the natural course of the disease with-
out operative interference. There are usually two pathologic condi-
tions which present themselves at the time of the operation in implanta-
tion adenomas of endometrial type; first, the hematoma of the ovary
or ovaries which may be the most evident pathologic condition found
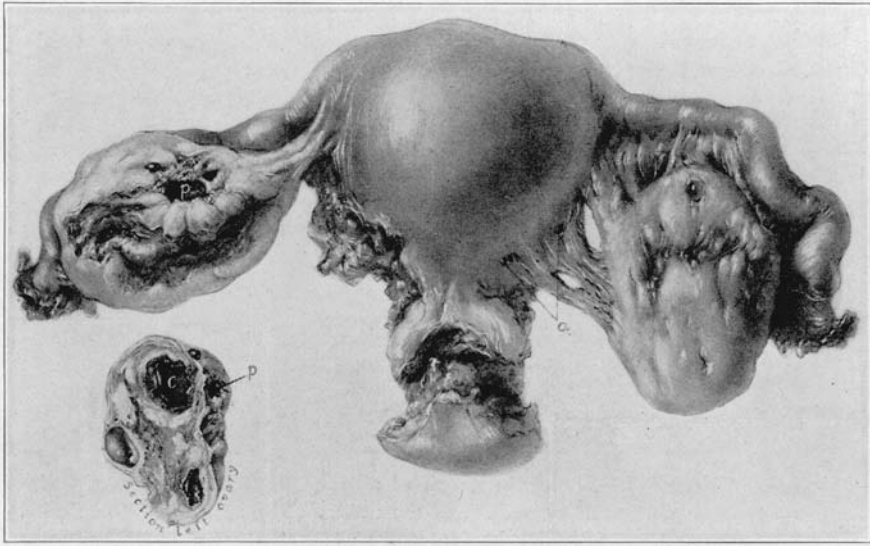
Fig. 35 (Case 11).—Perforated hematoma (of endometrial type) of the left
ovary with implantation adenomas (of endometrial type) on the anterior and
posterior surfaces (Fig. 34) of the uterus and on the anterior surface of the
sigmoid (Figs. 32 and 33). Posterior view of the uterus, tubes and ovaries;
× ⅔. When the adherent left ovary was freed a small amount of "chocolate"
fluid escaped because a previous perforation (*p*) of the hematoma, which had
been sealed by the side of the pelvis to which the ovary had become adherent, was
reopened. Could the implantations of adenoma have come from this source?
Compare Figure 36.

in the pelvis (Figs. 3 and 26). In other cases the ovarian condition
may be of minor importance as compared with the implantation
adenomas or is so insignificant as to be overlooked easily or it may
occasionally be absent. Second, the implantation adenoma of some
portion of the intestinal tract may be the outstanding condition (Fig.
41). In other cases it may be insignificant (Figs. 32 and 37). One
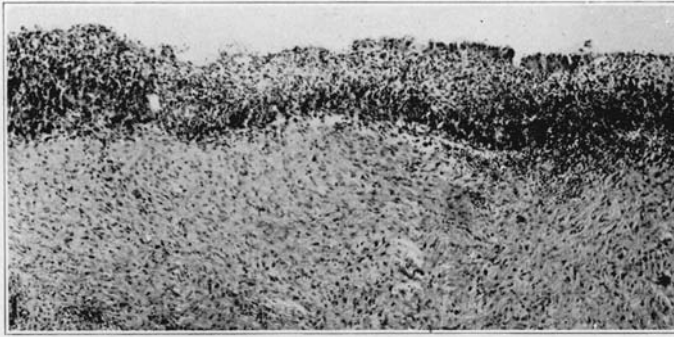
Fig. 36 (Case 11).—Photomicrograph of a section of the wall of the ovarian hematoma. It is in part lined by epithelium of endometrial type. Its function is similar to that of endometrium, namely, menstruation. Evidence of recent (fresh blood) and old hemorrhage (pigmented cells) is present in the wall of the hematoma, thus suggesting repeated hemorrhage as in menstruation. Some of the epithelium has been carried away by the underlying hemorrhage. What became of this epithelium? The evidence of a previous perforation would indicate that some of it might have escaped into the peritoneal cavity with the contents of the hematoma at the time of the perforation. The implantation adenomas just described have developed where the contents from such a perforation would be likely to fall.
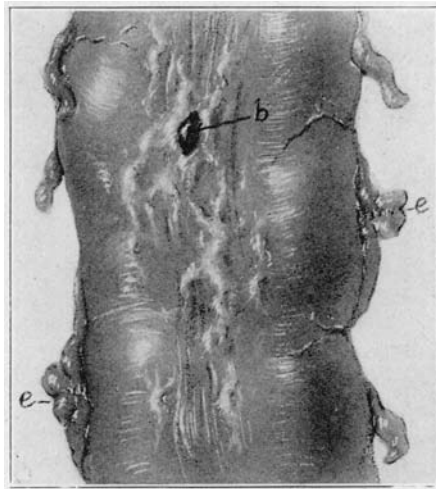
Fig. 37 (Case 7).—Implantation adenoma (of endometrial type) of the sigmoid and its epiploic appendages (natural size). Many irregular white elevations were present on the anterior surface of the sigmoid, apparently scars resulting from some irritating substance coming in contact with it. A brownish pigmented bleb is present at *b* (Compare Fig. 38) and two epiploic appendages on each side of the sigmoid (*e*) are adherent to each other as though ligated. The bleb (*b*) was excised and the epiploic appendages (*e* and *e*) were removed (Fig. 39).

would suppose that with the establishment of the menopause ovarian function would cease and that the implantation adenomas of endometrial type wherever situated would not only stop growing but would actually atrophy. I believe this is the rule; possibly there may be an
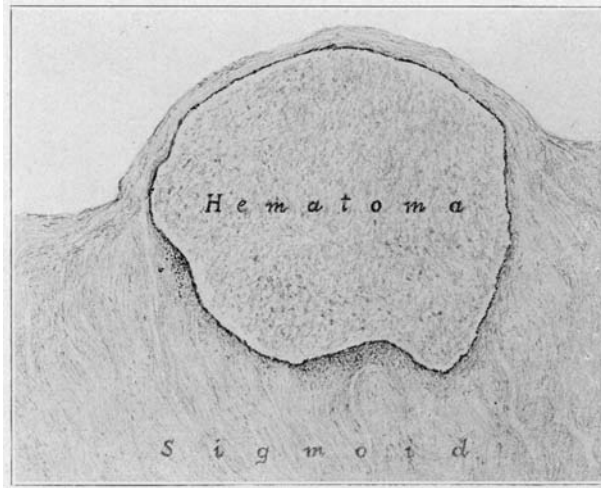
Fig. 38 (Case 7).—Cross-section of the bleb *b* (Fig. 37). It is a hematoma filled with old blood and lined by epithelium, columnar near the base and flattened toward the periphery. I believe it is a hematoma of endometrial type. Where could it have come from? Compare Figure 40.
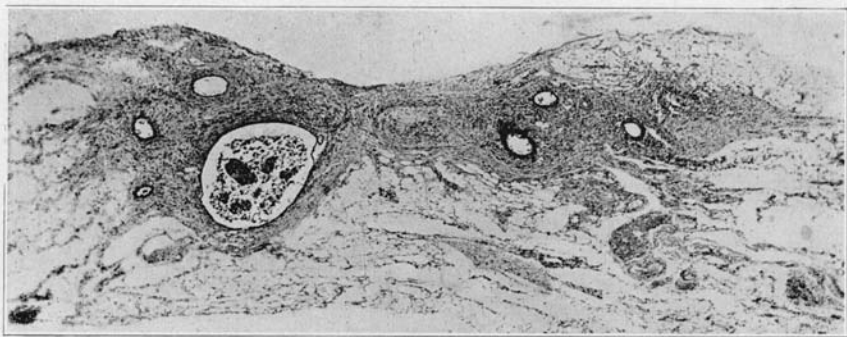
Fig. 39 (Case 7).—Cross-section of two of the fused epiploic appendages. They have become fused and are invaded by tubules of endometrial type.

occasional exception. To attempt to remove the pelvic implantation adenomas and disregard the condition in the ovaries or to preserve ovarian tissue is attended with the danger of possibly leaving an important focus in the ovaries for reimplantation; and, furthermore,

the persistence of ovarian function may stimulate the growth of implantations, which were not removed, wherever they may be situated (Case 12). My present reaction in these cases is to remove the uterus, both tubes and ovaries, and to disregard the implantations (including intestinal), except as they may be easily removed for histologic study (Cases 4, 7, 8, 10 and 11). The uterus is often retroflexed and adherent, and myomas and other pathologic conditions are present, as shown in the cases reported in this and in the previous series. There are, therefore, often indications for the removal of the uterus, tubes and ovaries other than the implantations and ovarian hematomas. I have occasionally saved ovarian tissue in these cases,
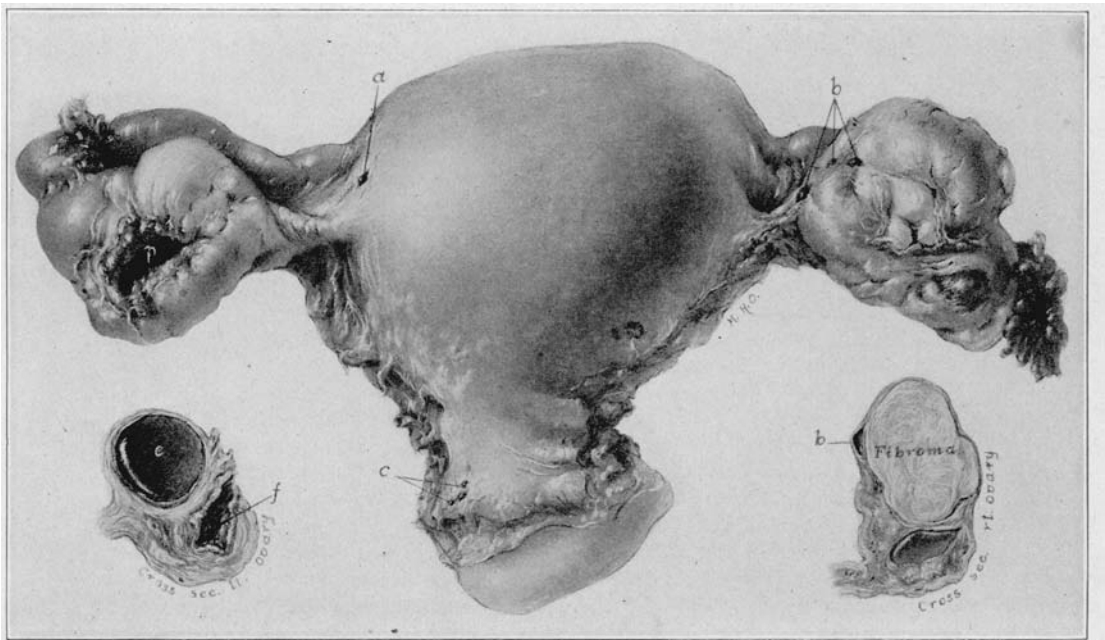
Fig. 40 (Case 7).—Perforated hematoma (of endometrial type) of the left ovary with implantation adenoma on the posterior surface of the uterus (a and c) and the right ovary (b), fibroma of the right ovary; submucous leiomyoma of the uterus. Posterior view of the uterus and tubes, ovaries turned upward, showing their under and lateral surfaces; $\times$ ⅔. On freeing the adherent left ovary a small amount of "chocolate" fluid escaped from a previous perforation (p), which was reopened. The ovary, which is shown in cross-section, contained two hematomas of endometrial type, one (c) had not perforated and the other (f) had. Implantation adenomas of endometrial type are present at a, b and c. The right ovary, which is shown in cross-section, contained a fibroma. The lining of the perforated hematoma of the left ovary is similar to the one shown in Figure 36. The left ovarian hematoma of endometrial type with evidence of a previous perforation indicates a source of the implantation adenomas.
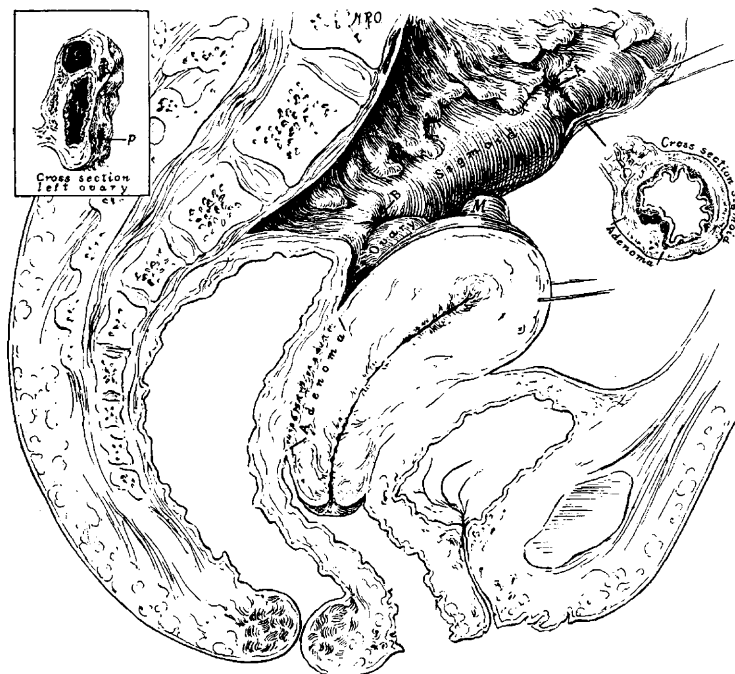
Fig. 41 (Case 2).—Implantation adenoma (of.endometrial type) of the sigmoid, uterus, rectum, ovaries, and perforated hematoma of endometrial type of the left ovary, small leiomyomas of the uterus. Sagittal section of the pelvis ($\times \frac{1}{2}$), showing the condition found at operation. On drawing the uterus upward and forward the rectum and lower sigmoid were carried with it because they were fused with the posterior wall of the cervix and uterus. Indentations of the sigmoid were situated at *A* and *B*. The one situated at *A* was the more evident of the two; the wall of the sigmoid about the indentation was thickened, and on palpation it simulated carcinoma. On freeing the left ovary an ovarian hematoma (*h*) was ruptured (*p*); compare cross-section of the left ovary in the insert. This proved to be a hematoma of endometrial type fully described in Case 19 of the previous publication. The indurated area *A* of the sigmoid was excised and a section of this area is shown in the insert and in Figure 42. Implantation adenoma was also found invading the posterior uterine wall, the left broad ligament (Fig. 45) and the surface of both ovaries. What is the source of these implantations? The ovarian hematoma of endometrial type of the left ovary with evidence of a previous perforation could have furnished the epithelium from which these implantations arose, just as ovarian cancer with evidence of a perforation gives rise to peritoneal implantations.

