MENSTRUATING TRACT FROM UTERUS TO ANTERIOR ABDOMINAL WALL *

REPORT OF A CASE

Goodrich C. Schauffler, M.D.

PORTLAND, ORE.

Reports of fifty-two cases of endometrioma of the postoperative abdominal scar have been reviewed.** Apparently the largest number available in previous reviews has been forty-six. Attention is called to the meager notice which has been paid in the past to the possibility of the development of these growths by direct invasion of endometrium into the abdominal wall. It has not been denied that this may occur, but for the most part it has been considered only the remote possibility, and in many instances the most obvious distortions of logic have been indulged in to avoid falling upon this quite adequate and apparent explanation. The fact, as Nicholson[1] says, that "anatomic continuity between the epithelium of uterine mucous membrane and that of the tumor has not been established in one single case," has been thought sufficient by the majority to exclude such a possibility.

The case to be reported in this paper furnishes a rather perfect example of such continuity. Other instances will be noted, in which the inference of a similar etiology is virtually unassailable. In the face of such direct evidence, and in view of other factors noted from a study of the available cases in the literature, the issue will be cleared for the recognition of this mechanism as the basis of the formation of these growths in a large number of the reported cases. Thus a more intelligent approach can be made to the prophylaxis of the condition.

CASE REPORT

The patient is 24 years of age and married. She has had one miscarriage and one normal delivery. Six years ago, following a gonorrheal infection, she was operated upon at Multnomah County Hospital. The operation lasted three hours. The operative report states that there was performed "bilateral salpingectomy, left oophorectomy, resection of fundus of uterus to just below where tubes come off, removal of cone shaped piece from endomertium." Three drains were inserted to the cul de sac.

The patient was discharged twenty-four days after operation with serous drainage from the incision. Menstruation occurred at the usual intervals and showed no notable abnormality until the sixth month following operation, at which time the serous discharge from the incision had

stopped. There now commenced a dull generalized lower abdominal pain, associated with tenderness in the lower part of the operative scar, and increasing with each menstrual period. Some months later there appeared gradually a very tender nodular thickening in this region which eventually exuded small quantities of darkish blood-stained fluid with each menstrual period.

This gradually increased in amount, and at present the patient states this bleeding requires that her sanitary napkin be placed forward in order to absorb the flow from this region as well as from the vagina. The flow is frequently quite profuse but always dark in color. The tenderness and pain at the menses is described as excruciating.

Abdominal examination (second day of menstrual period) reveals a wide, rather distorted midline scar from symphysis to umbilicus. The condition of the scar is suggestive of previous incisional infection. At the lower pole, immediately
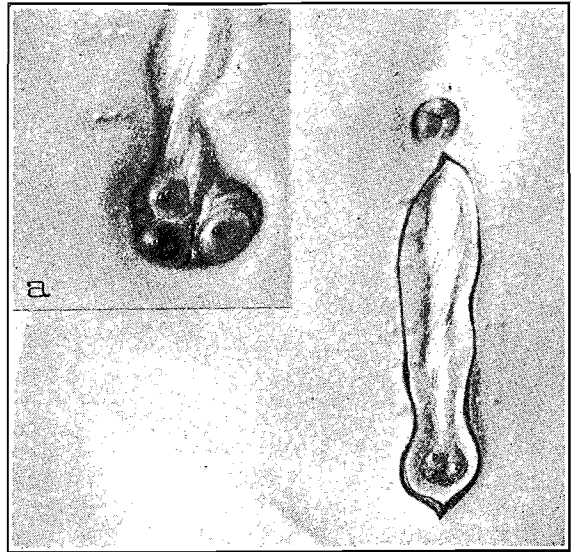

Fig. 1. Drawing of author's case at time of operation. The old scar with endometrial new growth at lower pole is shown with the incision made at recent operation. Detail of new growth is shown in inset. Bleeding occurred by rupture of the blebs at the menses.

above the symphysis, there is a wrinkled depressed area, reddened and puckered, and about the size of a five cent piece (fig. 1). Its depressions are filled with what appears to be old dried blood. A sanitary napkin, the upper end of which overlies this area, is quite profusely blood-stained. Removal of the blood from this depressed surface, which is exquisitely tender and deeply indurated, reveals three small darkish blue blebs in various stages of distention. The largest was ruptured by a probe in the course of the examination and its thick chocolate colored contents extruded. A probe can not be inserted without the use of undue force.

