Chapter 6

INFLAMMATORY AND METABOLIC DISTURBANCES OF THE UTERUS

In addition to inflammation and new growths and displacements of the uterus there are certain organic changes due largely to disturbance in the metabolism of the organ—either from endocrine disorders, as in endometrial hyperplasia, or from defective circulation and allied conditions, as in subinvolution.

The gynecologists of the past generation grouped a large number of conditions which we now know are due to other causes under the general heading of "Pelvic Congestion." Gustave Cotte devoted a chapter in his book to a discussion of the functional disturbances caused by pelvic congestion. Howard Taylor has recently reviewed the effects of vascular congestion and hyperemia on the structure and function in the female reproductive system and concludes that the early changes are due to congestion and that if this persists long enough fibrosis results. Some of the conditions which Taylor includes in this "congestion-fibrosis syndrome" are "mastodynia," premenstrual breast engorgement and certain types of "chronic mastitis," uterine congestion and hypertrophy, many cases of menorrhagia, cervical hypertrophy, and the majority of cases of "endocervicitis," the congested and "cystic ovary," and many of the cases of dyspareunia, dysmenorrhea, and obscure pelvic pain.

A similar syndrome has recently been described by Theobald under the designation of pelvic sympathetic syndrome. He feels that many of the symptoms result from a lowered threshold for stimuli in the nerves supplying the uterus and parametrium. The factors causing this lowered threshold may be inflammation, congestion, excessive sexual indulgences, mental distress, and others. His treatment consists of cauterizing the endometrium and the cervix with a silver nitrate stick. The patient then uses some vaginal antiseptic jelly or suppository twice daily and takes 5 mg. dienestrol three times daily for six weeks. At the end of this period if the symptoms are not relieved a second treatment is given. In patients with ovarian pain which persists, he injects 1 per cent procaine into the recti muscles; with persistent pain from prolapse, injection of procaine into the broad ligaments gives relief. Theobald states that though the threshold of the affected nerves may be restored to normal by hypnosis and psychotherapy, he feels that his therapy is simpler and that it gives a higher percentage of lasting cures.

In a recent psychosomatic study of pelvic congestion, Duncan and Taylor conclude that emotional disturbances are a definite factor in the etiology of this symptom complex.

Although in our opinion many of the numerous conditions included can be better accounted for by the more recent knowledge of physiology, endocrinology, and psychiatry, there are undoubtedly many cases with vague, unexplained symptoms in which this syndrome is a determining factor. For a more complete exposition of this subject the reader is referred to the articles by Taylor.

For convenience, these disturbances of metabolism and the inflammatory disorders are grouped together in this chapter. Laceration of the cervix is placed here also, for its clinical significance, in regard to products or symptoms or need for treatment, is due largely to complicating inflammation.

Under the cervix are included acute and chronic cervicitis, ulcer of cervix, cervical polyps, hypertrophy of the cervix, and stricture. Under the corpus uteri are included acute and chronic endometritis, hyperplasia of the endometrium, membranous dysmenorrhea, chronic metritis, subinvolution, hyperinvolution, hypertrophy of the myometrium, senile atrophy of uterine canal, and specific infections of the uterus.

ACUTE CERVICITIS

Acute cervicitis is acute inflammation of the cervical mucosa and underlying tissue lying between the external and internal os. It may be due to infection with ordinary bacteria or with the gonococcus. In gonorrheal vaginitis, the inflammation frequently extends into the cervix and may remain in check there for some time. If in a case of gonorrheal vaginitis applications are made within a healthy cervix, gonorrheal cervicitis is likely to result.

A common form of cervicitis due to ordinary bacteria is that found in lacerations of the cervix with everted mucosa, in which inflammation comes and goes owing to irritation of the turned-out mucosa by the vaginal bacteria. Streptococcic or staphylococcic infection of the cervix may follow labor or abortion, but in the acute stage it is usually overshadowed by the more serious inflammation in the body of the uterus, i.e., the septic metritis.

When there is pelvic congestion from any one of its various causes, as emphasized by Taylor, there may be increased secretion of clear cervical mucus and some reddening about the external os. This is frequently designated cervicitis, but it is apparently a circulatory rather than a bacterial disturbance. This hypersecretion with some erosion comes not infrequently in virginal conditions, when there is occupational or postural or endocrine pelvic congestion. It is frequently first discovered in the newly married, when care must be exercised to avoid mistaking it for beginning gonorrheal infection.

According to Robert Meyer, in about a third of newborn infants the upward growth of the squamous epithelium is arrested before the external os is reached, resulting in what is known as congenital erosion of the cervix. Wollner found that estrogens stimulated the proliferation of the columnar elements while progesterone stimulated the squamous elements, and from these and other findings he concludes that in a large percentage of cases there is an endocrine etiologic factor present. This is discussed at length under Chronic Cervitis Including Erosion later in this chapter.

Hofbauer called our attention to proliferative changes in the cervical epithelium occurring during pregnancy. He felt that the hyperplasia found

was due to the excess anterior pituitary hormone in the blood at that time. In a recent article by Edmondson et al. on papillary lesions of the cervix in pregnancy, the etiologic factors are reviewed, and though no one factor was found to be responsible, age, hormones, and infections were all considered important.

Symptoms and Diagnosis

The principal symptom of acute cervicitis is increased discharge from the cervix, with the irritation resulting therefrom. The cervix secretion is tenacious and stringy and resembles the white of an egg except that it is less fluid and more jellylike. The normal cervical secretion is clear and alkaline in reaction. In gonorrheal cervicitis the free pus admixture causes the mucous to become an opaque yellow plug in the cervix, with the tenacious stringy qualities characteristic of cervical mucus. In inflammation due to other bacteria the pus admixture is usually less in amount. There is usually considerable erosion about the external os, from the irritating discharge. There are also hyperemia of the cervix and bleeding on slight manipulation. The patient has an uneasy sensation of weight and discomfort in the pelvis, though acute cervicitis alone rarely causes pain. If there is much pain, it is probably due to some other trouble, for which search should be made.

Acute cervicitis causes but little trouble in diagnosis. The irritating partially opaque mucous discharge from the external os shows that there is inflammation in the cervix. The absence of pain and of tenderness of the body of the uterus on bimanual examination, and the absence of other symptoms of endometritis indicate that the inflammation is confined to the cervix. Whether or not it is gonorrheal may be determined by looking for evidence of gonorrhea elsewhere (vagina, urethra, vulvovaginal glands) and by examining the discharge for gonococci. A Papanicolaou smear will help to rule out early malignancy.

Treatment

The objects of treatment in a case of acute cervicitis are (a) to prevent the inflammation from spreading to the body of the uterus and (b) to remove the irritating discharge and the consequent discomfort. These effects are best secured by having the patient use an antiseptic vaginal cream or jelly; one of the best of these is Triple Sulfa Cream. Additional general treatment in cases of gonorrheal cervicitis is covered in Chapter 3 under Gonorrhea. Local applications and instrumentation of the cervical canal should be avoided as this tends to force the infection higher. Warm lactic acid or white vinegar douches taken daily remove the irritating discharge from the vagina.

CHRONIC CERVICITIS

Including Erosion, Eversion, Laceration, Cyst Formation, Leukoplakia, and the Sequelae of Laceration

Chronic cervicitis is chronic inflammation of the tissues of the cervix. It usually starts in the lining mucosa but has extended deeply into the surrounding tissues by the time it becomes chronic. Fulkerson found that 33 per cent of 6,483 adult women had chronic cervicitis.

Chronic gonorrheal cervicitis and chronic septic cervicitis follow acute inflammation of like character, though in some cases the acute symptoms are so slight as to escape notice. Laceration of the cervix is a fruitful source of chronic cervicitis, opening up the cervical glands and lymph spaces to the infection.

Changes in Cervix

The etiology of congenital erosion has been discussed. The cases in which infection is the main factor usually start as a result of small tears and eversion of the cervix which has not been corrected in the early postpartum period.

Disturbance of the normal vaginal acidity is another possible etiologic factor in the complex condition. Karnaky, who has made instructive studies of the pH variations in vaginal and cervical conditions, feels that faulty pH of the vaginal contents is an important factor, probably more important than the old infection, in keeping up and causing extension of cervical erosions and associated conditions, and hence that it must be considered in planning treatment.

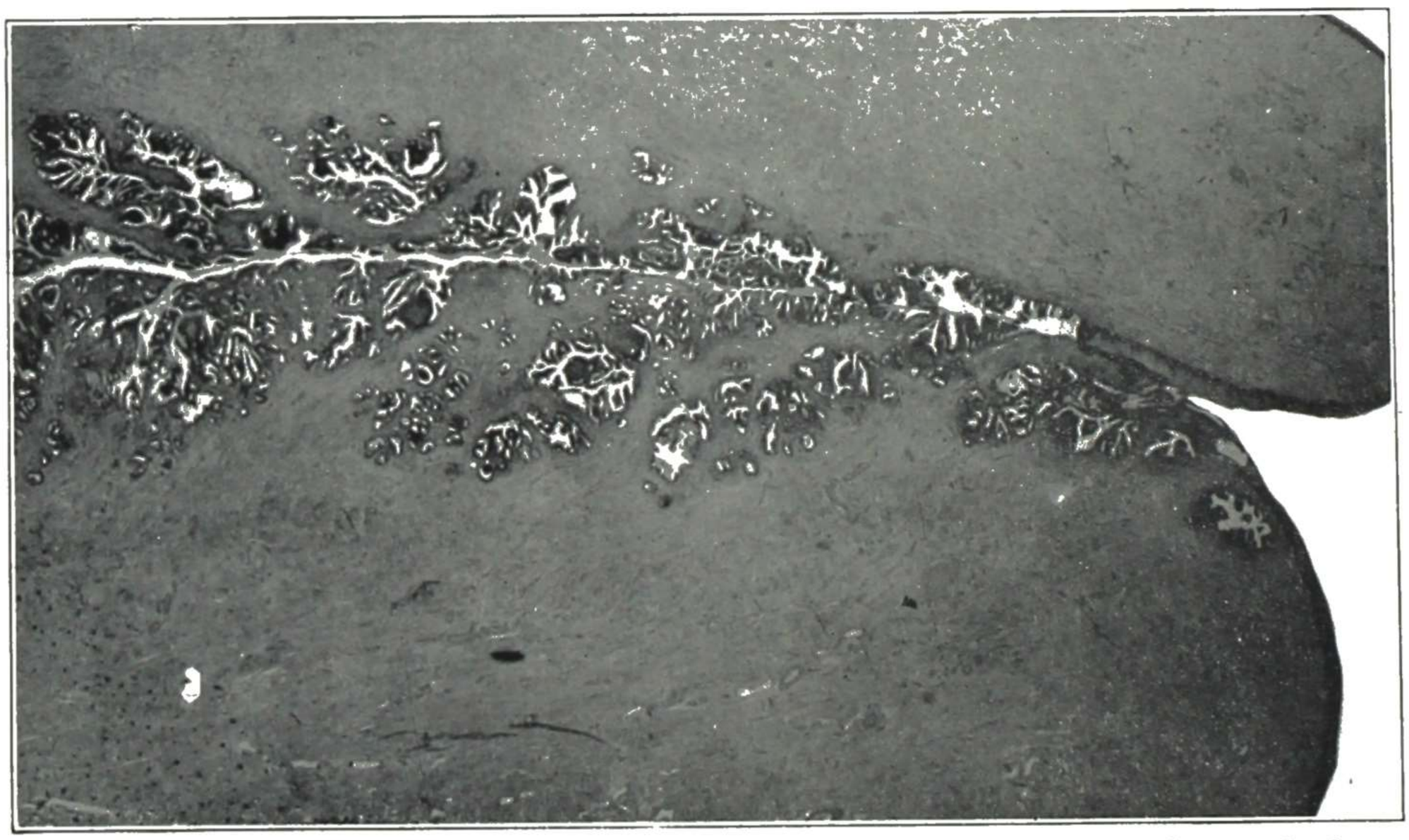


Fig. 504.—Cervicitis, chronic and localized to certain areas. This photomicrograph shows a considerable part of the cervical canal with its branching glands. The external os with its squamous epithelium is well shown. Notice that there are scattered inflammatory areas in the gland walls, both near the cervical canal and in the deeper portions of the glands. Each point of infection is surrounded by an area of round cell infiltration. Gyn. Lab.