as in Cases 1 and 5 of this series and in some of those reported in the previous series and intended to do so in selected cases. Three of the patients whose cases were reported in the previous series were not relieved by the operation and one was operated on again.[1] I am awaiting with great interest the end-results of all of these cases.

We must not lose sight of the fact that for many years we have been operating in these cases without realizing the exact nature of the disease. The results have been for the most part quite satisfactory,
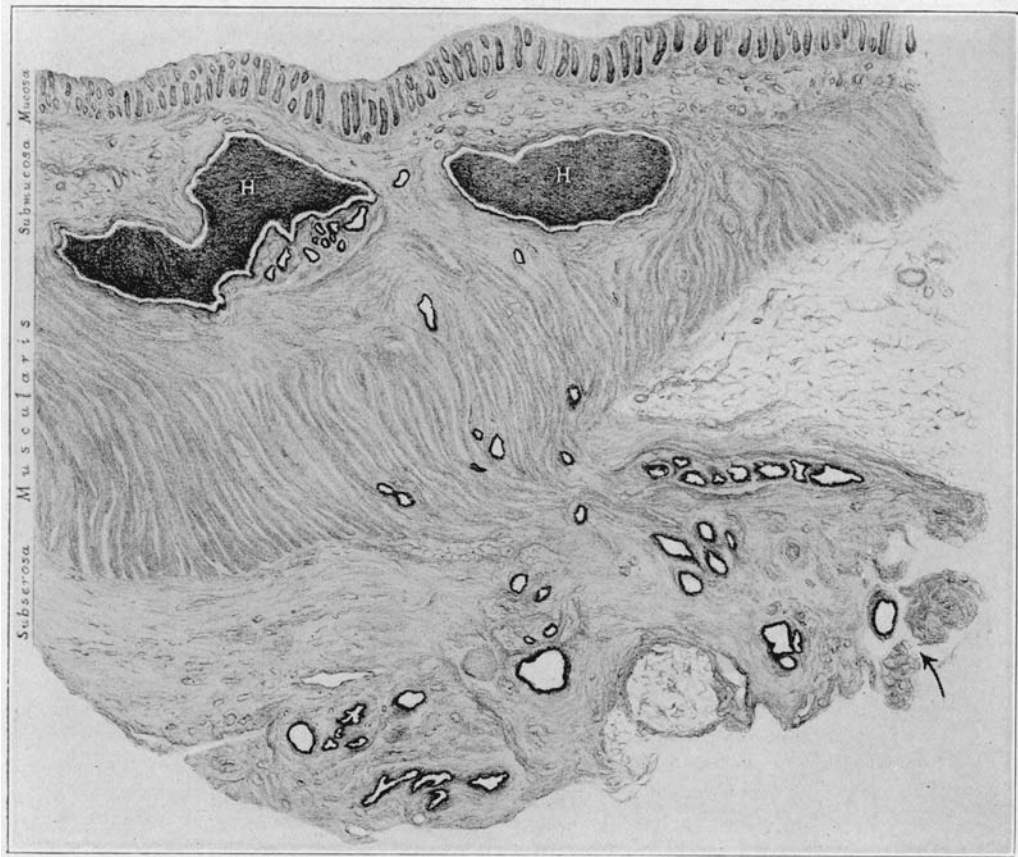
Fig. 42 (Case 2).—Section of the wall of the sigmoid which was excised (Fig. 41 *A*). It shows a typical adenoma of endometrial type. The implantation apparently began on the peritoneal surface, possibly through an epiploic appendage, indicated by the arrow, and invaded the subserosa and then wormed its way through the muscularis forming hematomas (*H*) in the submucosa. The latter were filled with retained "menstrual" blood. The hematoma on the left is in part lined by typical uterine mucosa. The patient complained of dysmenorrhea and symptoms of intestinal obstruction at the menstrual period. The distention of the hematomas with blood at the menstrual period offers an explanation of the cause of the intestinal obstruction at that time.

Fig. 43 (Case 2).—A small uterine cavity found in a section of the wall of the sigmoid.
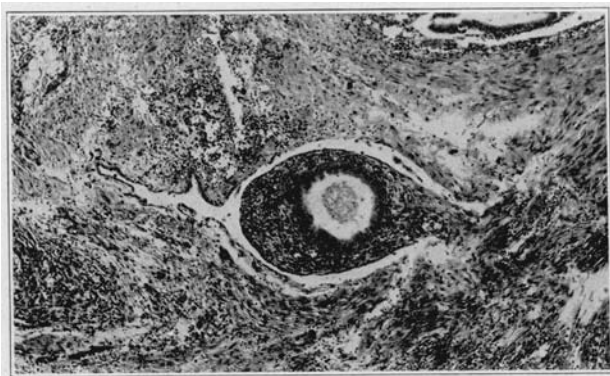
Fig. 44 (Case 2).—Endometrial polyp invading a lymph vessel in the subserosa of the sigmoid. These polyps are frequently found in implantation adenomas of endometrial type.

because the growth is usually of only histologic interest or only mildly invasive, and often the proper operative treatment was used without realizing it. I wish to emphasize what seems to me to be an important practical point. On detecting what appears to be a carcinoma of some portion of the intestines, especially of the sigmoid and rectosigmoid, the surface of this area should be carefully inspected to see whether it presents the external features of an implantation adenoma of this type (Figs. 4, 14, 19, 27, 32 and 37); other implantations should be looked for, and, most important of all, the ovaries should be carefully examined to see whether a hematoma is present with evidence
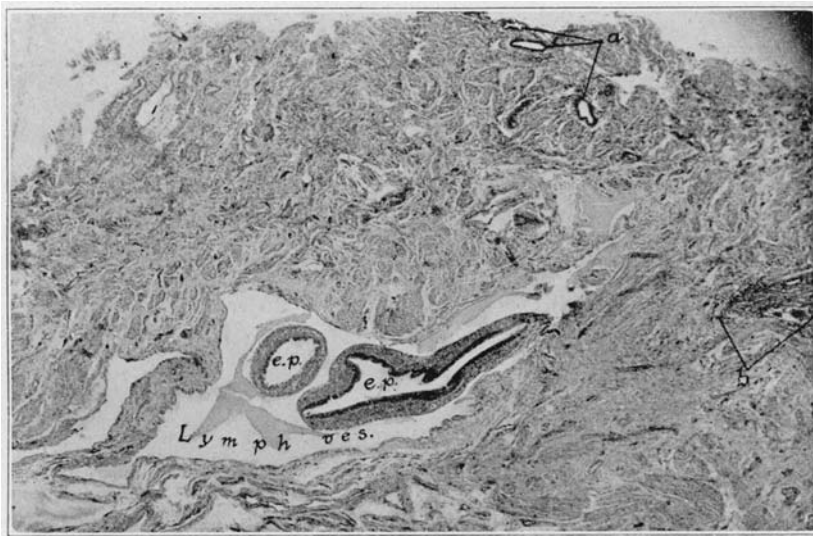
Fig. 45 (Case 2).—Implantation adenoma (*a*) on the surface of the broad ligament and invading a lymph vessel in the broad ligament. Two endometrial polyps (*c, p*) are shown, the larger one came from the adenoma (*b*) of this illustration. The invasion of the lymph vessels by these adenomas suggests that they may metastasize through these channels and offers one explanation for the appearance of adenoma in the groin. The invasion of the uterine wall was described in the previous article.

of a previous perforation, bearing in mind that the ovarian hematoma may be small (Fig. 52). If these are found, the true diagnosis is evident. My present opinion is that on making such a diagnosis it is preferable not to resect the portion of the intestine involved but to deal with the pelvic organs as I have just stated.