Vaginal examination reveals a small fluctuant tumor in the region of the right ovary, thought to be an ovarian cyst, and a fundus of normal size in fair anterior position and quite fixed, giving the impression of definite adhesion to the anterior abdominal wall.

Preoperative diagnosis: Endometrioma of abdominal wall, fundus adherent to anterior abdominal wall. Right cystic ovary (possibly chocolate cyst).

Operative report: At operation (eleventh postmenstrual day) the scar was excised, and the pelvic viscera were exposed. A firm cord-like adhesion was noted, extending from the peritoneal aspect of that part of the abdominal
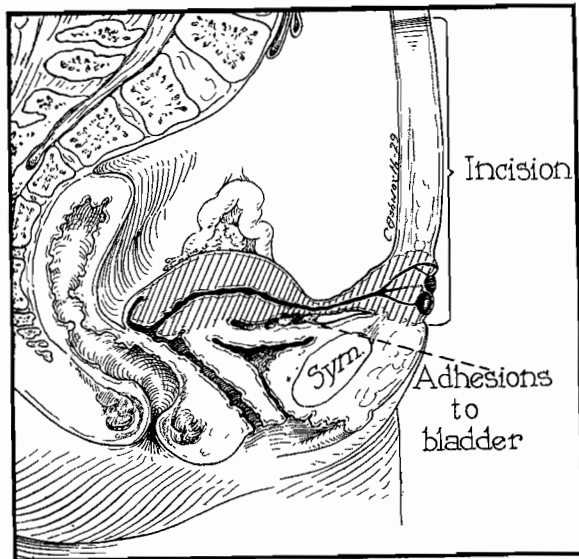
Fig. 2. Schema of author's case. The endometrial tract was traced by sections and reconstructed as shown. It was visible to the naked eye on gross section.

wall involved in the growth to the top of the corpus uteri at its midpoint (fig. 2). These relations were kept intact, and a cone shaped excision of uterine wall was made at the insertion of this cord-like structure into the fundus so as to remove complete a possible sinus tract to the endomertium. The uterus was sutured and the usual closure made. Convalescence was uneventful. Subsequent examination (after five months) revealed no evidence of recurrence.

Gross examination:[†] The operative specimen, exclusive of the excised scar, consists of an oval shaped piece of skin, to which is attached a mass of fat which in turn surrounds a firm tapering cord-like structure about 4 cm. in length. In the skin are two small openings, one a slit-like aperature 1 by 3 mm. in diameter and the other about 2 mm. (These correspond to the bases of the two larger blebs described and pictured at examination during the menses.)

The skin for a distance of several mm. about each opening was bluish black in color. The lower end of the specimen showed the cut surfaces of the cone-shaped portion excised from the uterus. The peritoneum covering the corpus uteri appeared to fuse imperceptibly (on the surface of the cord-like connecting structure) with that of the adjacent abdominal wall.

At the uterine end of the specimen and in the center of the clearly demarcated muscular cord there is a small opening approximately 2 mm. in diameter and apparently lined by mucous membrane. This is surrounded by a well defined wall about 3 mm. in thickness, the diameter of the entire structure being about 8 to 9 mm. Cross section at a number of points shows that this opening or lumen extends almost to the skin. Just beneath the skin it appears to divide into three smaller channels. These are grossly easily recognizable because filled with a blackish thick fluid (figs. 3–6).

Microscopic examination: Sections from various parts of the above described cord-like structure show that its lumen is surrounded by a wall composed of smooth muscle bundles with a small amount of connective tissue, carrying vessels, etc. The epithelial lining of the lumen consists of a

† This description combines the salient features of both the operative and pathologist's reports.

single layer of tall columnar epithelial cells. There is a clearly defined characteristic stroma, in which appear many simple glandular structures lined by a tall columnar to cuboidal epithelium. Cilia were not noted.

It is my observation, and that of Dr. Warren Hunter, that the muscular wall bears a great similarity to the myometrium, while the lining unquestionably bears the exact structure of the endometrium. Not only are the composite histologic structures identical, but the general arrangement throughout is that of a small but perfectly ordered endometrial cavity. It is interesting to note also that the condition of this miniature endometrium corresponds roughly to the late stage of regeneration which agrees with the patient's actual menstrual phase.