The infecting bacteria penetrate the mucosa and underlying structures, affecting the glands and interglandular tissue, as shown in Fig. 504. As the inflammation starts in the lining mucosa it is often referred to as "endocervicitis," but it quickly involves the underlying deeper tissues and consequently the more comprehensive term "cervicitis" is better. There is increased secretion from the cervix and the clear cervical mucus becomes a mucopurulent discharge.

In the clinical picture of chronic cervicitis there are certain features which need individual attention. These features are erosion, eversion, laceration, cyst formation, and leukoplakia.

Erosion.—That phase of chronic cervicitis designated as "erosion" is very interesting. The term itself is rather confusing in that we ordinarily think of an eroded surface as one which has lost its epithelial covering, whereas when a microscopic section of an "erosion" of the cervix is examined it is found covered with columnar epithelium, which has replaced the pavement epithelium normal to that location.

Ries puts the matter thus, "The name is explained by the development of our knowledge of erosion. In the primitive period of gynecology, when the speculum furnished the closest means of study of the cervix, the early observers believed the red areas to be raw. The name 'erosion' expressed their concept of an area deprived of the normal surface layer. When Ruge, Veit, and later R. Meyer, studied the microscopic appearance of these areas it became evident that there was no denudation, but a change from the normal stratified epithelium to the columnar type. The name 'erosion' was therefore corrected into pseudoerosion, but the usage of decades has been to call the condition *erosion*."

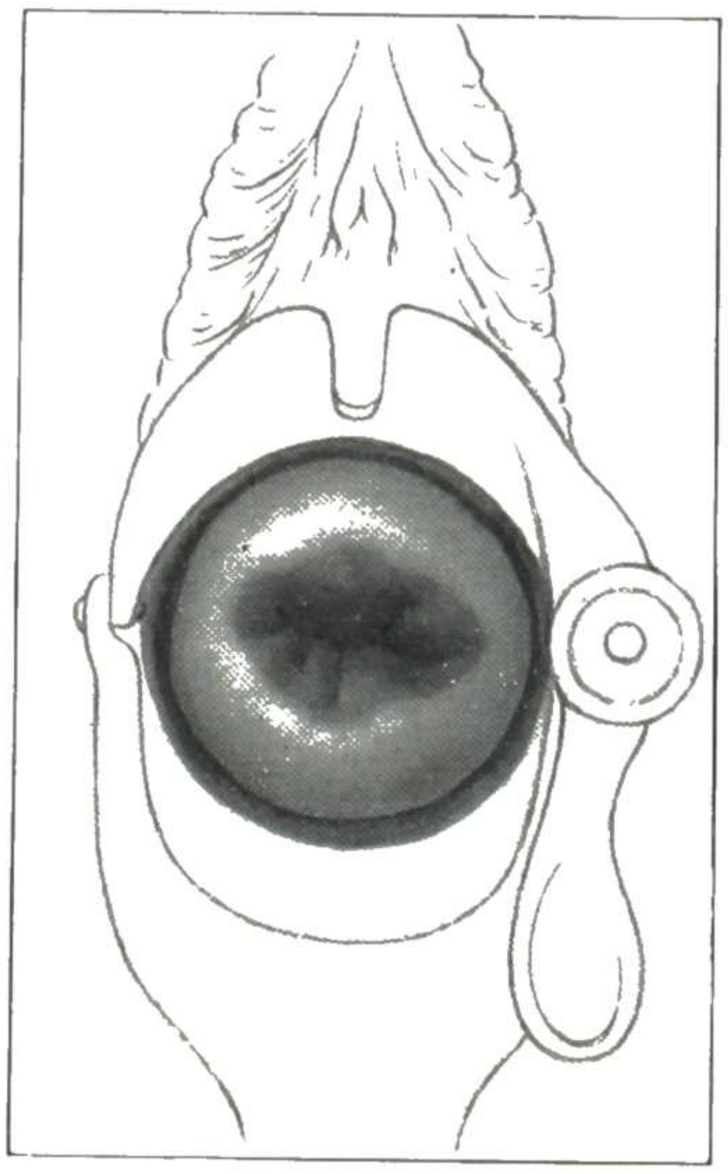


Fig. 505.—The usual appearance of an erosion on a multiparous cervix. The cervix is somewhat lacerated, and around the slightly everted cervical mucosa is the wide, irregular, red area of erosion.

Erosion is started by irritation, usually from inflammation, and in its development there is a regular sequence of events which have been admirably described by Robert Meyer, Schottlander, Frankl, and others. To harmonize the name with the microscopic findings it has been assumed that, before the columnar epithelium grew out, the area must have been denuded of the squamous epithelium, leaving a real eroded area (the primary "erosion"), and that what we see in sections constitutes the various stages of healing. Meyer in his classical description adopts this view and designates the ordinary findings as "healing erosion," and gives an interesting description of the different stages of healing. We have followed this plan as a working basis, and steps in the progress of healing are clearly illustrated by photomicrographs from our departmental laboratory.

The difficulty about the unqualified acceptance of the idea of a primary denuded area of any considerable extent is that no one sees such a denuded area. Again, casting off of

the pavement epithelium over the area in question and then covering of the denuded area by columnar epithelium is not the only way in which replacement of pavement epithelium by columnar could take place. It seems just as reasonable for the replacement of the pavement epithelium by the columnar to be simply a gradual pushing off of disintegrating pavement epithelium by the outgrowing columnar epithelium, without there being a real denuded area at any time.

The single-layered columnar epithelium covering the area permits the underlying vascular tissue to show through, giving a red appearance to the area. Fig. 505 is a diagrammatic representation of the erosion area as viewed through the speculum. To the right is the many-layered squamous epithelium, which gives the pinkish-white color to the normal cervix, as shown in Fig. 506, *A*. To the left is the beginning of the erosion, which on inspection is red, as shown in Figs. 506, *B* and 506, *C*.

This condition represents the first step in repair; that is, in the area where the many-layered protective squamous epithelium is damaged and dying, the quick-growing columnar epithelium has taken its place as a temporary covering, to be replaced later by the slower-growing squamous epithelium which forms the permanent protection. For convenience in description this healing process is divided into three stages. It is important to know the general plan and details of these stages, for it is this knowledge which enables understanding of the complex and confusing microscopic pictures, some of which may be easily mistaken for carcinoma.

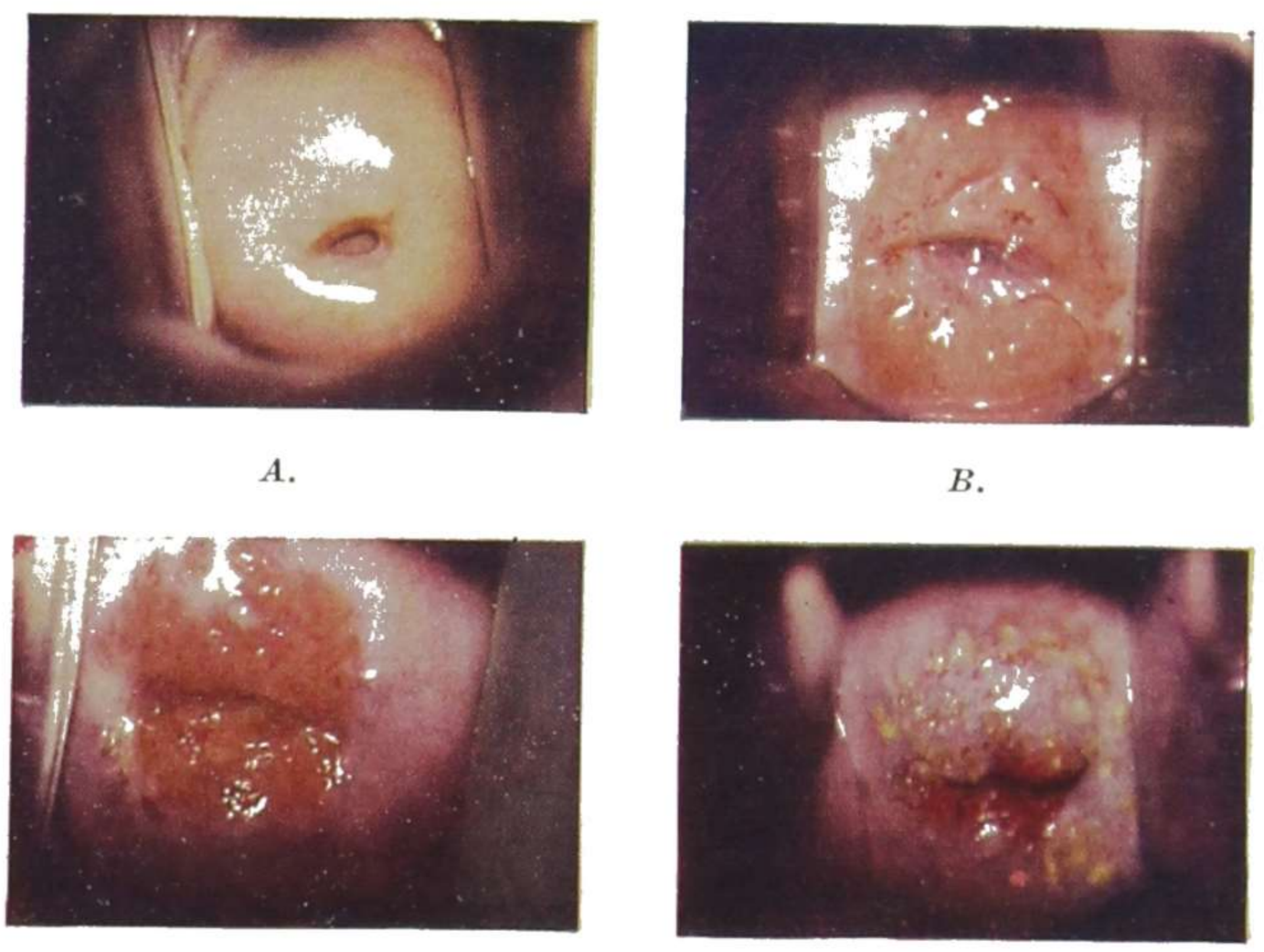
First Stage of Repair or Healing.—The columnar epithelium quickly grows out over the denuded or eroded area. This covering of the denuded area by columnar epithelium is so rapid that a bare area is seldom seen. In fact, the two processes probably go on simultaneously, the columnar epithelium advancing little by little as the squamous epithelial covering disintegrates. There is dilatation of the capillaries and round cell infiltration of the underlying muscle and connective tissue.

The new layer of columnar epithelium covering the damaged surface proliferates so rapidly that it is thrown into minute folds, giving somewhat of a granulating appearance to the surface of the ordinary erosion (Fig. 506, *B*). In some cases these folds become high (Fig. 507), producing a velvety appearance like projecting granulations. This condition is designated "papillary erosion" (Fig. 506, *C*). In addition to covering the surface, the columnar epithelium tends to grow down into the underlying tissues and form "glands." If the openings of these temporary glands become obstructed small retention cysts are formed. Also, the projecting papillae may become adherent, thus blocking escape of the secretion of the cells. A third factor in cyst formation, and probably the principal one in making the larger cysts, is the blocking of the regular glands of the cervix. When the cysts are numerous they form the "cystic erosion," as shown in Fig. 506, *D*. The cyst contents may be clear or may contain pus admixture, giving a yellow tinge as in the illustration. These little retention cysts of cervical glands were first described by Martin Naboth (about 1700) and are commonly called "nabothian cysts."

Second Stage (Figs. 508 to 511).—In the second stage of healing the squamous epithelium grows in from the edges, and from any remaining islands of squamous epithelium which were not cast off during the earliest stage. This epithelium grows under the columnar epithelium, displacing it. At the lumen of the glands it may dip in and displace the lining epithelium or it may seal off the lumen of the gland. If the latter occurs, the blocked glands may dilate beneath the squamous epithelium and form small cysts (nabothian cysts), which contain clear mucus or opaque pus. These little cysts or abscesses may rupture through the surface, causing a repetition of the desquamation of the squamous epithelium.

Third Stage (Fig. 512).—In the third or final stage of healing, the buried glands are taken over completely by the squamous epithelium, which continues to grow under the columnar epithelium, pushing off and disintegrating it. Spontaneous healing of the entire erosion is rare.

Coordinating Points.—The healing process is not in the same stage in all parts of the cervix. Usually the various stages of healing can be seen by examining different areas of the same erosion. The picture may be extremely varied, with confusing intermingling of the two types of epithelium. A detailed study of the illustrative slides will make clear the



A. *B.*

C. *D.*

Fig. 506.—Colored photographs showing the characteristics of cervical erosions. *A*, Appearance of the normal cervix; *B*, an extensive erosion; *C*, an erosion with definite papillary features; *D*, a cystic erosion, with pus in some of the cysts. (Baumrucker—By courtesy of Surgery, Gynecology and Obstetrics; Copyright, 1938, The Surgical Publishing Company of Chicago.)