THE ORIGIN AND DEVELOPMENT OF OVARIAN HEMATOMAS OF ENDOMETRIAL TYPE

In the previous communication, I[1] described small hemorrhagic areas in the ovaries of three patients that had been operated on

during their menstrual period. Histologically, these areas proved to be due to hemorrhage about, or into, a space lined by tissue of endometrial type. I stated that I believed that these glandlike spaces were lined by epithelium of endometrial type, as shown by their structure and by their function (menstruation). I also stated that ovarian hematomas of endometrial type might arise from this misplaced epithelium either
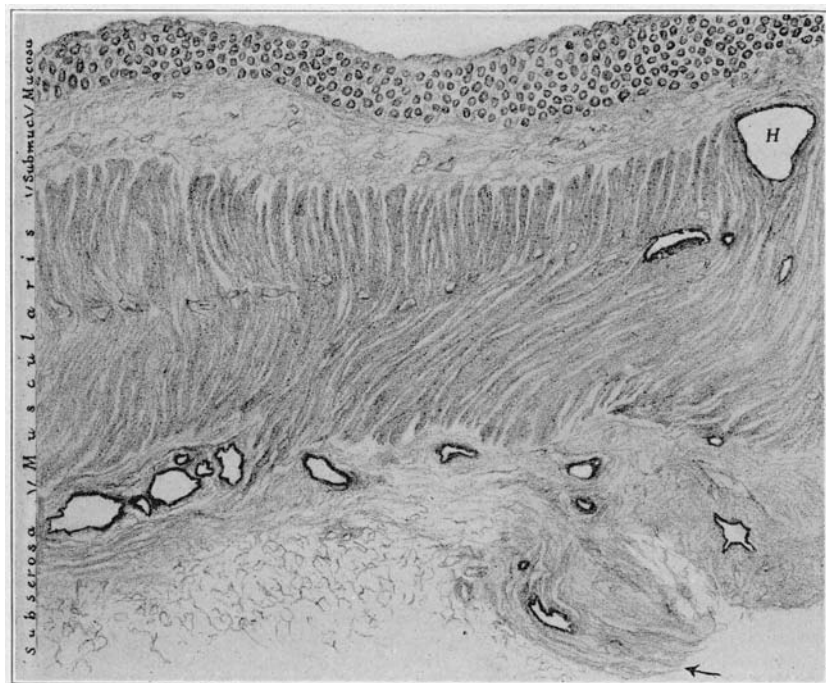
Fig. 46 (Case 1).—Section of the wall of the sigmoid showing an adenoma of endometrial type invading it. A portion of the sigmoid was resected (diagnosis of carcinoma). The left ovary was cystic and adherent. The left tube and ovary were removed. There was no note in the record of the case in regard to the exact condition of the ovary (operation twelve years ago). The portal of entry of the implantation was apparently on the surface of the intestine near the place indicated by the arrow. The adenoma first invaded the subserosa and then wormed its way through the muscularis forming a hematoma at *H*. The section suggests that the portal of entry might have been through an epiploic appendage. Many of the epithelial cells in the dilated tubules were ciliated.

by relining a follicular hematoma which might rupture near, or into them (the secondary epithelialization of follicular hematomas) ; or by hemorrhage (menstrual) into the lumen of the gland or space, they may develop into endometrial hematomas which they already are in miniature (Fig. 62). I have been unable to demonstrate the secondary epithelialization of follicular hematomas. Many sections which I have

seen might be interpreted as such; but all of these can be better explained by the regeneration of an endometrial hematoma, after hemorrhage and perforation, from epithelium left behind or possibly from cells which escaped through the perforation but which have grown in again. I have found every stage in the development of ovarian hematomas of endometrial type from these glands and tubules lined by tissue of endometrial type which may react to the menstrual impulse. If these tubules or glands are situated near the surface of the ovary, perforation occurs while they are still small (Fig. 62), a few millimeters in diameter or even microscopic in size. Epithelium may escape into the peritoneal cavity from these miniature hematomas (perforating hemorrhagic cysts) and give rise to implantations. Repeated hemor-
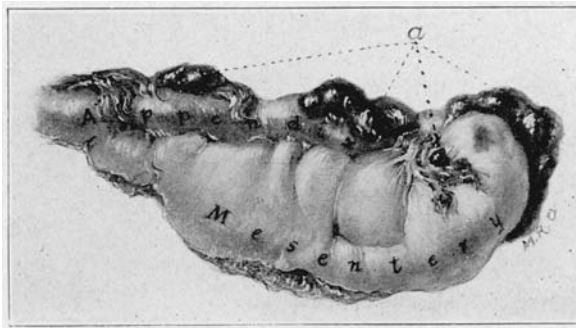
Fig. 47 (Case 9).—Implantation adenoma (of endometrial type) on the appendix and its mesentery, invading the former at *ad*, Figure 48. The appendix, uterus and both tubes and ovaries were removed (operation by Dr. Elting). The dark elevations on the surface of the appendix and its mesentery consist of typical endometrial tissue with hemorrhage in its stroma (Fig. 49). Adenoma of endometrial type was also found invading the posterior wall of the uterus. What is the source of these implantation adenomas of endometrial type? Typical hematomas of endometrial type were present in both ovaries with evidence of perforation.

rhages into the lumen of the smaller cysts, with loss of the overlying epithelium and repeated perforations, may destroy the cyst. If the endometrial tubule is situated in the deeper portion of the ovary, then it may develop into a large hematoma before perforation as in Figures 13, 18, 19 and 28. In the previous communication I referred to the pigmented "luteal" lining in parts of some of the hematomas which differed from that of a corpus luteum hematoma. At that time I believed that this "luteal" like lining in many of the specimens arose from hemorrhage into the wall of an endometrial cyst, with subsequent loss of the over-lying epithelium and the retention of the blood pigment in the tissues and cells of the cyst wall, and this is true. There were other instances in which this pigmented layer resembled the remains of a

corpus luteum and I was uncertain as to its origin in these cases. The endothelial leukocytes, which often play an important rôle in the development of the pigmented "luteal" layer, may sometimes simulate in their appearance and arrangement true luteal cells. My later studies have shown me that the development of all of the luteal-like layers in all the sections which I have studied of this type of ovarian hematoma

Fig. 48 (Case 9).—Implantation adenoma (of endometrial type) on the surface of the appendix and invading its wall at *ad*. Cross-section of the appendix and its mesentery taken through one of the hemorrhagic elevations shown in Figure 47.

may be traced from hemorrhage into the ovarian tissue lining the hematomas and its invasion by endothelial leukocytes. The various changes which take place in these hematomas during their development (including their reaction to menstruation) and retrogression must be reserved for another communication.

How does the epithelium of endometerial type reach the ovary? Is it of müllerian or wolffian duct origin? Cilia are sometimes present on
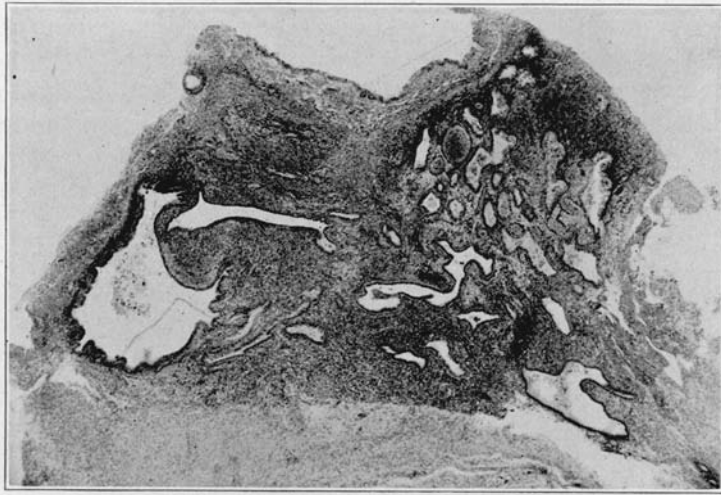
Fig. 49 (Case 9).—Photomicrograph of the larger implantation adenoma shown in Figure 48. Histologically, it resembles hypertrophied endometrium.

Fig. 50 (Case 6).—Photomicrograph of a portion of the wall of the appendix and its mesentery showing tubules of endometrial type (a). Some of the cells were ciliated. Small implantations of endometrial type were also present in the culdesac. Where could they have come from? Compare Figure 51.

the epithelium lining these tubules in the ovary, likewise on the epithelium in the larger hematomas and in the implantation adenomas. Cilia may sometimes be found on the epithelium of the uterine mucosa, more often on that lining the fallopian tubes and at times in the "adenomyomas" arising from the invasion of the uterine and tubal mucosa into the walls of the uterus and tube. The most natural conception of their origin would be that they arise from developmentally misplaced müllerian epithelium (Russell) or from the invasion of
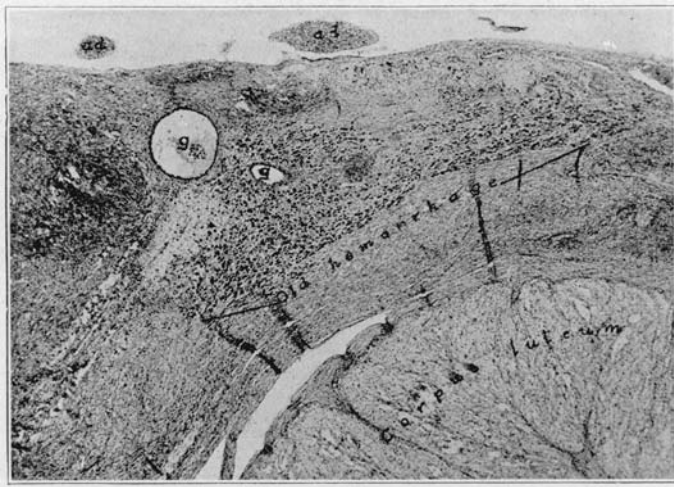
Fig. 51 (Case 6).—Photomicrograph through a small pigmented area on the lateral surface of the right ovary showing tubules of endometrial type (*g*) similar to those found in the appendix (some of the cells were ciliated). The right ovary was lightly adherent (compare adhesions *ad*) in the photomicrograph. Two small areas of pigmentation were noticed on the lateral and lower surfaces of the ovary. The pigmentation was due to the remains of a former stromal hemorrhage. The condition may be the remains of a small ovarian hematoma of endometrial type, as in Figure 52. Repeated hemorrhages and perforation with the casting off of the epithelium lining the hematoma may have removed the greater portion of this epithelium and the present condition arose from the repair which followed. A few epithelial cells remained and these developed into tubules or glands (*g*). Some of the epithelium which was cast off could have given rise to the implantations in the appendix and in the culdesac.

tubal epithelium from the fimbriae in contact with the ovary. Tubules are sometimes present in the hilum of the ovary which are apparently of wolffian duct origin and these might be considered as a source of these hematomas.

The data which I have been able to obtain suggest that tubal and uterine epithelial cells may, under certain circumstances (as an abnormal menstruation with a backflow), be expelled from the

fimbriated end of the tube and lodge on the surface of the ovary. They may become embedded in the tissues of the ovary and, true to their type, form glands and tubules which may actually invade the ovary. The process is analogous to that which results from the implantation of epithelial cells on the peritoneum from the perforation of ovarian hematomas of endometrial type, as described in the previous and also in this communication. Some of these glands and tubules which have invaded the ovary react to menstruation and develop into hematomas of endometrial type (Fig. 62). If they are situated near the surface of the ovary, perforation occurs early (while the hematoma is small,
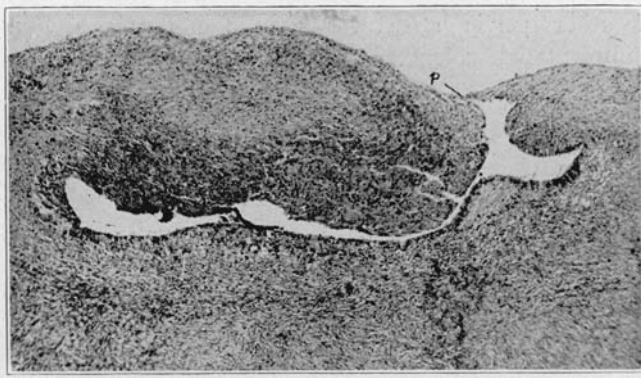
Fig. 52 (Case not reported in this series).—Photomicrograph of a small perforated hematoma of endometrial type of the ovary. This hematoma was about 1.5 mm. in diameter. It is lined by epithelium of endometrial type some of which is ciliated; underlying stromal hemorrhage (menstrual) is present. Some of the epithelium has been cast off by this hemorrhage rupturing into the lumen of the hematoma. A perforation of the hematoma is present and implantation adenomas were also found in the culdesac, invading the posterior wall of the uterus. Repeated hemorrhages and resulting loss of the epithelial lining of the hematoma followed by repair might give rise to the condition shown in Figure 51. If all of the epithelium was destroyed, it might in time be impossible to find any trace of the hematoma in the ovary and I believe that this sometimes occurs.