Sections of blocks, cut so as to include the skin and the attached cord beneath it, reveal an intimate connection between the smooth muscle which makes up the body of the cord and the corium of the skin. The two tissues blend intimately, yet are clearly differentiated from each other. Scattered here and there in the smooth muscle are glands identical in structure with those seen elsewhere except that here, near the skin, they are frequently much dilated and cystic with atrophy of the lining epithelial cells and are not flanked by so characteristic a stroma. Some contain blood, others mucus and cellular detritus. About them there is a scanty stroma which generally is suffused with blood. The sections do not show any of the glands actually communicating with the skin surface, although from the gross appearance of the specimen it seems certain that at least some of them must have opened externally, probably through cysts (fig. 7).

Pathologic diagnosis: Adhesions of fundus of uterus to anterior abdominal wall, producing elongation of a portion of uterus which contains endometrium and with formation of mutiple fistulae opening on surface of skin.

COMMENT ON ETIOLOGY

The rational explanation of the condition noted here is quite obvious. The presence of drains, together with the tendency to walling off of the drained tract and the occurrence of infection, involving the incision on the top of the corpus as well as the deeper layers of the abdominal incision, are all factors tending to cause fibrinous adhesion of the adjacent wounded and infected surfaces. With the subsequent establishment of fibrous adhesions, and the breaking down of the stitches in the uterine wall due to infection, it is quite simple to picture the formation of a sinus tract which eventually became carpeted with outgrowing endometrial mucosa.

We are familiar with that characteristic of this tissue which allows it to regenerate very rapidly to cover the denuded postmenstrual mucosa. Cullen,[2] in describing the invasion of mucosa into myomatous tissue, describes it as "flowing into the chinks." "If these are small, there is only room for
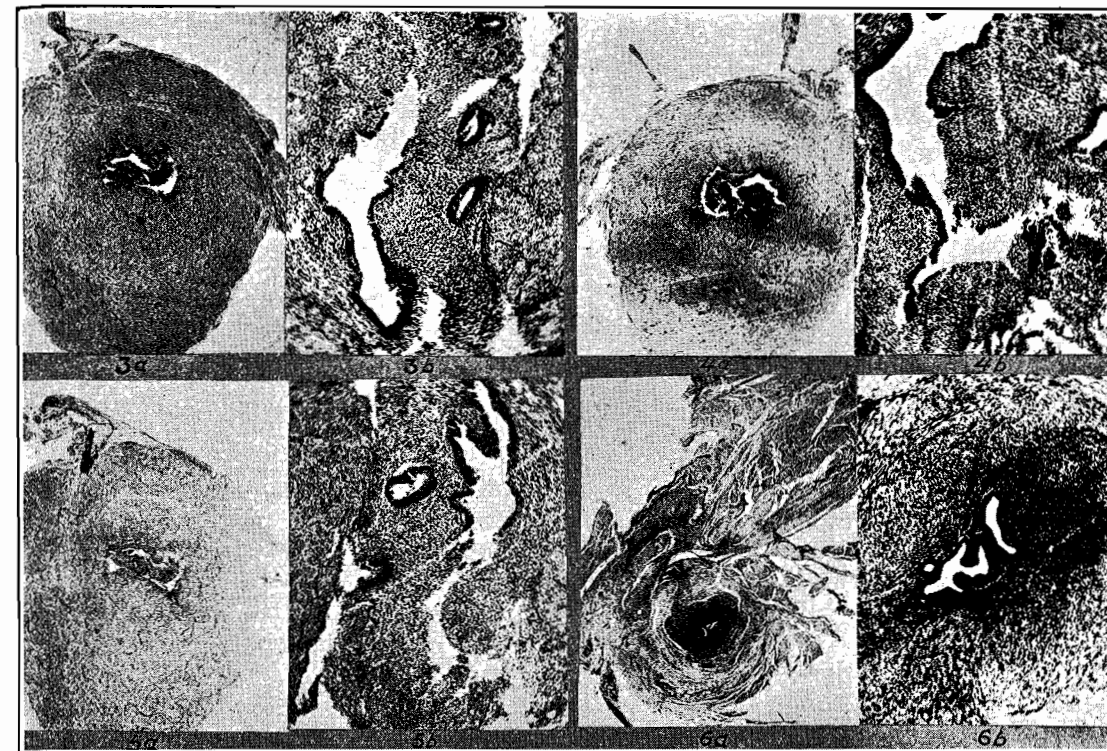
Figs. 3, 4, 5 and 6 are from sections taken at points along the tract from the top of the uterus to the fascia of the aponeurosis overlying the rectus muscle. In each case the low power view shows the entire muscular cord with its endometrial core, while the high power view gives the detail of the core at the same point. The cord is composed of smooth muscle. The tabs shown in sections 3, 4 and 5 represent fibrous adhesions to the bladder wall. Fascia and fibres of the rectus (striated) muscle are present in fig. 6.
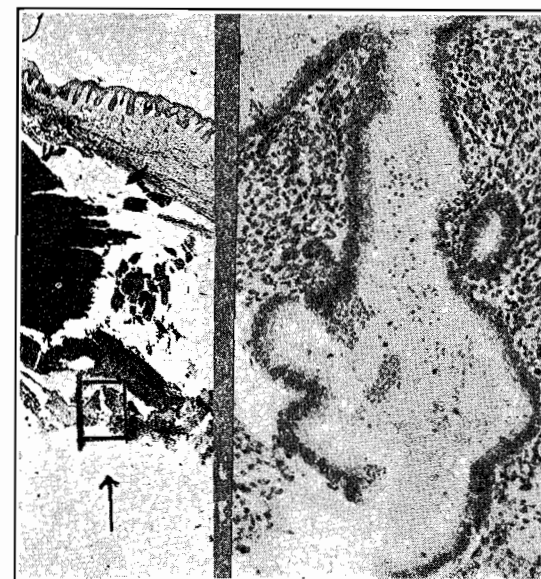