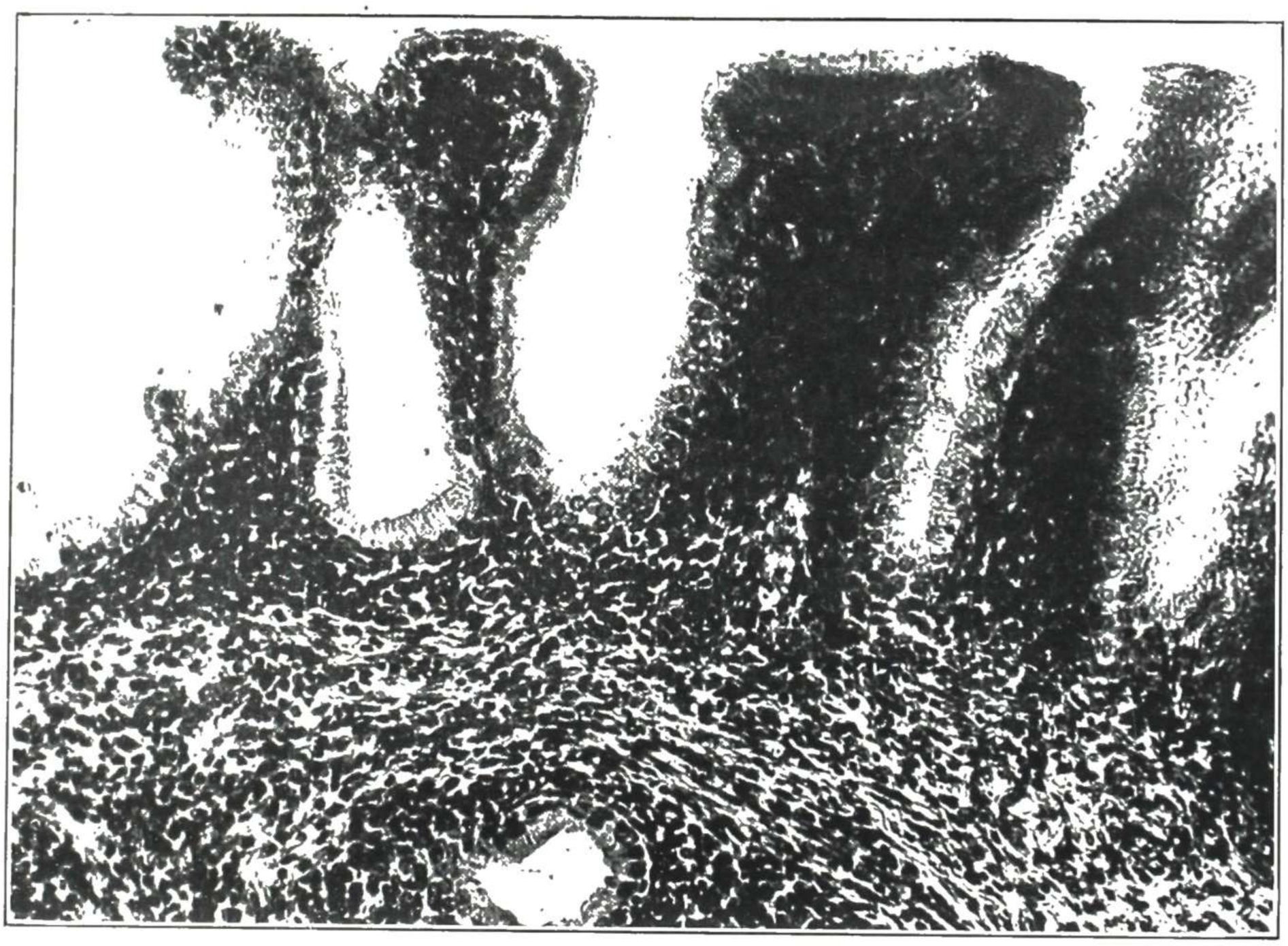


Fig. 507.—Papillary erosion. An early stage showing all surfaces covered by columnar epithelium. At the bottom of the illustration is seen a small gland. Gyn. Lab.

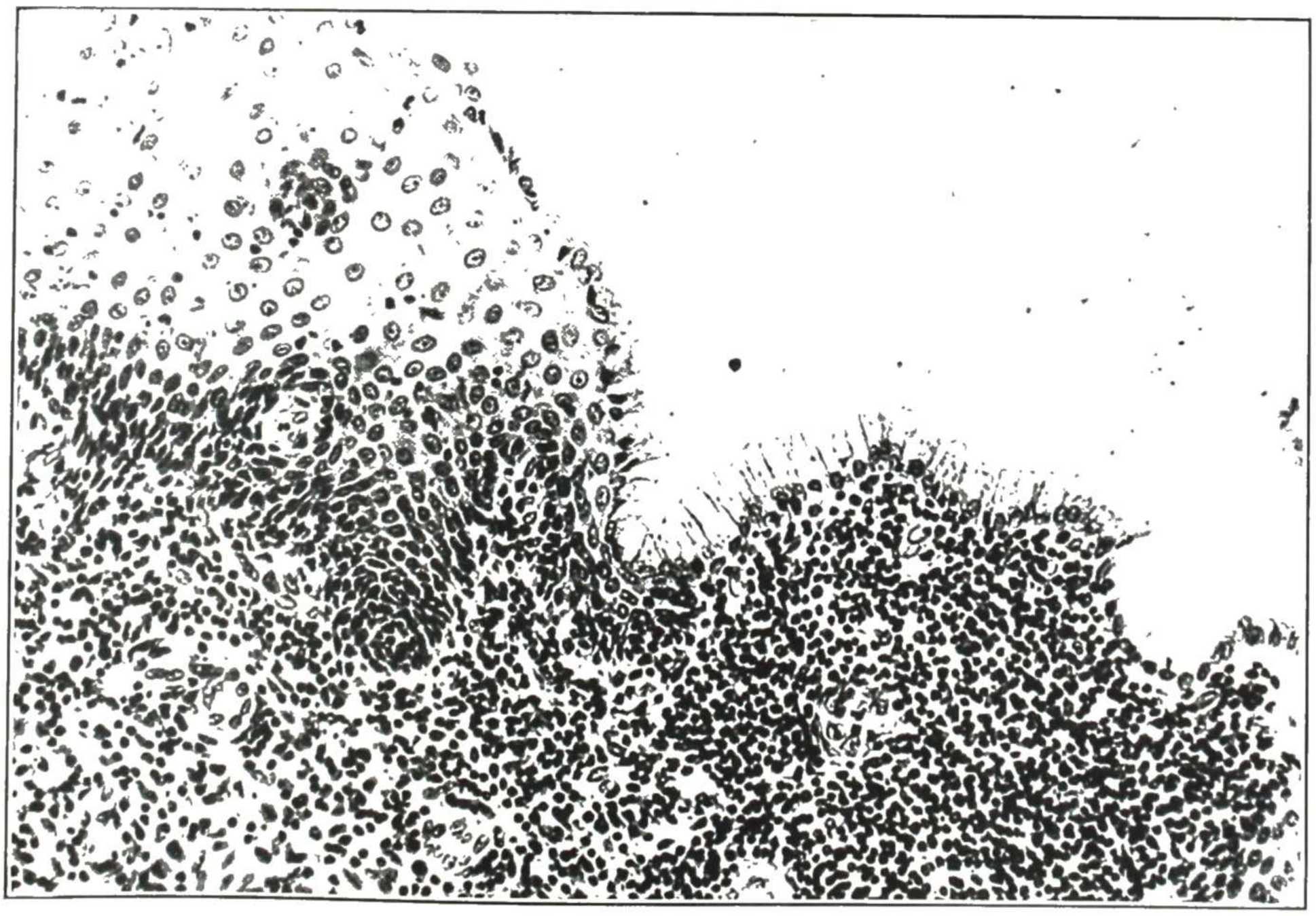


Fig. 508.—Healing erosion. Very early second stage. In the right half of the photomicrograph is seen the area of erosion covered over by the single layered columnar epithelium from the cervical canal. Beneath this epithelium the round cell infiltration is still present. The squamous epithelium at the left is beginning to grow beneath the columnar epithelium. As this "creeping under" process proceeds, the columnar epithelium is raised from the surface and gradually disintegrates. Here the columnar epithelium may be seen in all stages of necrosis, from mere remnants near the top of the picture at left of center to the perfect columnar epithelium covering the site of the erosion. Gyn. Lab.

salient features of erosion. The protecting squamous epithelium having been disintegrated by irritation, and the area quickly covered by outgrowth of the columnar epithelium, the regenerating squamous epithelium begins to regain the area by creeping under the temporary columnar epithelial covering. The beginning of this process is well shown in Fig. 508. The various stages and ramifications of the interesting phenomenon of replacement of columnar epithelium by squamous epithelium in an erosion can be seen in this series of photomicrographs.

This creeping of squamous epithelium under the columnar epithelium, displacing the latter and filling in aberrant gland cavities with solid masses of pavement epithelium, gives rise to microscopic pictures which require great care to differentiate from the aberrant cell masses of carcinoma. The differential diagnosis is taken up under the microscopic diagnosis of cervix cancer

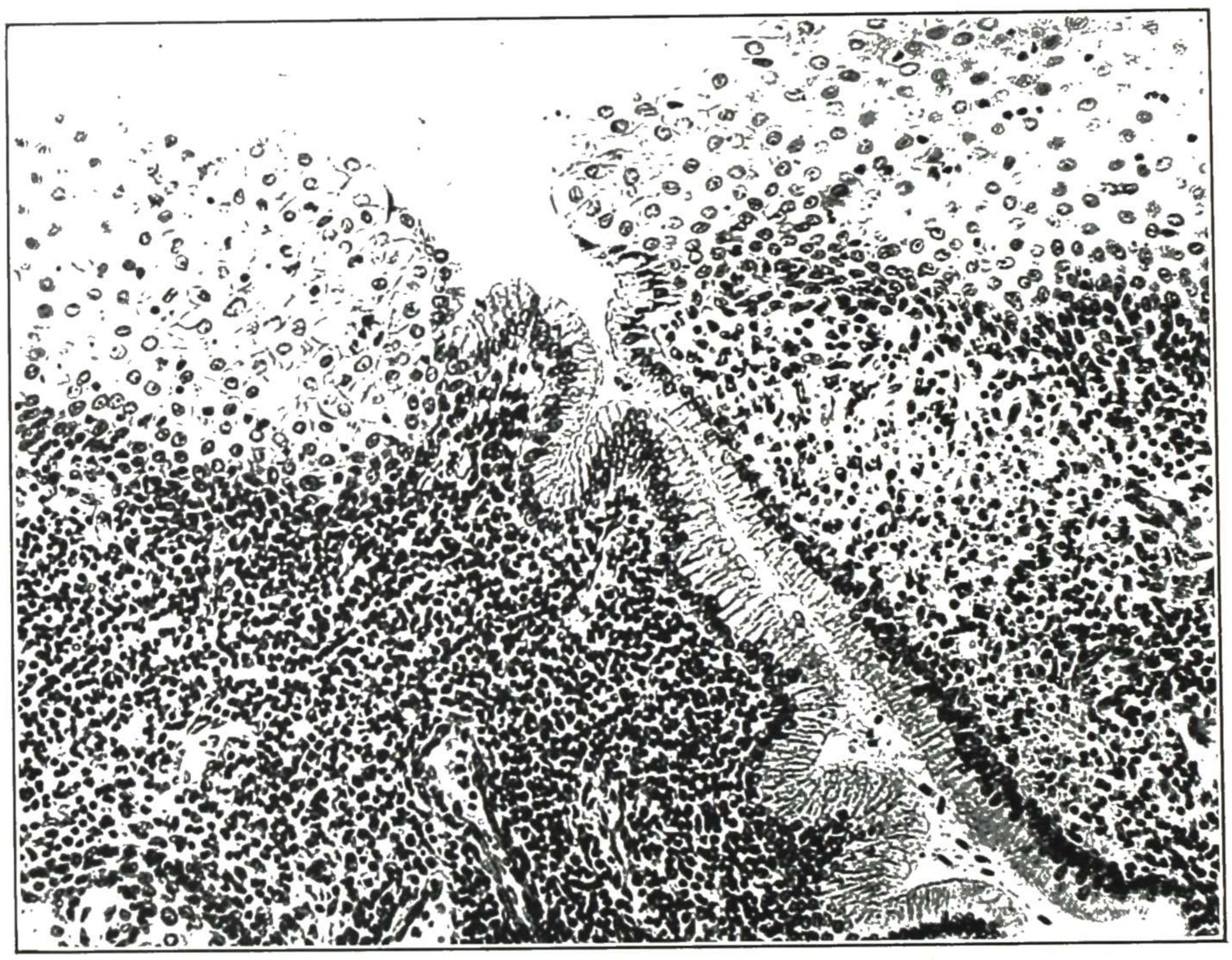


Fig. 509.—Healing erosion. The squamous epithelium has grown down from both sides and is seen here surrounding the duct of a gland. This gland is one of the many formed by the columnar epithelium which recently covered this area. From this point in the process of healing the squamous epithelium may do one of two things. It may grow across the opening leaving the gland beneath with no opening to the surface or it may encircle the gland, destroying the glandular epithelium and plugging the remaining space with squamous epithelium. If the former occurs, it is called the second stage of healing; if the latter occurs, it is designated as the third stage of healing. Notice the marked round cell infiltration in the underlying muscle. Gyn. Lab.

in Chapter 8. There it will be noted also that this faculty of regenerating squamous epithelium to creep under and displace columnar epithelium is not always limited to an area of erosion but may extend into the cervical canal and involve normally placed glands, giving squamous-cell masses deep in the cervix. This "epidermization" of areas ordinarily occupied by columnar epithelium, follows, of course, the gland outline; i.e., one of the distinguishing characteristics is that it follows "the trellis work of the glands" instead of being the haphazard invasion of malignancy.