Fig. 52) and some of the epithelium lining the hematoma, which has been expelled into the cavity of the latter by the subepithelial hemorrhage of menstruation, may be carried with the hemorrhagic contents of the hematoma through the perforation into the peritoneal cavity. Implantation adenoma of endometrial type may arise from the contents of such a hematoma as well as from the larger ones; but they are apparently not so widely distributed. If the hematoma develops from a tubule which has penetrated the deeper tissues of the ovary, it may reach a larger size before perforation occurs and a larger amount of menstrual blood, including epithelium, may escape into the

pelvis than from a smaller hematoma. Implantation adenoma from a
perforated ovarian hematoma may arise on any of the pelvic structures,
including the surface of the ovary from which the perforation has
occurred, and also on the opposite ovary and develop into other ovarian
hematomas. I consider the ovary as a sort of intermediary host, hotbed
or incubator. A very interesting phenomenon is evident in many of
these cases, that is, the epithelium expelled from these hematomas
often displays a greater degree of vigor and invasiveness than similar
epithelium manifests in the ovaries with hematomas which have not
perforated. I also believe that it is possible that tubal and uterine
epithelium escaping from the tube may become deposited on the sur-
face of other pelvic structures than the ovary and may give
rise to implantation adenomas similar to those from a perforated
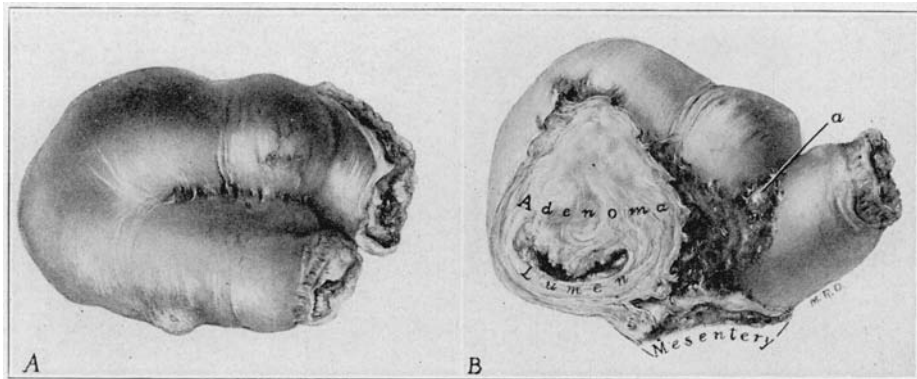
Fig. 53 (Case 3).—Implantation adenoma (of endometrial type) of the ileum.
About 4 inches (10 cm.) from the cecum a loop of the ileum was found to be
thickened and the adjacent walls of the intestine were fused together. This
portion of the ileum was resected and an end-to-end anastomosis was per-
formed (operation by Dr. Sadlier). Figure *A* represents the appearance of
the loop. Figure *B* shows the appearance of one half of the loop after cutting
across the intestine and separating the adherent walls. The adenoma had
developed on the surface of the intestine and had invaded the adjacent walls
which in places were greatly hypertrophied, thus narrowing the lumen of the
intestine, also shown in Figure 54, a section from another portion. The eleva-
tion at *a* is a growth (implantation), histologically similar to a uterine polyp.

ovarian hematoma. In the cases which I have interpreted as possibly
arising in this manner, the implantations have not shown the same
degree of vigor and invasiveness as those usually found when an
ovarian hematoma with evidence of a previous perforation is present,
and histologically they may differ in minor ways. It is for these reasons
that I look upon the ovary as an intermediary host, a hotbed or incu-
bator. In the cases above referred to, the implantations may have come
from a small ovarian hematoma which has disappeared.

This theory as to the origin of these ovarian hematomas and also their relation to endometrial implantations is based on the following data. The ovarian hematomas are of endometrial type as shown by their structure, function (reaction to menstruation) and their endometrial implantations. They are rarely found in women under 30 years of age. If of developmental origin, we would expect to find them in younger women. They develop during the menstrual life of the patient in a period when tubal and uterine epithelium might escape from the fimbriated end of the tube and become deposited on the
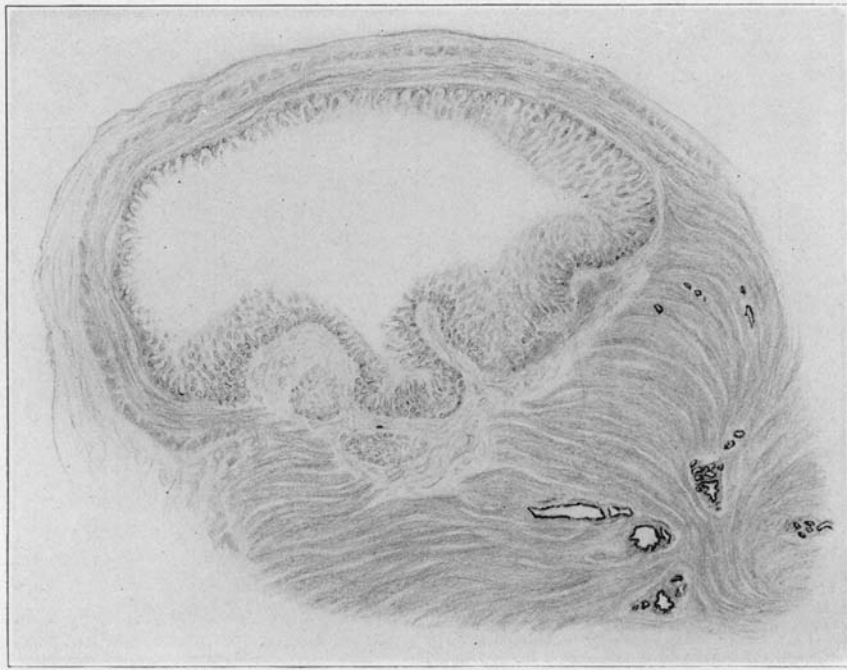
Fig. 54 (Case 3).—Adenoma (of endometrial type) invading the ileum. Cross-section of the intestine showing the adenoma invading its wall and the marked thickening of the circular muscle. What is the source of the adenoma? Compare Figure 57.

surface of the ovary just as peritoneal implantations arise from the perforation of ovarian hematomas. In forty-nine cases of perforated ovarian hematomas which I have studied, the tubes were apparently patent in all, suggesting that this avenue for this source of implantation was open. These hematomas usually develop on the lateral and the under surfaces of the ovary, the portions of the ovary most likely to be soiled by material escaping from the lumen of the tube, as well seen in the ovarian adhesions found in pelvic inflammatory disease of gonorrheal origin, and they are also often bilateral.

In thirty-seven cases of ovarian hematomas of endometrial type with perforation, in which I have studied microscopically the tissues involved in the adhesion apparently resulting from escape of the contents of the cyst, adenoma of endometrial type was found in all but one specimen. On the other hand, in three cases of typical ovarian hematomas of endometrial type without any evidence of perforation, adhesions were not present in the pelvis and there was not any gross evidence of implantation adenomas; the pelvis was examined very carefully in each instance. In the cases of perforated ovarian hematoma with implantation, the extent of the implantation usually varied with the size of the hematoma and apparent size of the perforation. The larger the hematoma and the greater the size of the perforation the more extensive the distribution of the implantations.
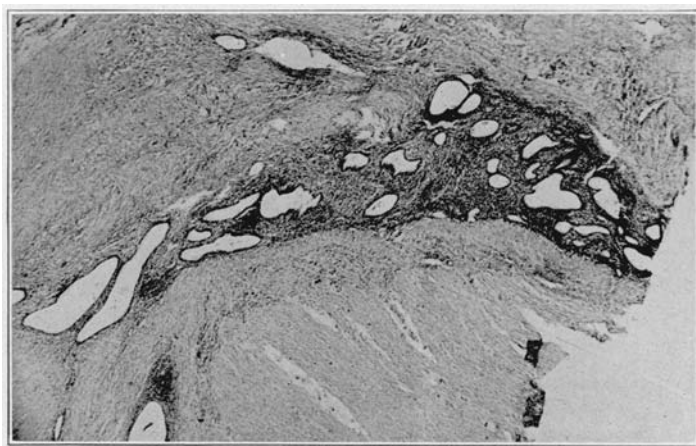
Fig. 55 (Case 3).—Adenoma (of endometrial type) invading the wall of the intestine. Photomicrograph showing the adenoma pouring into the muscular coats of the intestine.

May implantation adenoma occur from other sources than a perforated ovarian hematoma of endometrial type? I believe that this is possible, although it is difficult to exclude the ovarian source in any case. The ovarian hematomas may be very small and easily missed (Fig. 52), or as the result of repeated hemorrhage and loss of epithelium, they may become inconspicuous (Fig. 51) or even disappear. I believe that tubal and uterine epithelium escaping from the tube into the peritoneal cavity might, under proper conditions, give rise to implantation adenomas in the culdesac or wherever the epithelium may lodge, just as I believe the ovarian hematomas arise from this source. During the last year and a half I have operated on six

patients for uterine myomas in whom small peritoneal implantations of endometrial type were found in the culdesac without gross evidence of a perforated hematoma in the ovaries. One or both ovaries were removed in each instance. In the ovaries of three of the six patients, tubules of endometrial type were found, which I interpreted as the possible remains of a small ovarian hematoma which had perforated, or they were tubules which had not developed into hematomas. In a fourth specimen, an area containing pigmented cells was found in the ovary, which suggested the remains of a small ovarian hematoma. In the other two cases, tubules of endometrial type were not found in the ovary and there was not any evidence of a previous stromal
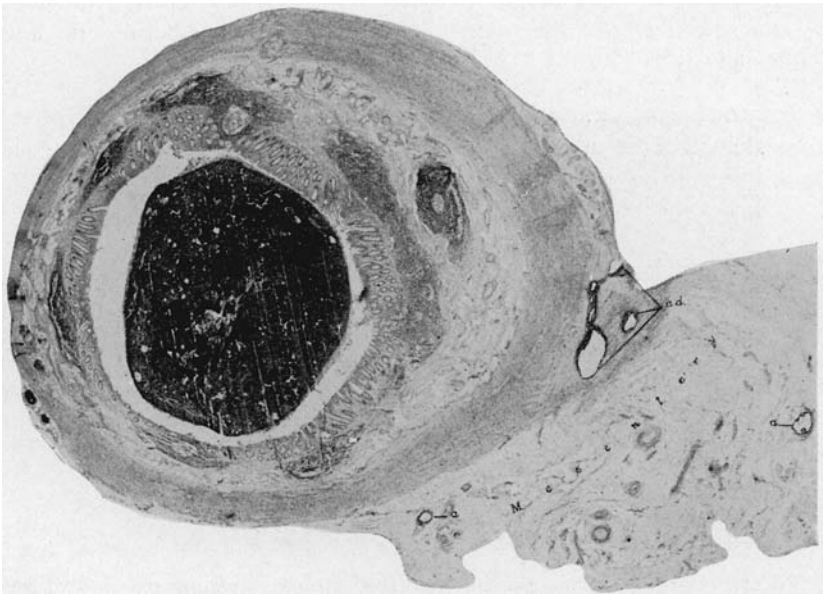
Fig. 56 (Case 3).—Adenoma (of endometrial type) invading the appendix. Photomicrograph of the appendix and its mesentery showing the adenoma (*ad*) invading the appendix at its mesenteric attachment. Cross-sections of small tubules of endometrial type are shown at *a* and *a*. (From a section lent by Dr. H. P. Carpenter). What is the source of the adenoma? Compare Figure 57.

hemorrhage. These may have been missed, as serial sections of the ovaries were not made. In the other thirty-eight instances of pelvic adenoma of endometrial type, an ovarian hematoma or hematomas of endometrial type were present, with evidence of previous perforation which could account for the adhesion and implantations. It is interesting to note the difference in the character of the implantations where there was no gross evidence of an ovarian hematoma with perforation. They were usually small and inconspicuous as compared

with those usually found in the pelvis associated with ovarian hema-
tomas with evidence of perforation, and histologically they usually
differed from them in minor ways. I also believe that implantations
from both sources may be present in some cases.