Fig. 7. Low power view of a section cut vertical to the skin through the center of one of the blebs depicted in fig. 1. The dermis is shown above, the cysts walls being lined by a single layer of cuboidal epithelium, flanked by typical endometrial stroma, as shown by high power taken as indicated. The cyst contains old blood and detritis, and is undistended. The section was taken during the intermenstrual phase.

isolated glands, but where the spaces are of goodly size, large masses of mucosa may flow into and

fill them." It is not difficult, then, to suppose that it may grow similary along a healing denuded sinus tract. It is quite difficult, in fact, to imagine any other explanation for the formation of so definite a tract as this.

Gouilloud, Martin and Michon[3] report the case of a woman thirty years of age who underwent a myomectomy for the removal of a large fibroid. The endometrial cavity was not opened, careful closure was effected, but drainage was instituted. The convalescence was stormy, lasting three months and there persisted a small fistula through the incision which exuded minute quantities of blood at the menses for another three months. This eventually closed, but after still another three months began again to discharge very small amounts of menstrual blood. A small tumor developed about the dimple-like opening of this tract which tumor was subsequently shown to be a typical endometrioma. Menstrual swelling and discharge continued for three years. The growth was excised about three years after the initial operation. The uterine scar was adherent beneath the abdominal wall growth, but at this time a continuous mucosal tract to the endometrial cavity was not demonstrated.

In this instance it seems reasonable to suppose that there did exist for some time a patent sinus, since the drainage of blood occurred at the menses for the first three postoperative months. During this time an incisional transplant could hardly have reached sufficient development to reproduce the menstrual function as eventually occurred. It seems

reasonable to accept, as do the authors, the highly probable hypothesis that there existed for three months an initial actual fistula which allowed the escape of menstrual blood from the fundus. Subsequent atrophy and occlusion of the connecting portion caused occlusion and obliteration of the sinus. Later the menstrual function was assumed by the growing endometrial elements in the better protected layers of the abdominal wall. Such a sequence seems reasonable, especially when we have evidence of the atrophy of a similar connecting tract in several cases, notably that of Fraas,[4] in which tubules and cysts were demonstrated in the adhesions connecting the fundus to the abdominal wall growth.

As an alternative explanation, certain authors (Nicholson,[1] Novak,[5, 6] et al.) have maintained that this phenomenon is due to a metaplasia of the peritoneal epithelium in the region of the scar, in response to an hypothetical and ill defined local irritation or hormonal imbalance, resulting in the production of glandular epithelium and the subsequent metamorphosis of the fibrous tissue of the region into stroma and smooth muscle. We cannot enter into an argument regarding the merits of the various theories for the genesis of ectopic endometrial tissue at this time. It seems fair, however, to point out that none of the variants of this theory can apply as a rational explanation of the case which I have reported, and that their application to the case of Goullioud et al. which I will mention seems in a high degree improbable.