The question of metaplasia of columnar cells (or columnar-cell antecedents) to squamous cells enters some of these cases of extensive epidermization in the cervix. This origin is more evident, of course, in epidermization of the endometrium, mentioned in the microscopic diagnosis of carcinoma of the corpus in Chapter 8. Novak, in accounting for this squamous epithelium where only columnar epithelium should be, states that we must consider three possibilities:

1. Direct extension of squamous epithelium from its normal situation (Meyer). This "creeping" tendency of squamous epithelium is clearly shown in our slides (Figs. 509 to 511) and is probably responsible for most of the epidermization seen in the cervix. It is possible for it to extend also to the endometrium, particularly if inflammation has prepared the way by damaging the intervening columnar epithelium.

Fig. 510.—Healing erosion. The squamous epithelium is beginning to encircle the gland. The advance is along the upper wall, where it has lifted the columnar epithelium over a large area. Remnants of the latter may be seen along the upper surface of the cavity. The edge of the invading squamous epithelium is seen beneath the papilla at the left lower portion of the picture. The remaining intact columnar epithelium is seen on the lower wall of the gland. Gyn. Lab.

2. Transformation or "metaplasia" of adult columnar epithelium into epithelium of the squamous type (Ruge).

3. Growth of squamous epithelium from embryonal rests of undeveloped cells (Meyer). These embryonal cells presumably retain the power to develop into squamous epithelium under proper stimulus. The extensive epidermization occasionally found in the endometrium is apparently due to embryonal rests or metaplasia.

A congenital type of erosion is described by Fischel, who states that it is found in 30 per cent of newborn infants. Frankl states that in the six-month fetus the squamous epithelium covering the cervix extends into the cervical canal, but at the end of fetal life the junction of the two types of epithelium is usually in the neighborhood of the external os. If the columnar epithelium

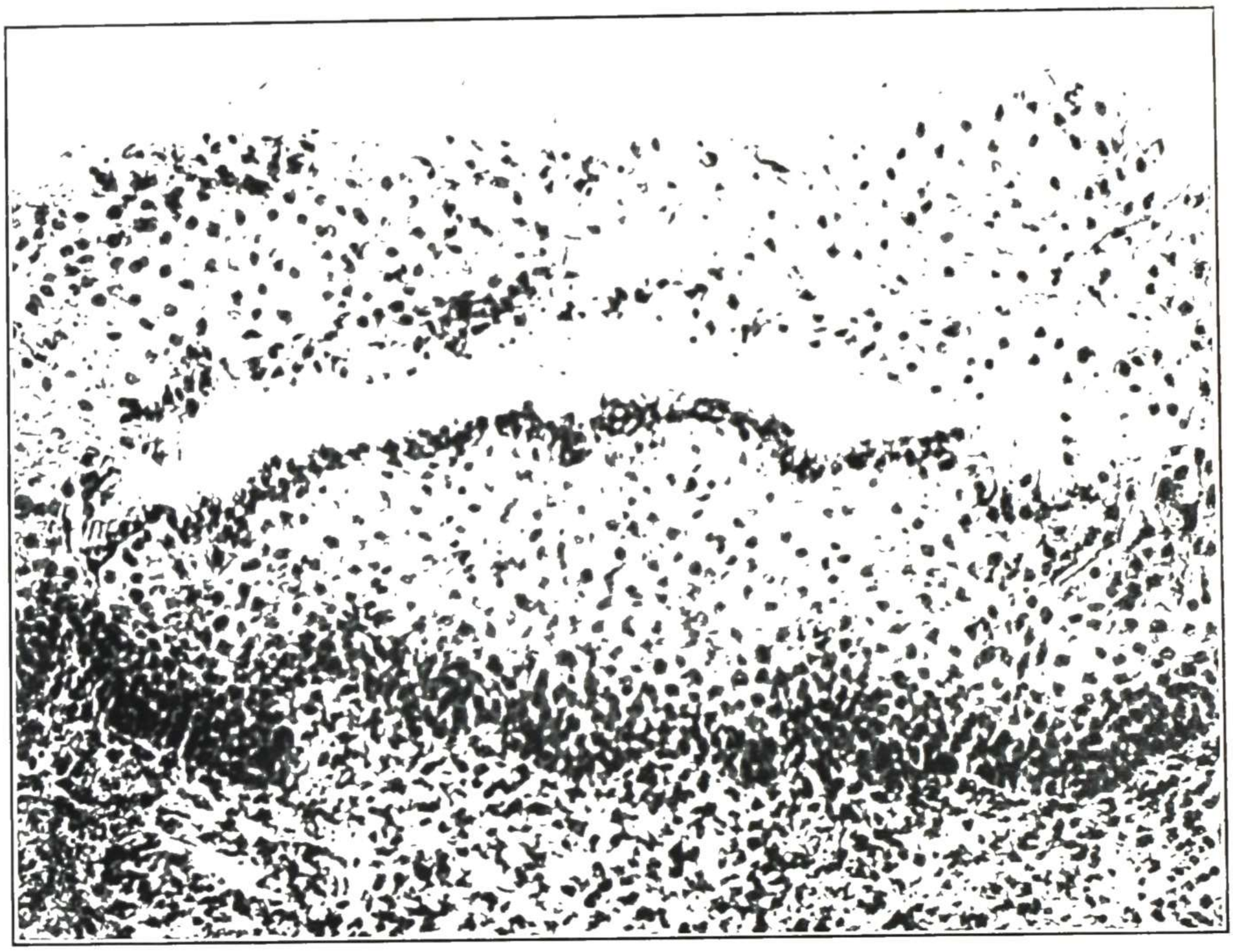


Fig. 511.—Healing erosion. In this section a superficial gland has been completely undermined by squamous epithelium and pushed out into the surface epithelium. It will soon be cast off with the superficial layer of the epithelium. Gyn. Lab.

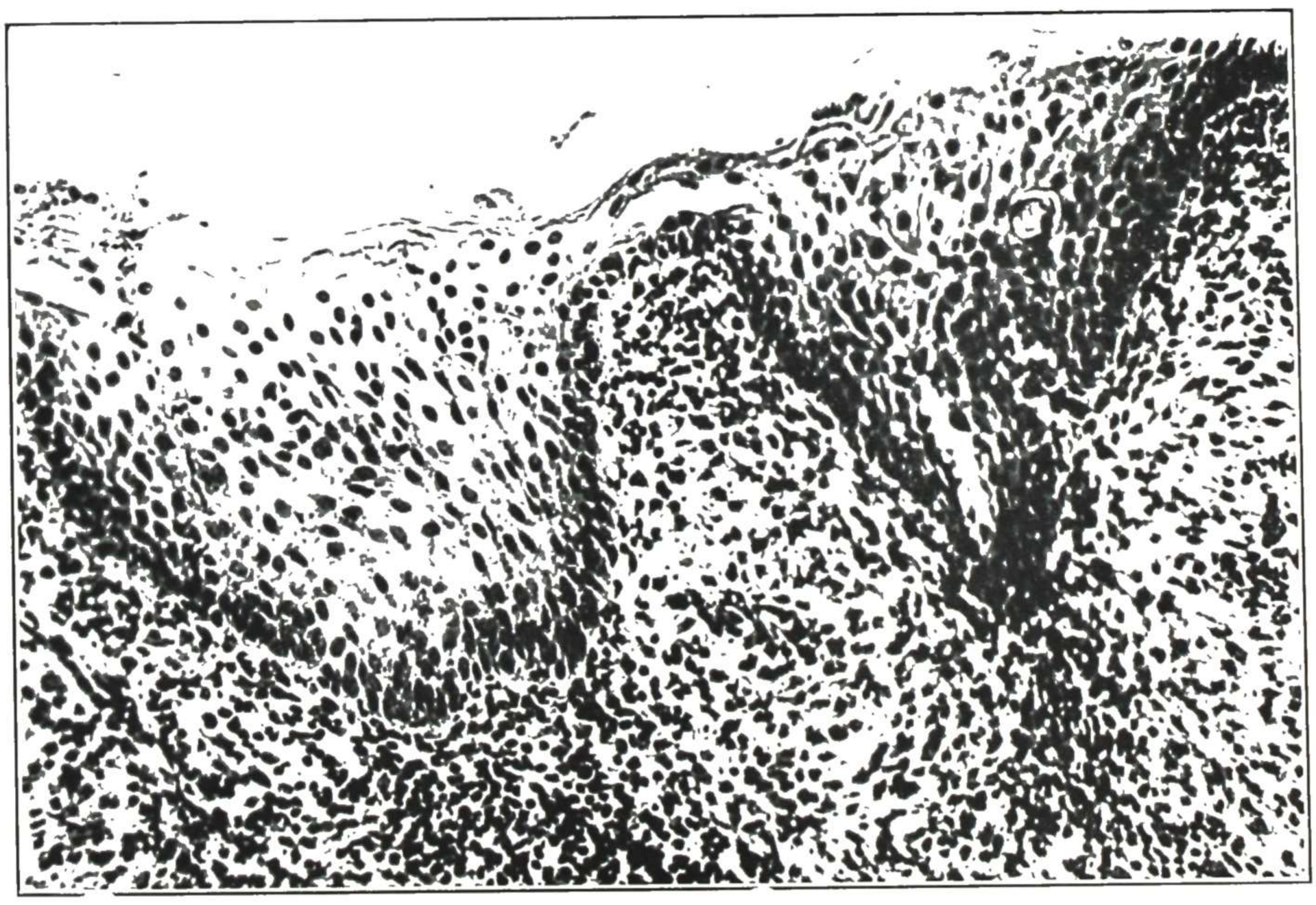
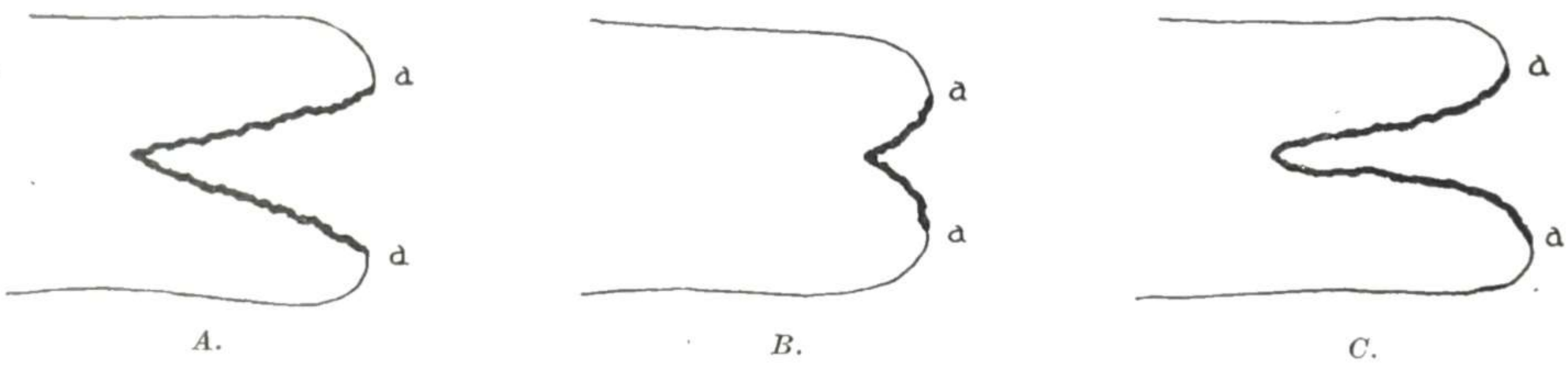


Fig. 512.—Healing erosion, third stage. In this area, all of the columnar epithelium has been eliminated, and the depressions filled with squamous cells. There is still much round cell infiltration beneath the surface, and the epithelial covering is very thin in places. Gyn. Lab.