The epithelium lining these tubules in the ovary is often ciliated,
in some instances resembling that of the fallopian tube, and in others
that of the uterine mucosa. In one instance, the epithelium in places
resembled the mucosa of the uterine cervix. These tubules might also
develop into ovarian cysts and carcinoma. The carcinoma shown in
Figures 1 and 2 may have arisen from this source. Some of the
epithelium of the glands in this carcinoma resembled very closely
uterine epithelium even to the presence of cilia.

The epithelium lining some ovarian cysts very closely resembles
that of the mucosa of the uterine cervix and some of these cysts
may arise from the tubules of endometrial type of the ovary. Refer-
ences to the literature on ovarian hematomas and ectopic growths
of endometrial tissue in the pelvis may be found in the previous com-
munication.

<div align="center">REPORT   OF   CASES</div>

CASE 1.—*Adenoma (of endometrial type) of the sigmoid, adherent cystic
left ovary (whether or not containing a hematoma of endometrial type was not
determined).* Mrs. G. N. G., aged 36, complained of pain in the left lower
abdomen and a sense of lack of support. She had had two children, the
youngest, 9 years old. Menstruation was regular, moderate in amount and
accompanied with pain (the duration of the dysmenorrhea was not noted in
the case record). The patient was not constipated. Pelvic examination dis-
closed a weakened pelvic floor with cystocele and rectocele. The uterus was
in normal position with what felt like an inflammatory mass occupying the
position of the left tube and ovary. The preoperative diagnosis was a weak-
ened pelvic floor and pelvic inflammatory disease of the left side.

At operation at the Albany Hospital, Feb. 10, 1909, the left ovary was found
to be cystic and densely adherent. The right tube and ovary appeared to be
normal. The left tube and ovary were removed. There is no note in the
case records as to whether or not the cyst was torn and whether any "chocolate"
fluid escaped into the pelvis. An indurated area was noticed in the wall of
the sigmoid just below the pelvic brim. This was thought to be a carcinoma
of the sigmoid, and about 8 cm. of the intestine was resected and repaired by
an end-to-end anastomosis. A section of the intestine showed a typical adenoma
of endometrial type, apparently invading the sigmoid from its peritoneal surface
(Fig. 46). The cystic ovary was not examined histologically and I do not know
whether or not a hematoma of endometrial type was present. The patient
developed a postoperative phlebitis of the left leg, followed by symptoms of a
pulmonary embolus. She eventually recovered and has remained well.

CASE 2 (Case 19 of previous series).—*Implantation adenoma (of endometrial
type) of the sigmoid, posterior wall of the uterus, anterior wall of the rectum,
and both broad ligaments; hematoma (of endometrial type) of both ovaries
with evidence of previous perforations.* Mrs. J. W., aged 45, complained of
marked constipation with attacks of partial intestinal obstruction, beginning

two years before the operation and gradually increasing in severity. She had two children, the youngest being 6 years old. 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 that the patient had to remain in bed; the abdomen became distended, and sometimes there was nausea and vomiting. Bowel movements were obtained with the greatest difficulty. No blood was ever
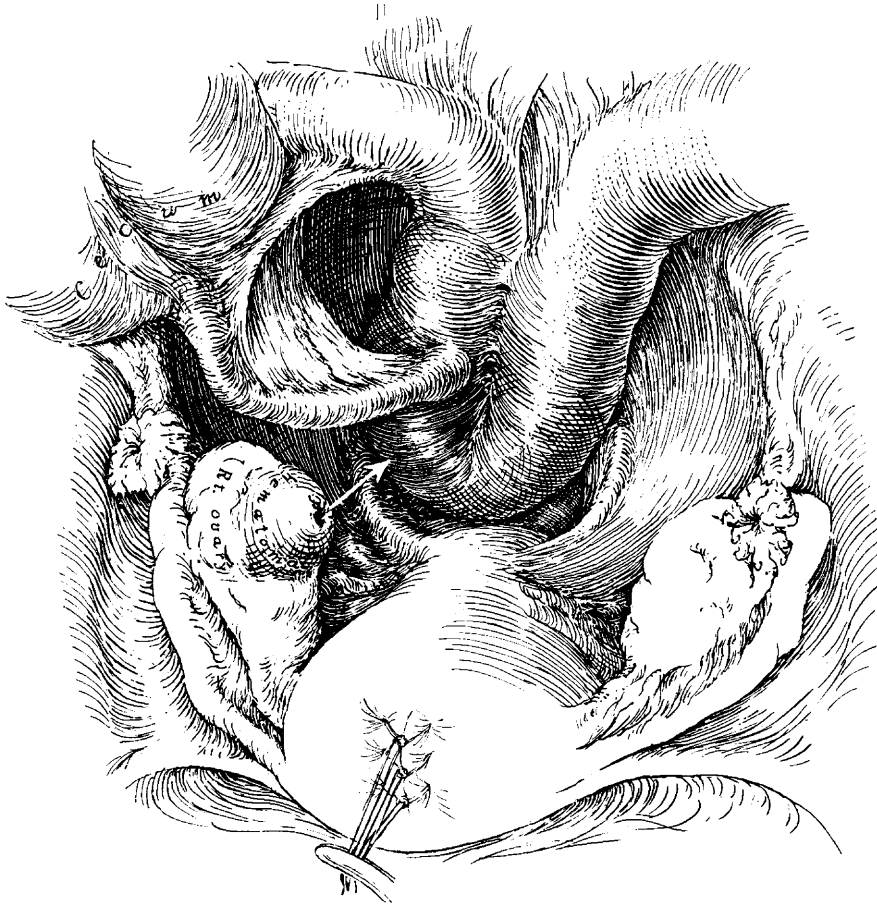
Fig. 57 (Case 3).—The probable source of the implantation adenoma found in Figures 53 to 56. View of pelvic contents showing a common normal relation between the right ovary and the terminal portion of the ileum and the appendix. A typical hematoma (of endometrial type), about 2 cm. in diameter, was found in the right ovary. The uterus is represented as drawn forward with myomas removed. The contents escaping from the perforation of the ovarian hematoma might easily fall on the appendix and terminal portion of the ileum in the culdesac and give rise to the implantation adenomas found in this case.

observed in the evacuations. The abdomen remained tender for about a week after the cessation of the flow. Pelvic examination demonstrated the uterus to be irregular, adherent and retroverted. The appendages were not palpated. No localized induration was detected in the culdesac. Roentgenograms were made following a barium enema, 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 retroverted and adherent to the rectum. A small amount of "old blood" was 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. There were two definite, puckered areas in the sigmoid. One area was situated just above the apparent rectosigmoidal junction and the other 8 or 10 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 (Fig. 41). 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. 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 was made. Histologically, the larger cyst of the left ovary was lined by a single layer of epithelium, the cuboidal type predominating, with evidence of recent hemorrhage into the underlying stroma. Adenoma of endometrial type was found lining the smaller cyst or pocket and it was also found 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; there was adenoma of endometrial type on the surface of the uterus, superficially invading its posterior wall. A similar adenoma invaded the wall of the sigmoid from its peritoneal surface and extended through the entire wall into the submucosa (Fig. 42). 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 in the culdesac.

CASE 3 (Dr. Sadlier's case).—*Implantation adenoma (of endometrial type) of the ileum and appendix, hematoma (of endometrial type) of the right ovary, multiple leiomyomas of the uterus.* In April, 1921, Dr. Lawrence Early showed me a section from the small intestine, of which he had made a diagnosis of adenomyoma. The section had been sent to the state laboratory by Dr. H. P. Carpenter of Poughkeepsie. I asked Dr. Early to write to Dr. Carpenter and to ascertain whether one or both ovaries had been removed and if so whether or not they contained any hematomas. Dr. Carpenter sent a tube and ovary and a portion of the small intestine to Dr. Early. The ovary which had been sectioned contained a typical hematoma of endometrial type, about 2 cm. in diameter. Dr. Carpenter referred me to Dr. J. E. Sadlier, who had operated on the patient, and it is through his courtesy that I am reporting this very interesting case. Dr. Carpenter kindly lent me the sections he had made from the specimen and with the help of these and the rest of the specimens, which he sent to Dr. Early, I was able to reconstruct the portion of the intestine as it probably appeared when first removed.

Fig. 58 (Case 12).—Implantation adenoma (of endometrial type) invading the posterior uterine wall, the ileum which was adherent to the latter and also the uterosacral ligaments. Condition found at the operation after freeing the sigmoid and the ileum which were adherent to the uterus (natural size). The left tube and ovary had been removed four years before. The ovary contained a hemorrhagic cyst (see report of the case). The sigmoid was adherent to the rough area of the uterus marked *s*. Adenoma of endometrial type was found invading the uterus in this area. The ileum was so densely adherent to the surface of the uterus marked *i* that in freeing it a portion of the wall of the former was left attached to the uterus (Figs. 59 and 60). Adenoma was found in the greatly thickened uterosacral ligaments (Fig. 61). What is the origin of these implantation adenomas? The perforated hemorrhagic cyst of the ovary removed four years ago may have been of endometrial type and the condition found at the present operation may have been present at the first (not so far advanced) or the implantations may have occurred in freeing the cyst at the first operation.

Mrs. E. C., aged 42, complained of profuse menstruation of about two years' duration. She had been married fourteen years but had never been pregnant. Menstruation had been regular and painful. The pain had increased in severity lately and the flow had been more profuse. She did not have any pain between the menstrual periods; and although constipated she did not give a history of symptoms suggesting intestinal obstruction.

March 25, 1921, Dr. Sadlier removed multiple myomas, the right tube and ovary and the appendix. He then noticed, about 4 inches (10 cm.) from the cecum, a fusion of the adjacent walls of a loop of the ileum which felt hard and indurated and naturally led to the diagnosis of malignancy. He resected this loop of the intestine and reunited the ends by a Murphy button. The portion of the small intestine removed showed that an implantation adenoma of endometrial type had developed on the surface of the intestine, fusing and invading the adjacent walls of the loop (Figs. 53, 54 and 55). A similar adenoma invaded the appendix at its junction with its mesentery (Fig. 56). There was a similar lesion in the right ovary and a hematoma of endometrial type, as already mentioned. Figure 57 shows a common normal relation between the right ovary, the terminal loop of the ileum and the appendix. The contents escaping from a perforation of a hematoma of the right ovary might easily soil the appendix and terminal loop of the ileum and give rise to the implantation adenomas above described.