In only six of the fifty-one cases which I have reviewed is the peritoneum described as actually involved in the growth at all (table 1). If metaplasia of the peritoneum were the constant initial factor, it should be the invariable seat of the initial growth. Is it not a distortion of logic to imagine a retrograde growth back through an adherent scar tissue stalk and through the uterine wall, with the creation by this ectopic and metaplastic mucosa of an actual sinus tract, lined by mucosa and flanked by smooth muscle? One may as well argue that a fecal fistula ordinarily originates from a stitch infection in the skin rather than from injury to or infection of the bowel wall itself. I am not in a position to press the argument against the theory of peritoneal metaplasia in its general application, but if we must fall back on explanations other than direct invasion for these growths the theory of transplants (Sampson) seems to have a more rational application.

Published by	Ventrofixation	Cesarean section at term	Operation on pregnant uterus	Hysterectomy	Hysterotomy	Operation on adnexae	Operation on uterine ligaments	Appendectomy	Myomectomy	Ectopic pregnancy	Total
Amos			1								1
Amann					1						1
Bonney	1							1			2
Berkeley	1										1
Briand	1										1
Cullen	1										1
Danforth (Shallenberger)	1										1
Dietrich	1										1
Fraas	1										1
Douglas	1	1				1					3
Goullioud et al.									1		1
Heaney		1	1								2
Halban	1										1
Klage	1										1
Lauche	3			1							4
Lochrane	1										1
Lemon and Mahle	5	1		2	1						9
Letulle et al.								1			1
Maes					1						1
Mahle and McCarty	1						1				2
Nicholson						1					1
Pujol et Chohez						1					1
Polano										1	1
Rosenstein	1										1
Roeder	1										1
Schwartz		1									1
Stratz	1										1
Tobler								2	1	1	4
Vassmer	1										1
Von Franke					1						1
Williams				1							1
Author's						1					1
TOTAL	19	7	5	2	1	8	2	3	2	2	51

TABLE 1.

THE ROLE OF VENTROSUSPENSION

It is obvious, then, that where there is adhesion between fundus and abdominal incision, invasion of the region of the scar by endometrial mucosa may occur. It is important to consider the conditions which may prepare the way for this.

Roeder's[7] case is of great interest in this regard. His patient, aged 25 and married, had undergone a ventrosuspension four years previously. There gradually developed a typical, rather large "menstrual tumor," very painful at the menses, but not exuding blood at any time

At operation (by Dr. Roeder) the mass was removed from the abdominal wall and a resection of the upper half of the body of the uterus was done. The fundus was found firmly attached to the abdominal wall by adhesions and dissection revealed the original silk sutures intact, extending to and through the wall of the fundus (fig. 8). The tract surrounding the suture was lined by the same appearing tissue found lining the uterine cavity and also in the tumor of the abdominal wall. Microscopic examination of the tissue in the region of the suture showed adenomatous tissue.

Dr. Roeder's opinion, apparently backed by that of Dr. Sampson, is to the effect "that in this instance, the uterine mucosa grew along the path of the silk suture and formed a distinct sinus, lined by endometrial tissue, enlarging into a mass on the external surface of the aponeurosis and
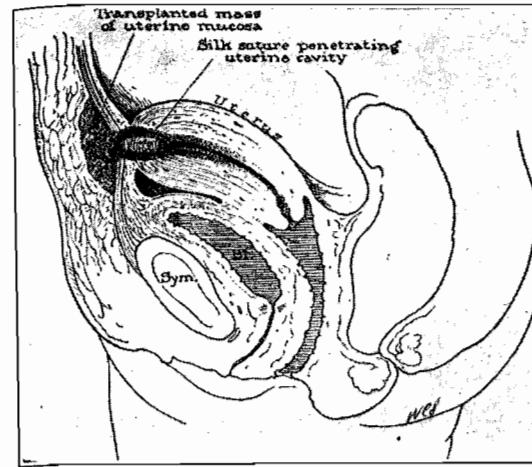

Fig. 8. Cut from Roeder's report. The mechanism of the formation of a fistula by migration of endometrial mucosa along the tract of a silk suture is obvious.

also infiltrating the scar." The silk suture in this instance was traced into the cavity of the uterus.

At this point, it is pertinent to note that out of the fifty-one cases abstracted from the literature, by far the largest number, following any single type of surgical procedure, have followed ventrosuspension of the corpus uteri. Nineteen, or 36.3 per cent of the total number of cases, appear as a result of this operation which is obviously (especially in the past ten years) a relatively infrequent procedure. In other words, the condition is seen most frequently following an operation which is relatively very seldom performed.