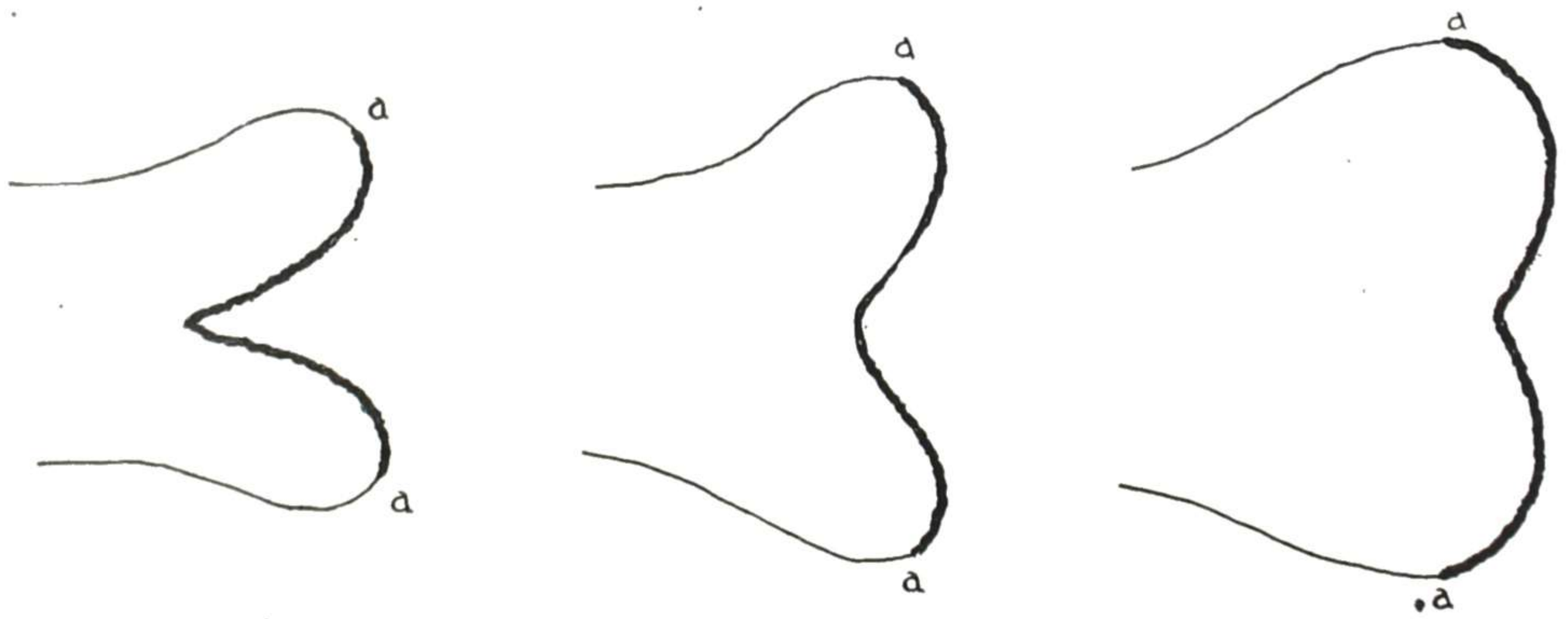
extends over the surface of the portio one speaks of it as a congenital pseudo-erosion. After birth there is, as a rule, a desquamation of the columnar epithelium, and the area is covered over by squamous epithelium from the border or from islands of squamous epithelium which have remained beneath the columnar epithelium.

There is an endocrine factor in erosions in the newborn and in children and in certain cases in adult life. Wollner was able to alter the histologic picture of atrophic cervices by administration of estrin and progestin. Estrin stimulated the proliferation of columnar cells, giving a picture of glandular hyperplasia with marked hyperemia and edema, such as is commonly seen in endocervicitis cases. Progestin, on the other hand, stimulated the growth of



A. *B.* *C.*

Fig. 513.—Illustrating different conditions in laceration of the cervix. *A*, Fresh laceration with the unchanged lips separated. *B*, Practically healed laceration of cervix, only a small notch remaining. C, Deep notch with two lips remaining, but the lips are not thickened. Such a cervix rarely causes trouble or requires repair.



A. *B.* *C.*

Fig. 514.—Different conditions in laceration of the cervix. *A*, Deep notch with thickened lips and beginning eversion. *B*, More thickening of lips and marked eversion. *C*, Marked infiltration and thickening of lips with complete eversion, forming the "ball-shaped" cervix.

the squamous epithelium. With a combination of both hormones, the estrin seemed to accentuate the action of the progestin on the squamous epithelium, while the progestin inhibited the effect of the estrin on the columnar epithelium. These facts help to explain the occurrence of cervical erosion in the newborn, where there is unopposed action of the maternal estrin. Fischel found cervical erosion in 30 per cent of stillborn children, and Meyer in 33 per cent. Some of the erosions found in young girls where there is no evidence of infection can be explained on this endocrine basis, and treatment with progesterone should be tried before resorting to any severe local measures.

Eversion.—In chronic cervicitis, the inflammatory infiltration causes marked thickening of the mucosa and underlying tissues. As these tissues become

more and more thickened, they push out in the direction of least resistance, which is at the external os. This rolling-out (eversion) from inflammatory infiltration is most marked in the cervix which has been lacerated.

Eversion may occur also in a cervix where there has been no laceration, the rolling-out of the thickened mucosa with the consequent enlargement of the external os giving a very deceptive appearance of laceration (Fig. 518). This swelling and eversion from chronic inflammation may take place in the unmarried and may become so marked as to give rise to an erroneous diagnosis of previous pregnancy.

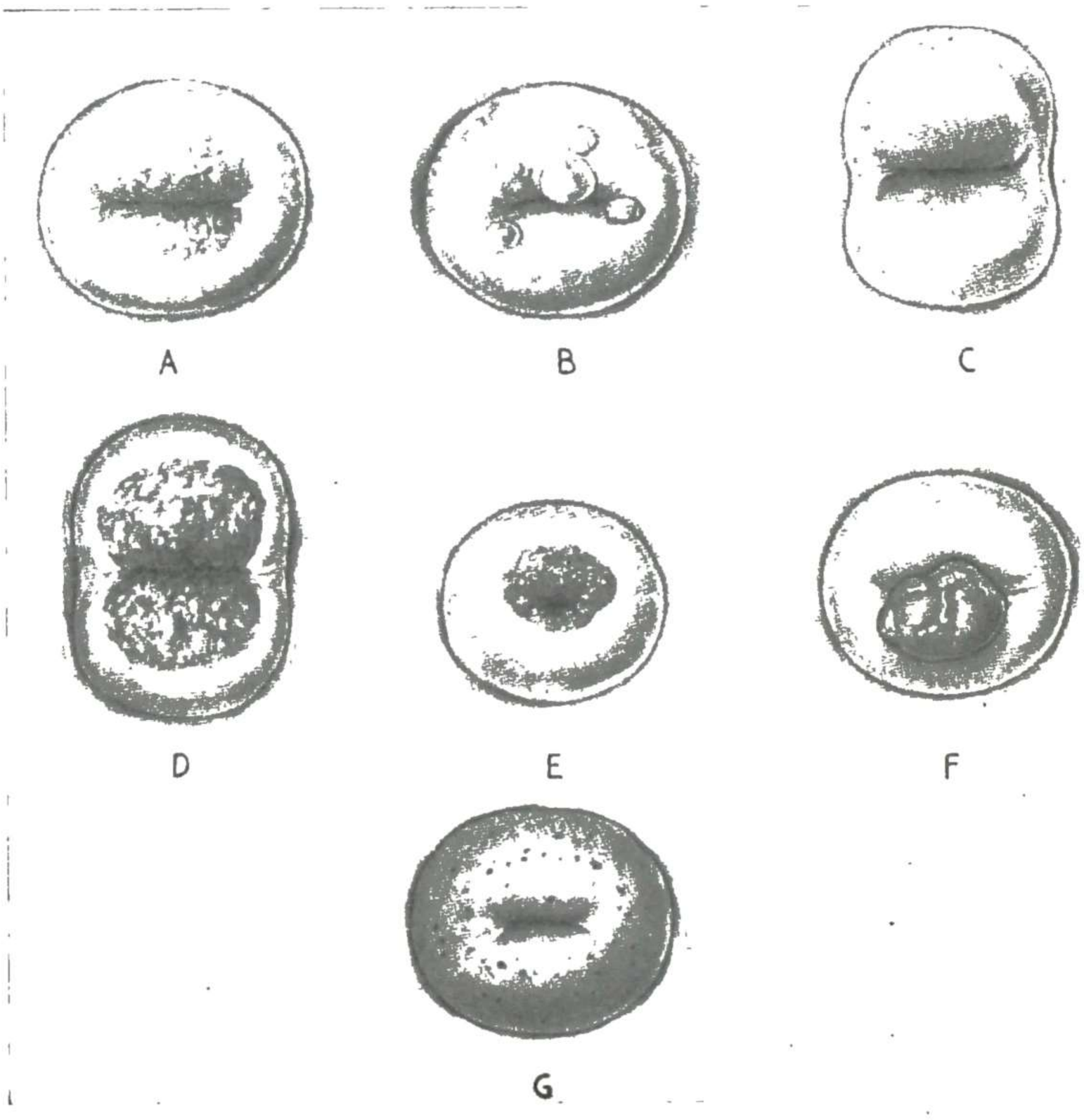


Fig. 515.—Lesions of the cervix. A, Erosion; B, Nabothian cysts; C, bilateral laceration healed; D, bilateral laceration with eversion and erosion; E, erosion in a virginal cervix; F, polyp; G, strawberry cervix. (From Kleegman: Am. J. Surg., April, 1940.)

Laceration.—Troublesome symptoms from cervix laceration and conditions requiring treatment are due largely to complicating inflammation. The changes brought about by inflammation in a lacerated cervix are progressive, and this progressive character with its underlying causes must be understood in order to recognize the various stages of the process as encountered in clinical work. To elucidate this matter let us follow through what may happen in a case of moderately deep laceration of the cervix, as represented by Fig. 513, *A*.

If there is no complicating inflammation of the torn surfaces, they may fall together and unite, leaving only a small notch as in Fig. 513, *B*. If they fail to unite, they may heal over by granulation and scarring, leaving two thin

lips without special irritation or other disturbance (Fig. 513, *C*). In either case the condition causes no trouble and requires no treatment.