CASE 4.—*Implantation adenoma (of endometrial type) of the sigmoid, posterior wall of the uterus, both broad ligaments, tubes, left ovary; large hematoma (of endometrial type) of the right ovary with evidence of a previous perforation.* Mrs. W. A. F., aged 28, complained of severe pain at the menstrual periods. She had one child, 6 years old, and she had had a miscarriage three years previously. Menstruation had been regular and free from pain until the last year. Since then she had had pain, worse on the right side, gradually increasing in severity. The last few months the pain was so severe that she was confined to her bed for two or three days. Constipation was increased during the menstrual period and bowel movements were associated with great pain at that time. The patient was operated on two weeks after the last menstrual flow. Pelvic examination demonstrated the uterus to be of normal size, pushed forward and to the left by a cystic tumor which filled the pelvis and seemed to be adherent. On rectal examination a definite localized area of induration could be felt in the anterior wall of the rectum. The rectal mucosa was freely movable over it. The preoperative diagnosis was perforating hemorrhagic cyst of the ovary with implantations in the culdesac.

At operation at the Albany Hospital, May 5, 1921, there was found a cyst of the right ovary, about 8 cm. in diameter, which filled the pelvis, pushing the uterus forward and to the left (Fig. 3). This cyst was densely adherent to the bottom of the pelvis and when it was freed a large amount of "chocolate" fluid escaped. Implantation adenomas of endometrial type were found involving the wall of the sigmoid, its epiploic appendages and mesentery, also the posterior wall of the uterus, broad ligaments and tubes (Figs. 4 to 13). The appendix, both ovaries, tubes and the entire uterus were removed.

The cyst of the right ovary was bilocular, with a larger loculus communicating with a smaller one. It was lined by cuboidal to columnar epithelium of endometrial type, with an underlying stromal hemorrhage. An occasional gland was found in the stroma. The epithelium lining the cyst was similar to that found in the implantations (Figs. 11 and 12) and in places the epithelium had apparently been removed by the blood beneath it rupturing into the cavity of the

cyst. There was evidence of a previous perforation, through which blood containing the epithelium above mentioned might escape into the peritoneal cavity; and wherever it would lodge, this epithelium might grow and give rise to the deposits of endometrial tissue found in the pelvis of this patient. I believe that this occurred.

The patient made a satisfactory convalescence. I examined her last in July, 1921. The area of induration was still present in the anterior wall of the rectum but was apparently smaller.

CASE 5.—*Implantation adenoma (of endometrial type) in the culdesac, fusing the anterior wall of the rectum with the posterior wall of the cervix, large*
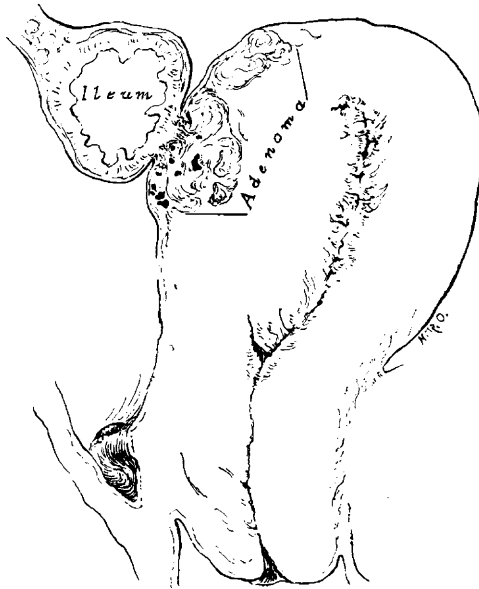
Fig. 59 (Case 12).—Sagittal section of the uterus taken a little to the right of the median line indicating its relation to the ileum prior to the last operation; × ¾. My interpretation of the etiology of this condition is as follows. At the previous operation, four years ago, some of the epithelium lining the hemorrhagic cyst of the left ovary became implanted on the posterior surface of the uterus and other portions of the pelvic contents and developed into implantation adenomas of endometrial type. The ileum became adherent to the implantation on the posterior surface of the uterus and was superficially invaded by it (Fig. 60). The uterine wall was invaded to a much greater extent as indicated in this illustration and the next. I believe the preservation of the right ovary was responsible for the development of the adenoma from the implanted epithelium.

hematoma (of endometrial type) of the left ovary with evidence of a previous perforation. Miss E. C., aged 39, complained of profuse menstruation associated with pain. Menstruation had been regular, normal and free from pain until about six months previously. Since then it had gradually increased in amount and was accompanied with pain. The last menstrual period occurred a week before the operation. The patient was constipated but this was not any worse during menstruation. Pelvic examination demonstrated the uterus

tc be irregularly enlarged, filling the pelvis and extending upward almost to the level of the umbilicus. The preoperative diagnosis was a multinodular myomatous uterus. The ovarian hematoma was mistaken for a subserous myoma, and the adenoma in the culdesac was not detected.

At operation at the Albany Hospital, May 7, 1921, the uterus was found to contain several leiomyomas. The right ovary was normal in appearance while the left was replaced by a cystic tumor about 6 cm. in diameter, densely adherent to the left half of the lower portion of the pelvis. The bottom of the culdesac was obliterated by the fusion of the anterior wall of the rectum to the posterior wall of the cervix, and on drawing the uterus upward, the rectum was carried with it in a characteristic manner (Fig. 14). The portion of the anterior wall of the rectum which was attached to the cervix was indurated and pigmented blebs were present on its free surface about the line of fusion with the cervix (Fig. 14). When the ovarian hematoma was freed, its wall was torn and a large amount of "chocolate" fluid escaped. A small amount of similar fluid escaped when the rectum was freed from the cervix. The appendix, left tube and ovary and entire uterus were removed. The right tube and ovary were not removed, against my better judgment, because the patient was most insistent that ovarian tissue should be preserved. Histologically, the posterior wall of the cervix showed a characteristic adenoma of endometrial type. The ovarian hematoma was for the most part lined by a pigmented layer, the result of previous hemorrhage without an epithelial covering. Epithelium of endometrial type was found in depressions of this pigmented layer near the hilum of the ovary and also structures resembling uterine glands (Figs. 16 and 17). The patient made a satisfactory convalescence and has remained well. I am awaiting with interest the ultimate outcome, as adenoma of endometrial type was left in the anterior wall of the rectum and the remaining ovary may stimulate it to further growth.

CASE 6.—*Implantation adenoma (of endometrial type) in the culdesac, in the wall of the appendix and in its mesentery; tubules (of endometrial type) in the right ovary with evidence of a previous hemorrhage in the surrounding ovarian stroma, multiple leiomyomas of the uterus, cholelithiasis.* Mrs. P. K., aged 42, complained of profuse menstruation and severe indigestion. She had been married twelve years but had never been pregnant. Menstruation was regular, free from pain and had been very profuse for the last four or five months. The last menstrual flow occurred three weeks before the operation. On abdominal palpation the right side of the abdomen was distinctly tender, the tenderness extending well up toward the costal margin. Pelvic examination revealed a nodular pelvic tumor, apparently arising from the uterus and extending about half way to the umbilicus. The preoperative diagnosis was a multinodular myomatous uterus and chronic appendicitis or cholecystitis.

At operation at the Albany Hospital, May 24, 1921, the uterus was found to be irregularly enlarged by several leiomyomas. The gallbladder was palpated and found to contain gallstones. The appendix, which was slightly adherent, was first removed. The right ovary was also lightly adherent to the side of the pelvis. Both tubes and ovaries and the entire uterus were removed. A small area of induration with pigmented spots was noticed in the culdesac. This was excised and found to be an adenoma of endometrial type. The gallbladder was also removed. Two small pigmented areas were noticed on the lateral and free surface of the right ovary. Histologically, the pigmentation was found to be due to cells containing old blood pigment, the evidence of previous hemorrhage into the tissues of the ovary. In this area glandlike

structures were found, some of which were dilated (Fig. 51). Some of the cells lining these spaces were ciliated. These areas might be interpreted as the remains of a small ovarian hematoma of endometrial type which had perforated, and most of the epithelium had been destroyed. In the repair which followed, some of the epithelial cells which had remained had proliferated, giving rise to these glandlike structures surrounded by the pigmented cells, the evidence of old hemorrhage. Dr. Thomas Ordway called my attention to glandlike structures in the wall of the appendix (Fig. 50). They were similar to those in the ovary, even to the presence of ciliated cells. There was not any evidence of hemorrhage into, or about, the glandlike structures of the
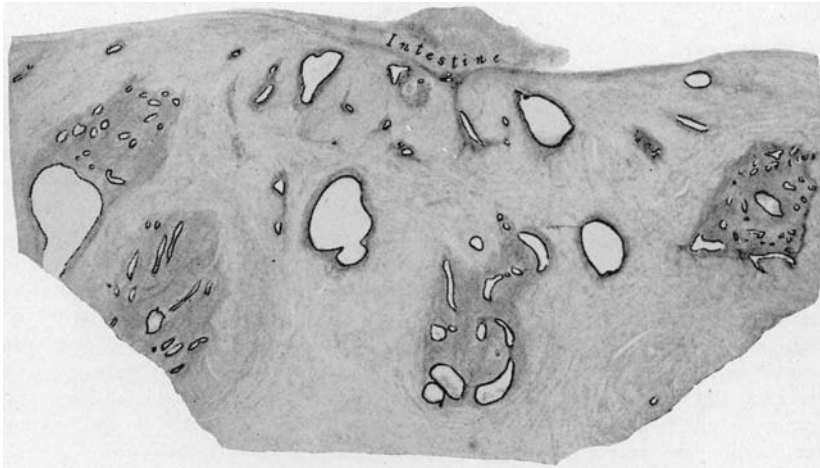
Fig. 60.—Adenoma of endometrial type of the posterior uterine wall and superficially invading the wall of the ileum which is fused to the uterus at this place. Section of a portion of the wall of the ileum which is fused with (drawn into) the uterine wall at this situation. I believe the implantation developed on the posterior wall of the uterus indicated by the depression beneath the piece of intestine attached to it. It only superficially invaded the wall of the intestine but has extensively invaded the uterine wall, giving rise to a typical so-called adenomyoma of the uterus, not arising from the direct invasion of the uterine mucosa from the uterine cavity or from the developmental inclusions of müllerian epithelium in the uterine wall or from a metaplasia of the peritoneal mesothelium but from the implantation of endometrial epithelium from the epithelial lining of a perforated hemorrhagic cyst of the ovary (of endometrial type), as probably the majority of the ectopic pelvic adenomas (of endometrial type) shown in this and the previous communication arose. (For another possible source of implantation adenomas of endometrial type, see text.)

appendix. What was the relation between the adenoma in the ovary to that in the appendix and culdesac? A small ovarian hematoma of endometrial type which had perforated, thus scattering some of its epithelial lining, would account for the involvement of the appendix and culdesac. The apparent remains of such a hematoma were found in the ovary.

Case 7.—*Implantation adenoma (of endometrial type) in the anterior wall of the sigmoid; similar adenomas involving the epiploic appendages, also on*

*the posterior uterine wall and right ovary, two hematomas (of endometrial type) of the left ovary, one not perforated, the other with evidence of a perforation, retroflexed uterus, leiomyoma and weakened pelvic floor.—*Mrs. J. L., aged 44, complained of uterine bleeding and a sense of lack of support. She had one child, 20 years old. Menstruation had been regular, at times profuse, but without pain. She had been flowing almost continuously for more than two months and had lost a large amount of blood. She was constipated but not more so during the menstrual period. Pelvic examination revealed a weakened pelvic floor, a small cervical polyp, a retroflexed uterus, slightly enlarged and very hard. The preoperative diagnosis was a weakened pelvic floor, cervical polyp, retroflexed uterus with myofibrosis, an intramural or submucous myoma.