Obviously, then, there is something in the nature of such a procedure predisposing to endometriomatous formation. I believe that the explanation rests in the use of nonabsorbable sutures from corpus to abdominal wall. There is almost constantly a varying degree of tension upon these sutures with resultant necrosis, and not infrequently there is infection with the occurrence of an actual necrotic tract as the pathway for subsequent invasion by the uterine mucosa. I hardly think it is necessary to argue regarding the possibility of dragging viable endometrial fragments through into the incision on a moving suture, or carrying out such fragments on the point of a needle. It seems that these are remote possibilities, especially since the sutures are seldom carried entirely through the uterine wall. The really logical explanation of this occurrence following ventrosuspension appears to reside in the use of nonabsorbable sutures with almost constant tension and not infrequent infection.

Another notable factor in the occurrence of these growths following other operations is the frequency with which drains have been used or postoperative infection has occurred or both. I believe these are important factors in the early phase of the genesis of the condition. A stormy postoperative course is almost the rule. It is easier to explain such an occurrence following appendectomy, for instance, when we know that drains and definite infection were factors in all three of the reported cases. Following operations on the adnexae, it is not difficult to picture an actual invasion through the agency of adhesions, especially where a cornual excision of a tube has been done. For example, in one of the reported cases the uterine cornu, from which the tube had been excised, was found adherent to the peritoneal aspect of the scar, subjacent to the endometrioma. Out of eight cases (15.4 per cent), following operations upon the adnexae, the fundus was adherent to the scar in three, not described in three and not adherent in two.

Where there is no adhesion or evidence of past adhesion via which invasion may have occurred, some other hypothesis must obviously be adduced. For example, two cases are noted following simple tubal sterilization, and others following operations involving only the uterine ligaments. Barring the possibility of infection (which is not always clearly eliminated), it would require a considerable distortion of the direct invasion theory to fit such conditions. It would perhaps be less out of the drawing to fall back on Sampson's theory and suppose that endometrial fragments from the invaded fundus or from tubal regurgitation (due to manipulation) may have become viable in the edges of the incision.

Space does not permit a careful analysis of the interesting aspects presented by even so brief a tabulation of the published cases as that in the chart. I will, however, call your attention to a few outstanding factors. Ventrosuspension, which is a relatively very infrequent operation, carries the largest incidence of postoperative endometrial transplant in the abdominal scar. This finding clearly substantiates my contention that direct invasion is indeniably a frequent etiologic factor.

Operations upon the adnexae come next in line (eight cases, 15.4 per cent) but it should be noted that under this head come most of the pelvic infections with subsequent drainage and frequent ex-

cision of parts of the corpus uteri resulting in adhesion to the anterior abdominal wall. In only two instances was a simple uncomplicated surgical procedure upon the adnexae alone followed by such a condition. Cesarean section is next in frequency (seven cases, 13.3 per cent[‡]). The nature of this operation and the great frequency with which it is performed would cause us to expect that it should be the forerunner of endometrial transplants in a very much larger number of cases. The infrequency of this sequence seems an argument against the general application of the direct implantation theory (Sampson). It is suggested that there is an attenuation of the regenerative potentiality of the decidua at term which is responsible for the low incidence noted.

In sharp contrast to this figure is that which I note for operations involving opening of the pregnant uterus in the first two trimesters. This is a very unusual procedure indeed, yet it carries a percentage incidence scarcely lower than that of section at term. I think this should suggest definitely that there is a heightened growth potentiality of this early decidua over that at term. This, of course, is mere speculation. I am not aware of animal experiments which might clarify the question.

TREATMENT

The treatment of this condition in all of the reported cases has been surgical excision. No recurrences have been noted, and the surgical treatment may be considered satisfactory. General considerations in regard to prophylaxis would indicate the desirability of carefully covering the exposed wound edges in all laparotomies, but especially where the endometrial cavity is being invaded. The operation of ventrosuspension of the corpus uteri should be undertaken with even more than the usual circumspection. Some modification of the older type of operation, which would include complete enucleation of the endometrial mucosa, might entail less likelihood of later endometrial formation. Undue tension on sutures should be avoided. The use of drains should be limited to imperative indications. They are not indicated in operations involving ordinary infections of the adnexae.