If inflammation supervenes, there follow an interesting series of progressive changes, leading to the various conditions seen in the later examination of such patients. As the inflammation penetrates into the cervix, the resulting infiltration causes marked swelling. This enlargement of the deeper tissues causes expansion in the direction of least resistance, which is inward

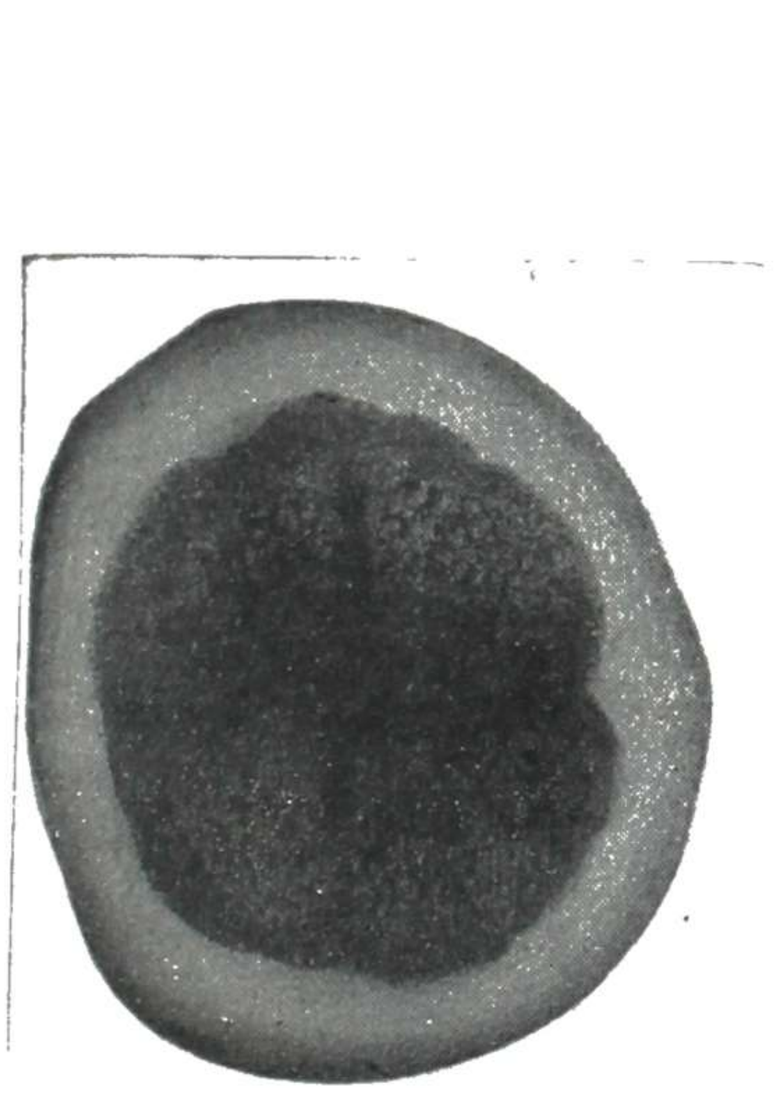


Fig. 516.

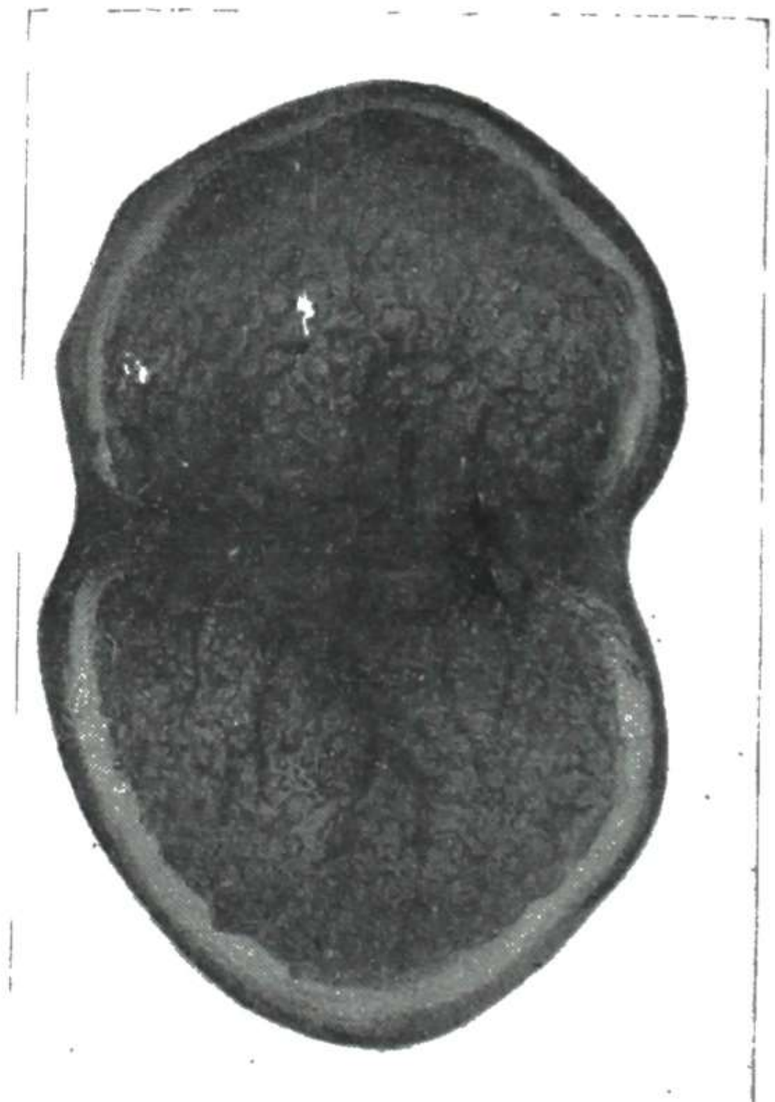


Fig. 517.

Figs. 516 and 517.—Bilateral lacerations of cervix. Fig. 516 shows marked bilateral laceration, with distinct lips rolled out. Fig. 517 shows an unusually deep bilateral laceration extending to the vaginal vault. (From Mann: American System of Gynecology.)

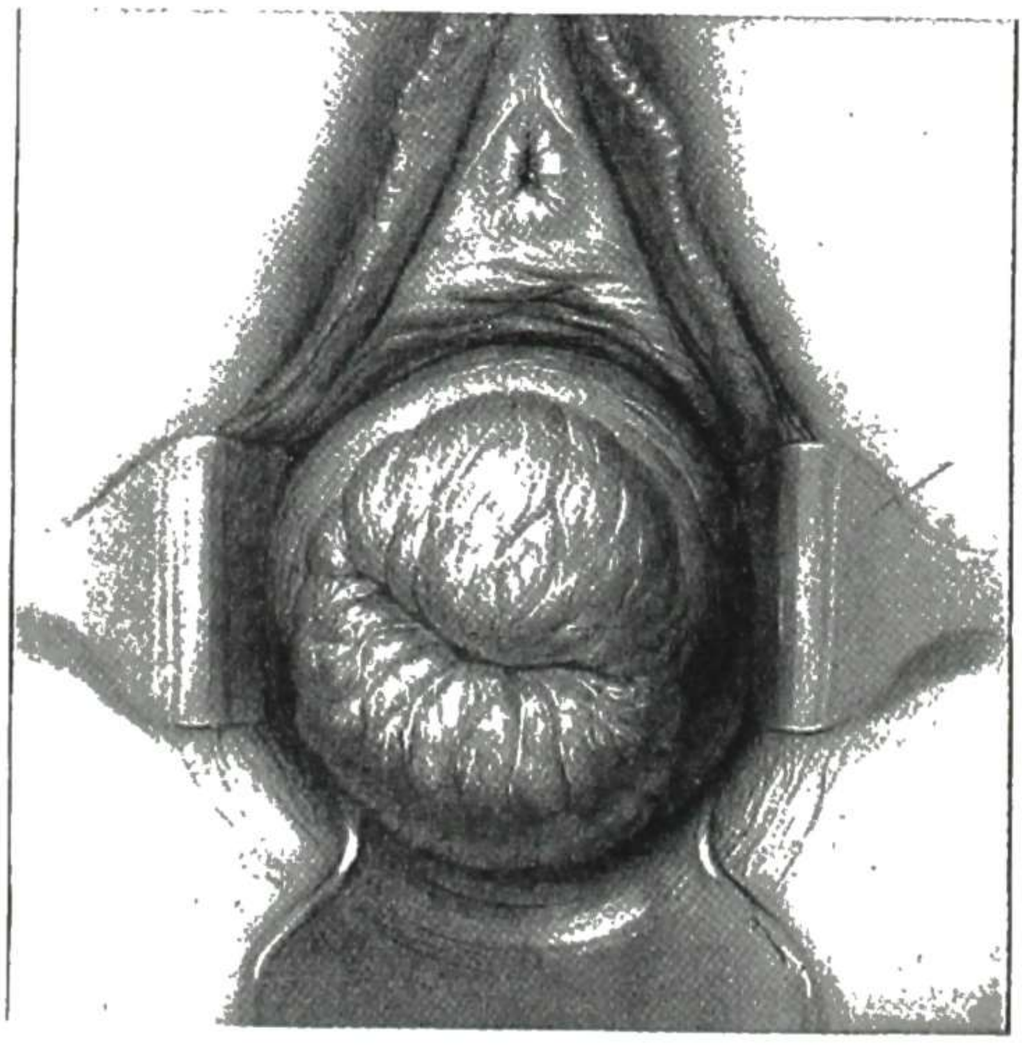


Fig. 518.—Marked eversion from chronic cervicitis. There is no laceration of the cervix, the patient being a nullipara. (From Cullen: Cancer of the Uterus; W. B. Saunders Co.)

This eversion of the cervical mucosa by inflammation only, without previous laceration, is likely to lead to a mistaken diagnosis of laceration of the cervix. It is also of medicolegal importance, as the appearance of laceration may lead to the erroneous conclusion that the patient has at some time given birth to a child.

toward the canal. The firm muscular wall of the cervix prevents expansion outward and prevents much lengthening of its outer portion. Consequently, as the increasing tissue accumulates in the inner portion of the damaged cervix, it tends to push apart the lips and roll out at the opening, causing eversion as indicated in Fig. 514, *A*.

This exposure of the endocervix to the vaginal bacteria and irritation increases the infiltration and eversion. The result is a progressive widening of the cervix and rolling-out of its inner portion, as shown in Fig. 514, *B*.

This process may keep on until the cervix becomes shaped like a ball, as shown in Fig. 514, *C*. This ball-shaped appearance is quite deceptive, as there is no notch to indicate the former deep laceration, and it may cause confusion in diagnosis unless the process of its development is understood. The clinical appearance of moderate eversion is shown in Fig. 515, *D*, and marked eversion to the ball-shaped stage in Fig. 515, *C*. Other cervices with laceration and chronic cervicitis are shown in Figs. 516 and 517.

Fig. 519.—Section of cystic cervix. Notice how the dilated glands extend out under the squamous epithelial layer. Gyn. Lab.

A congenital split resembling a lateral laceration of the cervix has been observed in the newborn infant in a few instances. This congenital notch is of little importance, except that when seen in the adult it may lead to an erroneous diagnosis of previous pregnancy. A distinct laceration of the cervix is one of the strongest proofs of previous pregnancy, and the fact that a congenital notch somewhat resembling a laceration may occur is of medicolegal importance. Also, it must be kept in mind, as above mentioned, that chronic cervicitis may produce a condition of eversion resembling laceration (Fig. 518).

Cyst Formation.—The formation of small retention cysts in the cervix is due to obstruction of the ducts of normally situated glands by inflammatory infiltration and to the formation of glandlike cavities in areas of erosion as already explained. If there has been a laceration of the cervix, the resulting scar tissue may obstruct ducts and thus aid in cyst formation.

These retention cysts are felt as small hard nodules, like shot of various sizes, in the cervix, and may give rise to an erroneous diagnosis of cancer. The cervix may be honeycombed with these small cysts, producing a condition designated as "cystic degeneration" of the cervix (Fig. 519). The mucus in these cysts is usually clear and presents the characteristic tenacious, stringy consistency. In some cases a cyst may contain pus and appear as a yellow spot (Fig. 506, *D*).