Operation at the Albany Hospital, July 8, 1921, demonstrated the uterus to be enlarged, retroflexed and freely movable. The left ovary was densely adherent to the side of the pelvis, and when it was freed, a small amount of "chocolate" fluid escaped. The peritoneum of the anterior surface of the lower sigmoid was in places thickened and white as though scar tissue had arisen from some irritating substance which had "burnt" it. On one of these scarred areas there was a small hemorrhagic bleb (Fig. 37), which was excised. Two of the epiploic appendages on either side of this area were adherent to each other, as though they had been ligated (Figs. 37 and 39). These were removed. The appendix, both tubes and ovaries and the entire uterus were removed and the pelvic floor was repaired. The hemorrhagic bleb embedded in the sigmoid was lined by low to cuboidal epithelium and its cavity was filled with old blood. I believe it was a hematoma of endometrial type. The fused epiploic appendages were invaded by tubules of endometrial type (Fig. 39). The hematoma of the left ovary with evidences of perforation could have given rise to the implantation. The implantations on the uterus and right ovary were adenomas of endometrial type. The two hematomas of the left ovary were typical hematomas of endometrial type. The patient developed a postoperative intestinal ileus which was relieved by an enterostomy. Otherwise she made a satisfactory convalescence.

CASE 8.—*Implantation adenoma (of endometrial type) of the sigmoid and the posterior and anterior surfaces of the retroverted uterus, large hematoma (of endometrial type) of the left ovary with evidence of a previous perforation.* Mrs. F. W. T., aged 47, complained of pain in the left lower abdomen and constipation at the menstrual periods. She had had one child, ten years ago. Menstruation was moderate in amount and always associated with some pain. This pain had gradually increased in severity during the last three years and especially during the last four months. The pain had been so severe during the last four months that she was forced to spend one or two days in bed. The pain was worse on the left side. Constipation had been increasing and was worse during menstruation. The patient did not have any pain between the menstrual periods. Pelvic examination demonstrated the uterus to be retroflexed and fixed in the pelvis with an adherent cystic mass, the size of a small orange, occupying the region of the left ovary. The bottom of the culdesac (best detected on rectal palpation) felt slightly nodular. The preoperative diagnosis was a probable, perforated hematoma of endometrial type of the left ovary, with implantations in the culdesac and adherent retroverted uterus.

At operation at the Albany Hospital, July 21, 1921, the uterus was found to be retroverted, with the sigmoid adherent to the fundus. Small peritoneal cysts with encapsulated blood were found on the surface of the uterus at the junction

of the fundus and adherent sigmoid and one on the anterior surface of the uterus below the origin of the left round ligament. There was a similar bleb on the mesentery of the sigmoid at the pelvic brim and a characteristic lesion on the anterior surface of the sigmoid (Figs. 26 and 27). The uterus was adherent to the sigmoid and rectum, posteriorly. When the densely adherent ovarian hematoma was freed, its wall was torn and a large amount of "chocolate" fluid escaped. The wall of the hematoma was so densely adherent to the side of the pelvis that it was removed in fragments. Both tubes were apparently patent and the right ovary seemed normal. An indentation was found in the wall of the lower sigmoid, with thickening of the tissues about it and characteristic small pigmented areas on the surface of the intestine (Fig. 27). The appendix, both tubes, ovaries and the entire uterus were removed. The implantations in the sigmoid were not disturbed. The greater portion of the posterior wall of the uterus was superficially invaded by an endometrial adenoma. Similar tissue was found in the anterior wall of the uterus beneath the small hemorrhagic
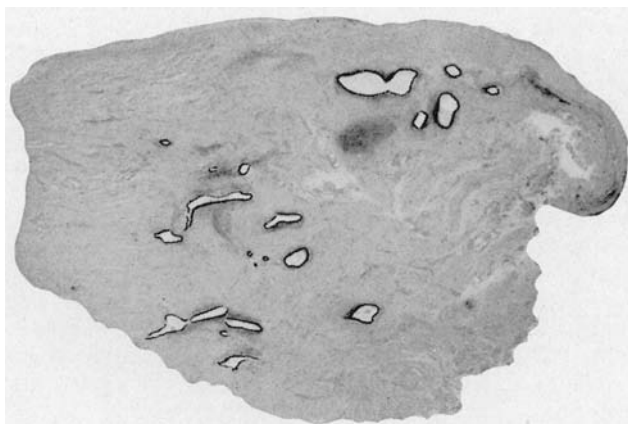
Fig. 61 (Case 12).—Cross-section of the left uterosacral ligament showing that it is invaded by an adenoma of endometrial type, the dilated tubules of which were distended with menstrual blood prior to the operation.

cysts. I believe the blood in the cysts arose from the underlying adenoma and was menstrual. Sections of the wall of the left ovarian hematoma showed that it was lined by pigmented tissue resulting from previous hemorrhages. The epithelium, for the most part, was lacking, except near the hilum of the ovary. The hematoma of the left ovary with evidence of perforation could have been the cause of all the implantations. The patient made a satisfactory convalescence and has remained well.

CASE 9 (Dr. Elting's case).—*Implantation adenoma (of endometrial type) of the appendix and posterior uterine wall; hematoma (of endometrial type) of both ovaries with evidence of perforations.* September 30 of this year, Dr. A. W. Elting showed me a specimen of the uterus, tubes, ovaries and appendix, which he had just removed and had correctly interpreted as one of implantation adenoma with perforated hemorrhagic cysts of both ovaries. He gave me permission to study the specimen and it is through his courtesy that I am reporting the case.

Mrs. R., aged 47, complained of abdominal pain. She had had one child, twenty-three years previously. Two years ago she had an attack of pain in the lower abdomen, the symptoms suggesting peritonitis. She had a similar attack, September 5, of this year, beginning on the first day of the menstrual period. At the operation at the Albany Hospital, Sept. 30, 1921, Dr. Elting found the intestines and omentum stained a dirty brown (old blood); this was most marked in the pelvis. The uterus was firmly adherent to the rectum. He removed the uterus, tubes, ovaries and appendix. Both ovaries contained typical hematomas of endometrial type with evidence of a previous perforation. Implantation adenoma of endometrial type was present on the posterior surface of the uterus, which it had invaded. The surface of the appendix was studded with reddish elevations which histologically proved to be implantations of typical uterine mucosa (Figs. 47, 48 and 49). The hemorrhage into the peritoneal cavity undoubtedly arose from menstrual blood escaping from the implantations, the ovarian hematomas or both. It is most significant that the present attack of abdominal pain occurred on the first day of the menstrual period. The ovarian hematomas with evidence of a previous perforation could have given rise to the implantations.

CASE 10.—*Implantation adenoma (of endometrial type) of the rectum, rectovaginal septum, epiploic appendage of the sigmoid, mesentery of the appendix, tubes, posterior layers of the broad ligaments and posterior uterine wall; hematoma (of endometrial type) of both ovaries, evidence of a previous perforation of the hematoma of the right ovary, multiple leiomyomas of the uterus.* Mrs. W. W. C., aged 40, complained of severe dysmenorrhea and pressure sensations in the rectum, the latter most marked during the menstrual flow. She had been married thirteen years but had never been pregnant. Menstruation had always been painful, gradually increasing in severity during the last year and especially during the last four months. The amount of the flow had increased during the last year. Backache and pressure sensations in the rectum were most marked the third and fourth days of the flow and lasted for a week after the flow ceased. Constipation had also increased the last year but was not always worse during the menstrual flow. The patient was operated on four days after the last menstrual period. Pelvic examination demonstrated the uterus to be irregularly enlarged and fixed in the pelvis. There was marked irregular induration in the culdesac, with an oblong mass the size of one's thumb extending down between the rectum and vagina to the right of the cervix (Fig. 25). The preoperative diagnosis was implantation adenoma of endometrial type in the culdesac with extension downward to the right of the cervix in the rectovaginal septum, multiple leiomyomas of the uterus and probable perforated hematoma of endometrial type of the ovary.

At operation at the Albany Hospital, Oct. 22, 1921, the uterus was found to contain several leiomyomas. On drawing it upward and forward the anterior rectal wall was carried with it, as it was fused with the posterior wall of the uterus. The right ovary was enlarged and adherent to the posterior layer of the right broad ligament. Small pigmented cysts were found on the posterior wall of the uterus, on the anterior wall of the rectum just above the line of fusion with the uterus, and also on the posterior layer of the right broad ligament along the line of fusion with the ovarian hematoma. Implantations were also present on the posterior layer of both broad ligaments just beneath the tubes (Fig. 19). The appendix was removed. On freeing the right ovary from its attachment to the posterior layer of the right broad ligament, "chocolate" fluid escaped. The uterus was separated from the rectum with great difficulty. Both
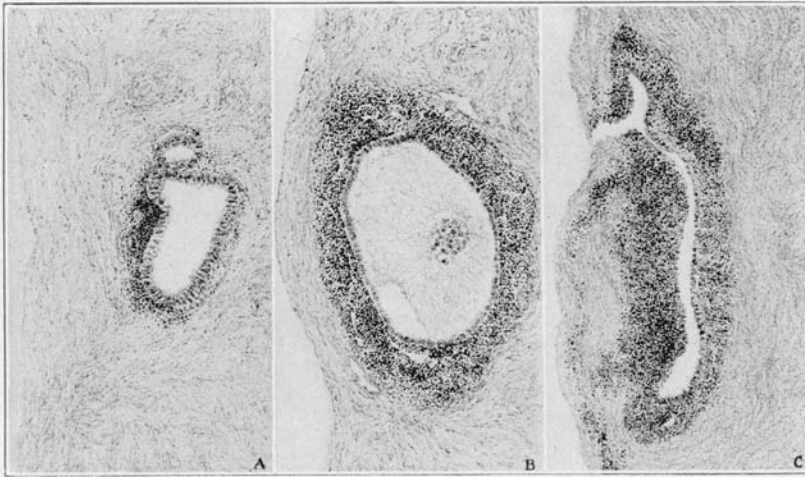
Fig. 62 (Case not reported in this series).—The development of a small perforated hematoma of endometrial type from glands or tubules of endometrial type in the ovary which react to menstruation. These three drawings were made from different parts of the same ovary. Section *A* shows a gland or tubule lined by columnar epithelium, some of which is ciliated. (The probable origin of such a gland is discussed in the text.) The dark area to the left of the gland indicates a stromal hemorrhage. Section *B* shows a later stage, the tubule or gland has become larger. It is now a small cyst lined by epithelium of endometrial type with stromal hemorrhage all about it and evidence that, previously, some of the blood in the stroma had escaped into the cavity of the cyst. This cyst is gradually approaching the surface of the ovary and perforation would probably occur before it becomes much larger. Section *C* shows one of these cysts which has perforated, one half the magnification of *A* and *B* and from the same section as that shown in Figure 52. Some of the blood in the stroma surrounding the cyst had broken through into its lumen, carrying with it some of the overlying epithelium. Perforation had occurred into the peritoneal cavity and some of the contents of the hematoma, including epithelial cells, escaped through the perforation and might have given rise to implantation adenomas of the same type as the epithelium lining the cyst. Implantation adenomas of this type were present in this case where the contents from such a cyst would be likely to fall. The cyst *C* is only partly lined by epithelium which is low to columnar and only a few ciliated cells were found. I believe that the larger hematomas or hemorrhagic cysts shown in this paper arose from similar glands and tubules situated deeper in the ovary.

tubes, ovaries and the entire uterus were removed, the greater portion of the growth extending between the rectum and vagina to the right of the cervix was not removed. Histologically, all the implantations showed adenoma of endometrial type and both ovaries showed hematomas of endometrial type. The patient made a satisfactory convalescence.