SUMMARY

It has been argued that endometrioma of the laparotomy scar does not occur as the result of direct invasion of the abdominal wall by uterine mucosa. The chief argument against this occurrence

[‡] Several cases following cesarean section have been found since the reading of this paper. They are not included in Table I.

has been that direct continuity between the epithelium of the uterine cavity and that of the new growth has never been established.

A case is reported (author's) in which such continuity is definitely established and other cases, apparently not generally noted are referred to (Loicq,[8] Puccioni,[9] Ballin,[10] fig. 9). Another case is quoted (Roeder's), in which the evidence is clearly to the effect that migration occurred along silk sutures from the endometrium to the abdominal wall. In a third case (Goullioud's) there was apparently at first a definite sinus from the uterus to the skin, with later closure of the deeper part of the tract and still later assumption of the menstrual function by the more superficial elements, remaining viable in the abdominal wall. A fourth case (Fraas') com-
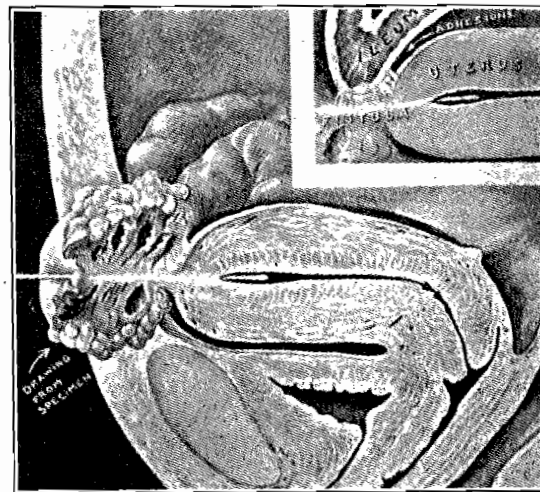

Fig. 9. Cut from Case 3 of Ballin's report. Note passage of bristle into fundus. Postoperative menstrual fistula. Direct communication of the fistula through the endometrial enclosure into the uterine cavity. Also note the intestinal adhesions to the enclosure.

pletes the sequence indicated by the others by the finding of endometrial tubules and cysts in the adhesions connecting the fundus to the endometrioma of the abdominal wall.

These cases are selected from many similar reports as simply forming a convincing sequence. Added to this evidence we find on reviewing the available cases from the literature that the largest number of cases (nineteen or 36.5 per cent) have occurred following the relatively infrequent operation of ventrosuspension of the uterus. Many of the remainder have followed the use of drains and massive infection, factors which obviously predispose to adhesions and the formation of a tract from the fundus to abdominal scar.

I believe from the above findings that direct invasion of the abdominal scar by endometrial ele-

ments via nonabsorbable suture tracts or sinuses, dependent upon pressure or infection necrosis or drains, is the correct explanation of the occurrence of many of these growths. It cannot, however, explain all of the reported cases.

BIBLIOGRAPHY

1. Nicholsen, G. W.: Endometrial Tumors of Laparotomy Scars. J. Obst. and Gyn. Brit. Emp. XXXIII, 620, 1926.

2. Cullen: Adenomyomata of the Uterus.

3. Gouillaud, Martin and Michon: Les Endometriomes des Cicatrices de Laparotomie. Gynec. et Obst. XVII, 2, 106, 1928.

4. Fraas, E.:Ueber Adenombildung in der Bauchmarbe und Elongatio uteri nach Ventrifixur. Zbl. f. Gyn. XLIII, 750, 1919.

5. Novak, E.: Histologic Interrelationships of Menstruation and Ovulation. Am. Jour. Obst. and Gynec. X, 802, 1925.

6. Idem: Significance of Uterine Mucosa in Fallopian Tube, with Discussion of Origin of Aberrant Endometrium. Am. Jour. Obst. and Gynec. XII, 484, 1926.

7. Roeder, C. A.: Surgical Transplantation of Endometrial Tissue from the Uterus into the Abdominal Wall. Neb. Med. Jour. XIII, 226, June, 1928.

8. Loicq: Utero Parietal Fistula after Conservative Cesarean Section. Gynec. et Obst. VI, No. 5, 322, 1922.

9. Puccioni: Utero Parietal Fistula. Riv. Ital. de Gynec. III, 107, 1924.

10. Ballin: Menstrual Fistulae of Post operative and Endometrial Origin. S. G. and O. XLVI, 4, 525, April, 1928.

549 Medical Arts Building.