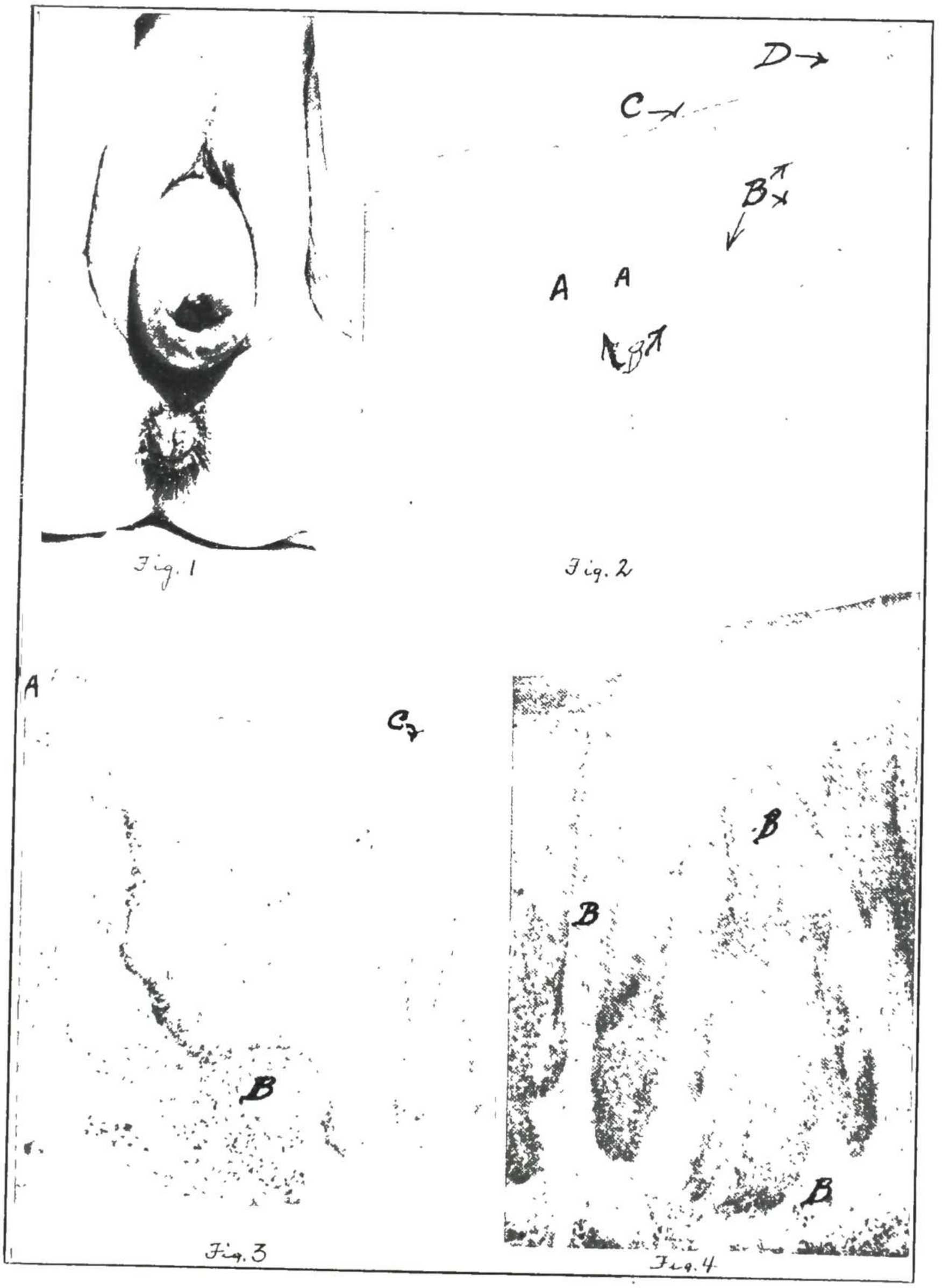


Fig. 520.—Leukoplakia of the cervix. *1*, Prolapsed cervix and uterus, showing dark area of erosion and whitish collar of leukoplakia in the cervix. *2*, Leukoplakic area, showing diffuse round cell infiltration (*B*) at the margin and beneath irregular rete malpighii pegs (*A*). Latter are bizarre and atypical. Cornification present (*C*). Sudden transition to more normal epithelium (*D*). *3*, A break in the epithelium due to ulceration (*A*); round cell infiltration beneath and between rete pegs (*B*). Stratified squamous epithelium greatly thickened, cornified epithelium covering the surface (*C*). *4*, Irregular and bizarre rete pegs which are atypical, having precancerous appearance. Round cell infiltration between and within rete pegs. (From Kretchmer: Am. J. Obst. & Gynec.)

Fig. 521.—Leukoplakia of the cervix. A somewhat later stage. Note the cervical glands. Gyn. Lab.

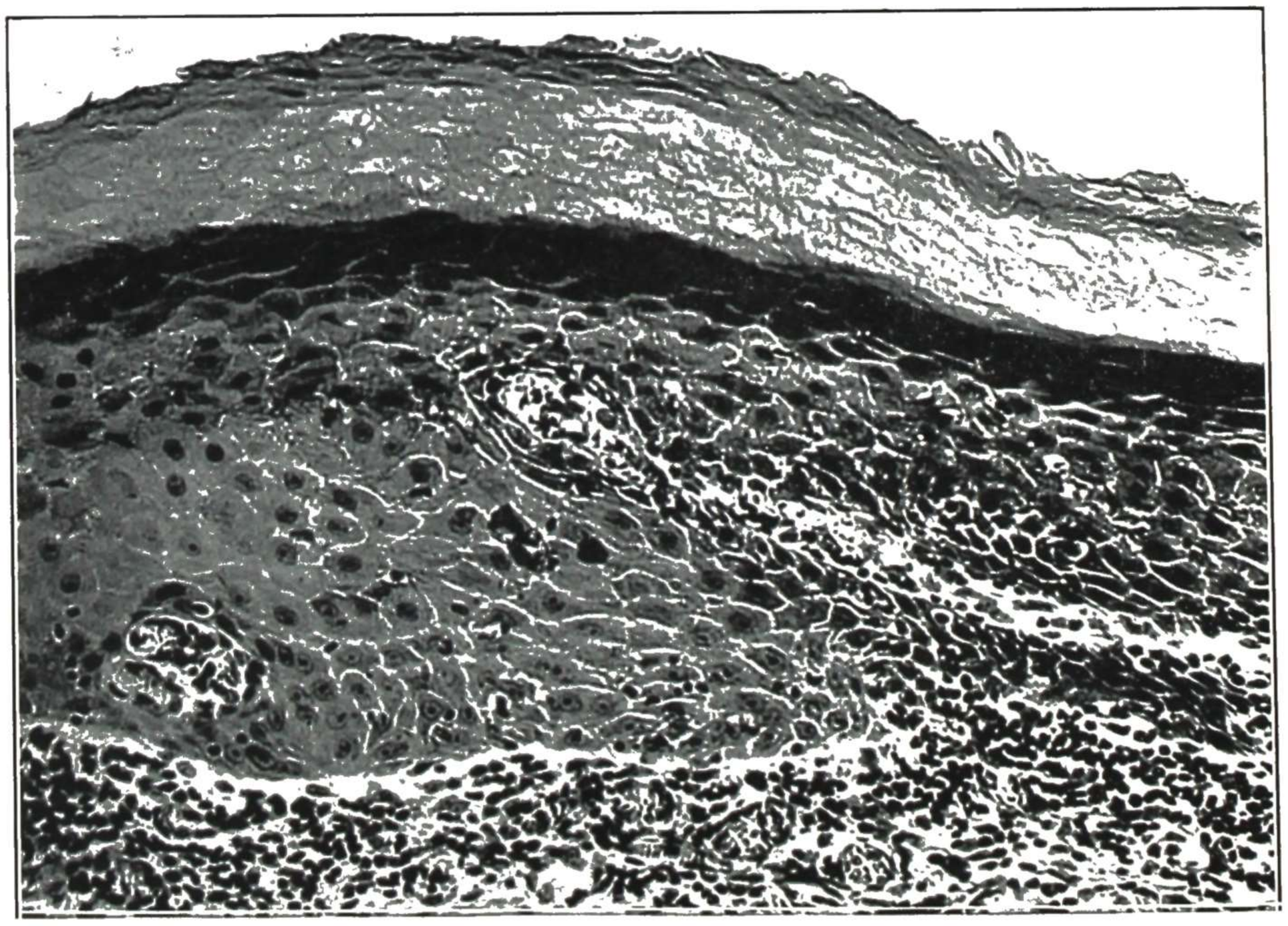


Fig. 522.—Leukoplakia of the cervix. High power of Fig. 521. Note the similarity of this to leukoplakia of the vulva (Fig. 273). At the top is the hyperkeratinization, beneath this is the dark layer made up of eleidin cells. A marked round cell infiltration is seen beneath the flattened prolongation of epithelium. Gyn. Lab.

Leukoplakia.—Leukoplakia is the term applied to certain small white areas occasionally seen on the cervix. They are smooth and there may be several, differing in size and shape.

Although leukoplakia of the cervix was clearly described as early as 1896, very little was done to emphasize its importance until Hinselmann reported a study of a series of cases by the aid of a colposcope. Since that time the importance of this condition is gradually being realized.

As seen through the speculum, leukoplakia appears as a small, smooth, white area on the surface of the cervix. It may be single or multiple. It may be wiped off but returns within two or three days. Occasionally there is a halo of fine vessels around the area. After the area is removed, it loses its whitish appearance and is indistinguishable from the surrounding cervical tissue. Hence the advice of Ries, that when a cervical specimen containing a leukoplakic spot is excised for examination, the spot should be marked by a small identifying suture on each side, otherwise it cannot be found in the laboratory.

The pathologic changes in leukoplakia of the cervix are: (1) hyperplasia of the epithelial prolongations, (2) changes in the cells of the epithelial layer, and (3) round cell infiltration in the underlying tissue.

1. Hyperplasia of the projections normally found at the junction of the epithelium with the underlying tissue is seen early in leukoplakia and is characteristic of the "hyperplastic stage." The prolongations become greatly enlarged and irregular, as shown in Fig. 520, though the surface may remain flat. In the atrophic stage, which comes later, the epithelial layer atrophies along with the marked changes in the subcutaneous tissue, as shown in Figs. 521 and 522.

2. The changes in the cells of the epithelial layer are described by Ries as follows:

> The cells of the leucoplakia are packed densely, they take deeper stain in their protoplasm and in their nuclei, they are more irregularly arranged than in the normal stratified epithelium. Their basal layer is different from the normal basal layer in shape and staining quality. Protoplasmic bridges between the cells of the malpighian layer are less frequent and less pronounced. At the border of the leucoplakia there is a complete change which surprises the observer by its abruptness in a sharp, usually vertical, line extending from the base to the surface. In the leucoplakia the very last basal cell toward the normal tissue produces a totally different generation of cells from those starting out from the first and all other basal layer cells of the normal epithelium.

The cell changes found in leukoplakia of the external genitals (leukoplakic vulvitis) are shown in detail in Figs. 270 to 273.

Many cases of leukoplakia of the cervix develop cell changes which are very erratic—so much so that they raise the question of beginning cancer. Martzloff states, "The epithelial changes in some leucoplakic plaques have all the cytologic characteristics of cancer but lack the attribute of invasion."

In regard to tendency toward malignancy, some workers claim that leukoplakia of the cervix is not a precancerous lesion. But Hinselmann states that all leukoplakias observed for a long enough time have become malignant, and he cites six cases. As mentioned above, Martzloff states leukoplakia may present all the cytologic characteristics of malignancy, but makes the point that technically an epithelium with such changes cannot be positively designated

as cancerous until there is invasion, as there is always the possibility that the erratic cell activity may stop short of this last and decisive attribute of malignancy.

The question as to whether or not cells presenting such marked erratic activity are already on the way to invasive development and should be considered and treated as cancer is taken up under the diagnosis of cancer of the cervix in Chapter 8. There additional points are illustrated by slides, one of which shows a leukoplakia with erratic cell changes, pronounced benign, which ten months later was invasive cancer.

Leukoplakia of the cervix should be promptly removed, the same as any other area of chronic irritation. There is likely to be associated irritation in the form of erosion or cyst formation, and the whole affected area should be removed by conization or conical excision. In this connection it is to be remembered that when the specimen is removed, the color distinction disappears. On this account it is important, before removing such a specimen, to mark the leukoplakic area with one or two small sutures just outside the boundary; otherwise it may be missed in the laboratory.

Symptoms and Diagnosis of Chronic Cervicitis

The principal symptom of chronic cervicitis is chronic vaginal discharge, though many cases have no symptoms and the cervicitis is discovered on routine examination. When the adjacent parametrial tissue is involved with some fixation, dyspareunia may be a complaint. Cervicitis is frequently accompanied by other lesions such as inflammation higher in the genital tract or relaxation of the pelvic floor and supporting ligaments of the uterus, and the symptoms caused by these associated lesions are sometimes attributed to the cervicitis. There is a tendency to concentrate attention on an obvious lesion which can be seen through the speculum, such as cervicitis and laceration of the cervix, and miss higher lesions. When present, such a higher lesion, though less obvious at examination, is usually much more important as a factor in the patient's disability. In fact, a complaint of pelvic pain and disability is an indication of some disturbance in addition to the cervicitis, and careful search should be made accordingly.

The importance of cervicitis in urologic infections was stressed by Seaman. The pathway of infection is probably direct from the cervix or vagina to the urethra and bladder and secondarily to the ureters and kidney. Cultures from the cervix are frequently identical to those from the urethra. Seaman had many urinary tract infections which resisted cure until the cervical infection was removed.