CASE 11.—*Implantation adenoma (of endometrial type) of the anterior surface of the sigmoid, anterior and posterior wall of the uterus and right ovary, hematoma (of endometrial type) of left ovary with evidence of a previous perforation.* Mrs. W. S., aged 38, complained of severe dysmenorrhea. She had never had any children but had had three miscarriages, the first one ten years ago, the last one five. I had operated on her eight years ago, removing the appendix and suspending the uterus. Menstruation had always been regular but painful. The operation gave partial temporary relief. The pain had greatly increased in severity the last year. Recently she had to spend from one to two days in bed. The flow was profuse and of from six to eight days' duration. The last menstruation occurred a week before the operation. She was constipated but this did not seem to be more marked during the menstrual period. Pelvic examination demonstrated the uterus to be in normal position, the left ovary was possibly adherent and very tender, the right one was enlarged and tender. The culdesac was also very tender, but no definite induration or nodules were palpated. The preoperative diagnosis was adherent left ovary with possible perforated hematoma and implantations in the culdesac and cystic right ovary.

At operation at the Albany Hospital, Oct. 25, 1921, the left ovary was found to be adherent to the side of the pelvis and on freeing it a small amount of "chocolate" fluid escaped. Implantation adenomas were found on the anterior surface of the uterus, just above the vesical attachment and also on the posterior surface of the uterus. A small red growth resembling a small polyp or urethral caruncle was noticed on the anterior surface of the sigmoid, just below the pelvic brim (Fig. 32). This was excised and proved to be a typical endometrial polyp (Fig. 33). The entire uterus and both tubes and ovaries were removed. The implantations on the uterus were typical endometrial adenomas (Fig. 34). Similar implantations were also found on the lateral surface of the right ovary. A typical perforated hematoma of endometrial type was present in the left ovary (Figs. 35 and 36), and this could have given rise to the implantations of the endometrial tissue in the pelvis.

CASE 12.—*Implantation adenoma (of endometrial type) of the posterior uterine wall with invasion of the small intestine adherent to it, endometrial adenoma of both uterosacral ligaments; the left ovary, which was removed four years before, contained a hemorrhagic cyst.* Mrs. F. B., aged 35, complained of severe dysmenorrhea, backache and pressure sensations in the rectum. She had been married for five years but had never been pregnant. Menstruation had always been painful; but the pain had increased in severity the last year and the flow had also increased in amount. The last menstrual flow occurred a week before the operation. She was constipated and complained of pressure sensations in the rectum for nearly a year. These sensations were worse during her menstrual periods. She had been operated on four years ago by Dr. E. MacD. Stanton of Schenectady for an acute attack of abdominal pain; the left tube and ovary, the right tube and the appendix were removed. Pelvic examination, Nov. 21, 1921, demonstrated the uterus to be of normal size and position, with somewhat restricted movements. The uterosacral ligaments were distinctly palpable, thickened and very tender. There was a definite enlargement

of both of them near their uterine attachment. This was more marked on the left side and this ligament felt distinctly nodular. The preoperative diagnosis was implantation adenoma of endometrial type in the culdesac, with involvement of the uterosacral ligaments. The opinion was expressed that the ovary removed four years before probably contained a hematoma of endometrial type. At operation at the Albany Hospital, Nov. 25, 1921, the uterus was found to be in normal position, the sigmoid was densely adherent to the left uterine cornu and a loop of the small intestine to the posterior uterine wall. The sigmoid was first separated from the uterus and then the loop of the small intestine. The small intestine was so densely adherent that a small portion of its outer wall was left attached to the uterus. After freeing this loop of the small intestine, it was evident that it had been fused with an implantation endometrial adenoma of the posterior uterine wall and that both uterosacral ligaments contained a similar growth (Figs. 58, 59, 60 and 61). The entire uterus and remaining ovary were removed. The ovary was normal; the uterosacral ligaments and posterior uterine wall showed endometrial adenoma (see the illustrations above referred to with their legends).

I wrote to Dr. Stanton asking him what was found at the previous operation. He very kindly furnished me with the following information: The patient was suddenly seized with severe abdominal cramps accompanied with nausea, Sept. 2, 1917, and was operated upon September 29, at the Ellis Hospital, Schenectady. The pathologic laboratory report (No. 570) of that hospital is as follows: "Appendix, both tubes and left ovary: appendix and tubes, nothing remarkable; left ovary, 4.5 by 3.5 by 2 cm., one hemorrhagic cyst has been evacuated." The ovarian cyst was not examined histologically; but I believe it was probably a hematoma of endometrial type and was probably responsible for the endometrial adenomas involving the posterior uterine wall and the uterosacral ligaments. These adenomas may have been present at the first operation; but I believe that it is more likely that they developed subsequently from epithelium escaping from the hemorrhagic cyst of the left ovary when it was freed. The preservation of the right ovary may have been responsible for the development of this epithelium into adenomas.

CONCLUSIONS

Intestinal adenomas of endometrial type are implantation growths, similar in many ways to those arising from a rupture or perforation of a malignant (carcinomatous) ovarian cyst. Fortunately, their distribution is usually not so great; they are not so invasive; they grow more slowly and spread less rapidly. They often take part in menstruation and, therefore, may combine this function with that of invasion. These implantations may spread by growth by continuity and, possibly, by further implantations arising from the escape of menstrual blood from them, carrying some of the overlying epithelium with it.

The portions of the intestinal tract most frequently involved are those usually found in the pelvis; as the sigmoid, rectum, appendix and terminal loop of the ileum. In the twelve cases reported in this series, the rectum and the sigmoid, including the epiploic appendages, and the mesentery of the latter were involved in eight, the appendix in four and the small intestine in two. In the eight instances of implanta-

tions on the sigmoid and rectum, an ovarian hematoma, with evidence of a previous perforation, was situated in the left ovary in six; while in the four instances of implantation on the appendix, a similar hematoma was situated in the right ovary in all four. This suggests that while the intestinal implantations from either ovary may be general in their pelvic distribution, the portion of the intestinal tract normally situated near that ovary is more likely to be involved.

The character of the intestinal lesions varies greatly, and they may be grouped as follows.

1. Surface and superficial implantations:

(*a*) Subperitoneal glands and tubules of endometrial type with evidence of hemorrhage into the tissues about them or in the lumen of the glands or tubules. The surface of the intestine involved is thickened and the brown pigmented dots (1 to 2 mm. in diameter) and larger elevated areas due to the hemorrhage (menstrual) can be easily detected at operation.

(*b*) Endometrial tissue on the surface of the intestine including polyps, which often appear homorrhagic.

(*c*) Subperitoneal hematomas, a later stage of Group *a*.

(*d*) Encysted menstrual blood which had escaped from an underlying endometrial implantation.

2. Implantations developing between adherent folds of peritoneum and other adherent structures (pocketed implantations), best seen in the culdesac between the posterior wall of the uterus and the rectum, which are often fused together. The surface of the adherent parts, which are exposed after separating them, often have a characteristic "pitted" appearance due to the exposure of endometrial tissue in the pockets between the adhesions or in the deeper tissues of the organ involved.

3. The deep invasion of the underlying structure or organ. The tubules worm their way into the tissues of the intestine; and this is often associated with a marked hypertrophy of the surrounding connective tissue and muscle. Many varieties of endometrial tissue and its derivatives may be found, including glands and tubules with and without a characteristic endometrial stroma, dilated tubules, miniature uterine cavities, hematomas and the invasion of lymph vessels by endometrial polyps.

As in implantation carcinoma these implantations may occur on any part of the intestine; its peritoneal surface, its mesentery and especially the epiploic appendages of the sigmoid. The latter may serve as a portal of entry to the deeper tissues of the wall of the intestine.

The intestinal lesions are often only of histologic interest and do not give rise to any symptoms. In other cases the lumen of the

intestine is encroached upon by indentations, by hypertrophy of its walls, and by hematomas; the latter may become larger during menstruation so that symptoms of obstruction may only occur or be more marked at that time.

The implantations in the culdesac, including the involvement of the rectum, can often be palpated prior to operation. In typical cases the diagnosis can usually be made before operation. The age of the patient (usually between 30 and the menopause), the acquired dysmenorrhea or recent increase in menstrual pain, the disturbance of intestinal function during menstruation, the detection of a small adherent ovarian cyst or adherent ovary and the palpatory findings in the culdesac present a syndrome rarely furnished by any other condition.

The operative treatment of intestinal adenoma of endometrial type is at present an unsettled problem. My own reaction, at present, on finding what appears to be an intestinal lesion is to examine carefully the surface of the intestine for dots and areas due to hemorrhage, to look for other implantations in the pelvis and most important of all to examine carefully the ovaries for any signs of a hematoma with evidence of a previous perforation, bearing in mind that it may be very small and is most frequently situated on the lateral or the under surface of the ovary. If the evidence found indicates an adenoma of endometrial type I do not disturb the intestinal lesion, except as it may be easily removed for histologic study, but deal with the pelvic organs as their condition requires. Conservative ovarian surgery in these cases leaves behind a possible source of more implantations, and apparently retained ovarian tissue may sometimes stimulate the growth of the implantations which have not been removed.

I believe that an important, and probably the principal, source of these implantations is the epithelium escaping from an ovarian hematoma of endometrial type which has perforated. The majority of the implantations in the twelve cases reported in this series apparently arose from such a source. There is the possibility that some of them may have arisen from tubal and uterine epithelium escaping through the fimbriated end of the tube, independent of an ovarian hematoma with perforation.

Ovarian hematomas of endometrial type arise from glands and tubules of this type in the ovary which react to menstruation. If they are situated on, or near, the surface of the ovary, perforation occurs while they are small and repeated hemorrhage and perforation may carry away all of the epithelium so that they may disappear; or if it is not all removed the ovarian lesion may be so small and inconspicuous that it may be easily overlooked at the operation and also in the labora-

tory study of the ovary. If the endometrial gland or tubule is situated in the deeper tissues of the ovary, then the hematomas reach a larger size before perforation takes place.

How does this epithelium of endometrial type reach the ovary? Is it of developmental origin from the inclusion of epithelium of the müllerian or the wolffian ducts or is it acquired during adult life? The evidence which I have, at present, suggests that it is usually (possibly always) acquired from the implantation on the surface of the ovary of tubal or uterine epithelium escaping through the fimbriated end of the tube and possibly from tubal fimbriae in contact with the ovary. This epithelium may subsequently invade the tissues of the ovary and later develop into menstruating cysts giving rise to hematomas of endometrial type, the perforation of which permits some of the epithelium, cast off by the menstrual hemorrhage, to escape into the peritoneal cavity and there develop into implantation adenomas of endometrial type. I consider the ovary as an intermediary host, hotbed or incubator, which may impart increased vigor and virulence to this epithelium, so that when it escapes from the ovary it may be more virulent (malignant) and invasive than before the hematoma developed and the perforation occurred. It may not be an essential intermediary host, for it is possible that pelvic implantations may arise from tubal and uterine epithelium escaping from the tube; and also implantations from both sources may be present in the same case. The few cases which I have interpreted as possibly arising from epithelium escaping from the tubes have lacked the vigor, invasiveness and wideness of distribution of the implantations usually found in those associated with an ovarian hematoma with evidence of perforation and also usually present a slightly different histologic picture from the latter. This is a problem for further study. The larger the hematoma and the greater the perforation the wider the distribution of the implantations and apparently the greater their virulence.

Intestinal adenoma of endometrial type is a common condition occurring in more than one half of the cases with ectopic endometrial adenomas and the latter may be found in from 10 to 20 per cent. of women between 30 years of age and the menopause who require an abdominal operation for some disease of the pelvic organs. On account of its frequency, pathologic interest and clinical importance, it deserves a greater recognition than has been accorded it in the past.