As to the local condition in the cervix, the appearance and palpation findings of chronic cervicitis are so characteristic that there is little trouble in making the diagnosis. Tuberculosis or syphilis occasionally produces a confusing lesion of the cervix and should be thought of in atypical conditions there.

The principal diagnostic difficulty in connection with chronic cervicitis is the question as to whether or not there is beginning malignant disease. Chronic cervicitis, in its various forms and with its long-continued irritation, is an important factor in the development of cancer in this situation. This is

readily appreciated when we consider the persistent irritation from erosion, eversion, and cyst formation, with the resulting proliferative cell changes in this danger area where two types of epithelium meet.

Carcinoma of the cervix develops usually on a base of chronic cervicitis. No one can tell when the malignant development starts, for the microscopic change produces no symptom or sign in the really early stage. When appreciable induration or ulceration appears, cancer cells have already penetrated deeply—usually to the outlying portions of the pelvis. The facts supporting the conclusion that chronic cervicitis is an etiologic factor in the development of cervical carcinoma and the effectiveness of its elimination in preventing cervical cancer are fully discussed under cancer of the cervix (Chapter 8). Suffice it to say that no time should be wasted watching chronic cervicitis for evidence of cancer. The affected area should be eliminated promptly by appropriate treatment, before cancer develops.

Treatment

The treatment required for chronic cervicitis varies with the extent of the lesion. Harvey B. Matthews, who has written extensively on this subject, has suggested an excellent classification as an aid in selection of the proper treatment:

"I wish to present the following classification of chronic infections of the cervix, which we believe is of great help in choosing the best method of treatment:

"Group 1. The recently lacerated cervix (of three to twelve weeks' duration) with superficial infection; or the nulliparous cervix, the seat of mild gonorrheal or nonspecific infection with or without slight erosion and no cyst formation.

"Group 2. The lacerated, eroded cervix of from three to twelve months' duration with somewhat more extensive and deeper infection than in Group 1 and perhaps a few superficial cysts. This may obtain in a moderately deeply infected nulliparous cervix.

"Group 3. The lacerated, eroded, everted cervix of two to five or more years' duration, moderately deeply infected and hypertrophied usually with visible cysts. A similar condition is present in the deeply infected nulliparous cervix with or without erosion and cyst formation.

"Group 4. The neglected lacerated, everted, eroded, hypertrophied, cystic cervix, deeply and extensively infected and of long duration (fifteen to forty years). Rarely the nulliparous cervix may be similarly deeply and extensively involved.

"This classification is simple and gives a thumb nail picture of the extent of the gross pathology present. It, furthermore, affords a convenient way of applying the various methods of treatment for each group. For example, we use the small nasal type of cautery for Groups 1 and 2 and for a few cases in Group 3. Conization is an excellent procedure for Group 2 and many cases in Group 3. Lately we have been using it more frequently than formerly because we feel it has advantages over the cautery for the deeper seated chronic infections. For Group 4 we invariably employ the Sturmdorf operation."

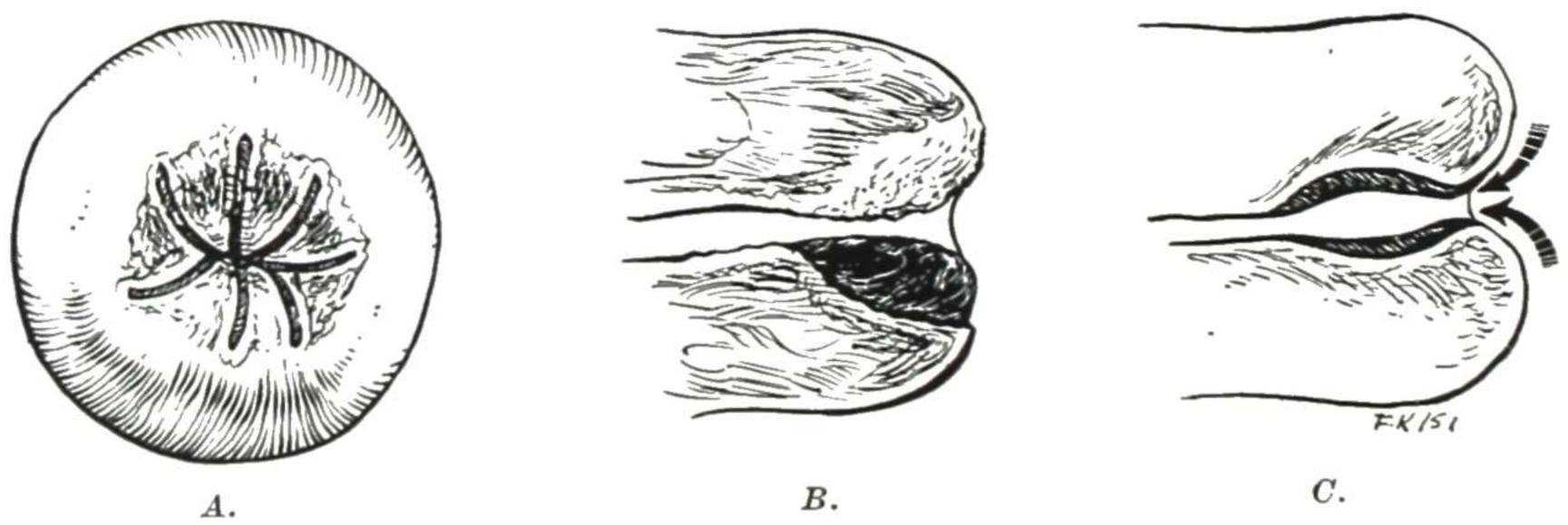
We have found the plan satisfactory for handling the different grades of cervicitis, advancing from the smaller to the larger lesions:

1. Astringent applications, adjusting pH, hormones.
2. Linear cauterization.
3. Office conization.
4. Hospital wide conization with suture.
5. Sturmdorf operation.

1. Applications, Douches, Hormones.—When the cervicitis involves only a very small area about the external os, or in the congenital type found in the virginal cervix, application of copper sulfate or 5 per cent silver nitrate is usually helpful in correcting the condition. Acid jellies or douches used at home facilitate healing. Wollner was able to correct some erosions of this type by progesterone therapy or by a combination of estrone and progesterone.

2. Linear Cauterization.—If the above treatment does not prove sufficient, or the small lesion is not of a type likely to yield to it, linear cauterization may be indicated. The condition most likely to yield to linear cauterization is the small eversion, the chronic inflammation being kept up by the eversion exposing the single-layered mucosa to vaginal irritation. This is the ideal method of treating the postpartum cervix.

This treatment is carried out with the ordinary small cautery outfit, using a thin nasal cautery tip. A few radiating incisions are made, two to five, as thought necessary to draw in the everted area, by the contracting scars. Fig. 523, *A* gives a very good idea of the incisions and of the type of lesion suitable for this treatment. Care must be taken to make the cauterization incisions in such a way that the contracting scars will be effective in overcoming the eversion. To accomplish this, the inside part of the incision should extend rather deeply from the canal, as shown in Fig. 523, *B*, and the outside part should be limited to the involved area, so that all the contraction will be inside, as indicated in Fig. 523, *C*. If the incisions are extended too far out on the vaginal surface of the cervix, the outside contraction may prevent satisfactory inversion. Of course, any cysts present are punctured by the cautery.



A. *B.* *C.*

Fig. 523.—Linear cauterization of the cervix. *A*, Showing the cautery incisions, and also the type of lesion suitable for this treatment; *B*, showing the deepening of the cautery incisions on the inside, so as to secure inversion from the scar contraction; *C*, indicating the correction of the eversion, by the contraction of the scars.

There is ordinarily no pain from these small cautery incisions, and if they have good effect, additional ones may be made for any remaining small everted area. In making any additional incisions, avoid the new scars which are sometimes hypersensitive.

3. Conization.—If the small lesion of the type mentioned does not yield to the treatments given, it may be eliminated by office conization. This simple and satisfactory method of treatment was originated by Hyams and elaborated and the results reported by him in several articles. The general arrangements for conization are shown in Fig. 524, and the shape of his electrode and its position in the cervix are shown in Fig. 525. Hyams gave special emphasis to the removal of the endocervical mucosa. He shaped his electrode and tech-

nique accordingly and insisted that the removal of tissue should be limited to that within the canal and to the 1/8 inch width of his electrode.

4. Wide Conization.—When the lesion is extensive within deep cysts, or in cases which do not respond to cautery or office conization, wide conization is indicated. This is a hospital procedure and requires a different type of

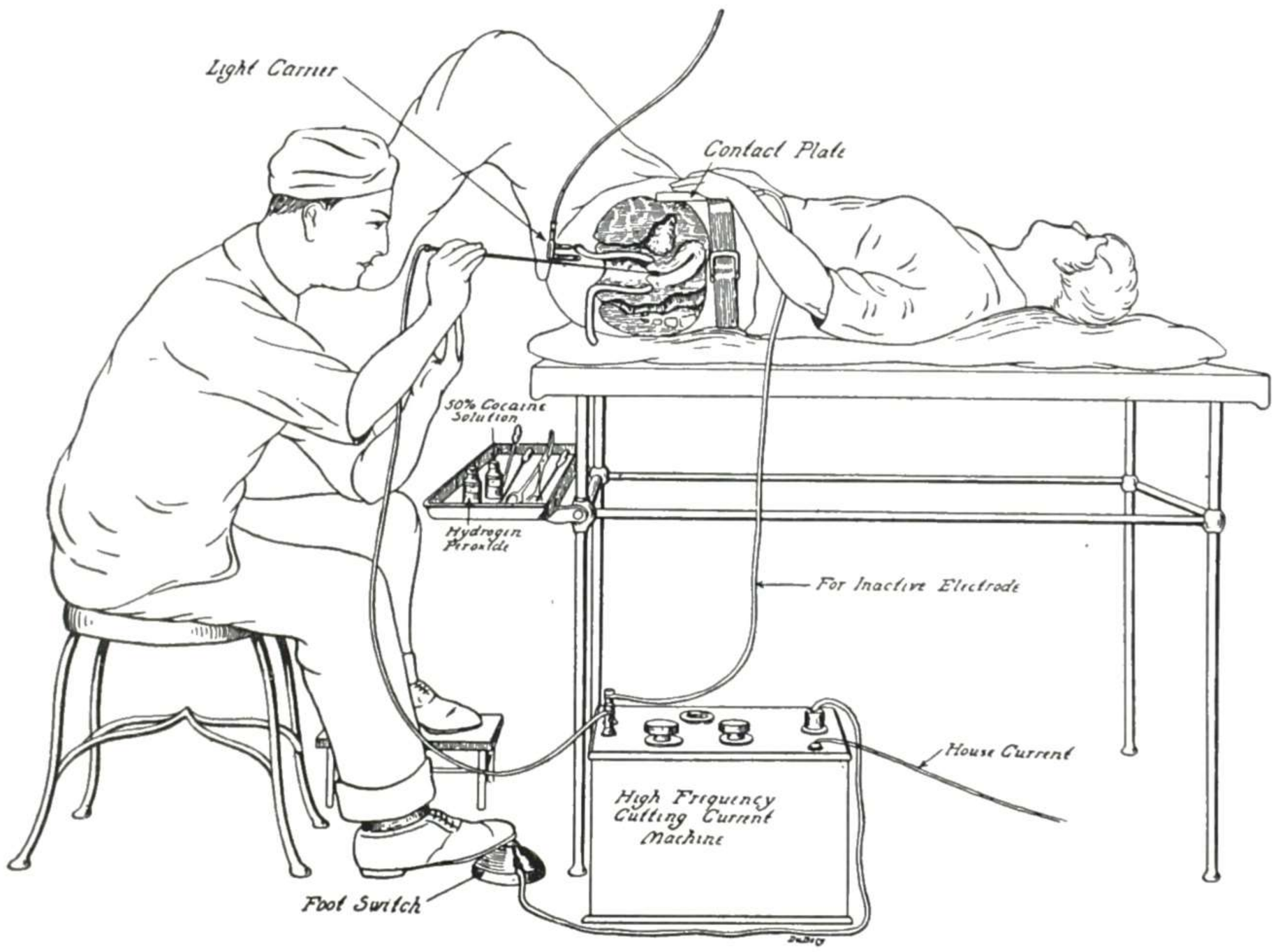


Fig. 524.—Schematic drawing of surgeon and patient during conization. (From Hyams: Am. J. Obst. & Gynec.)

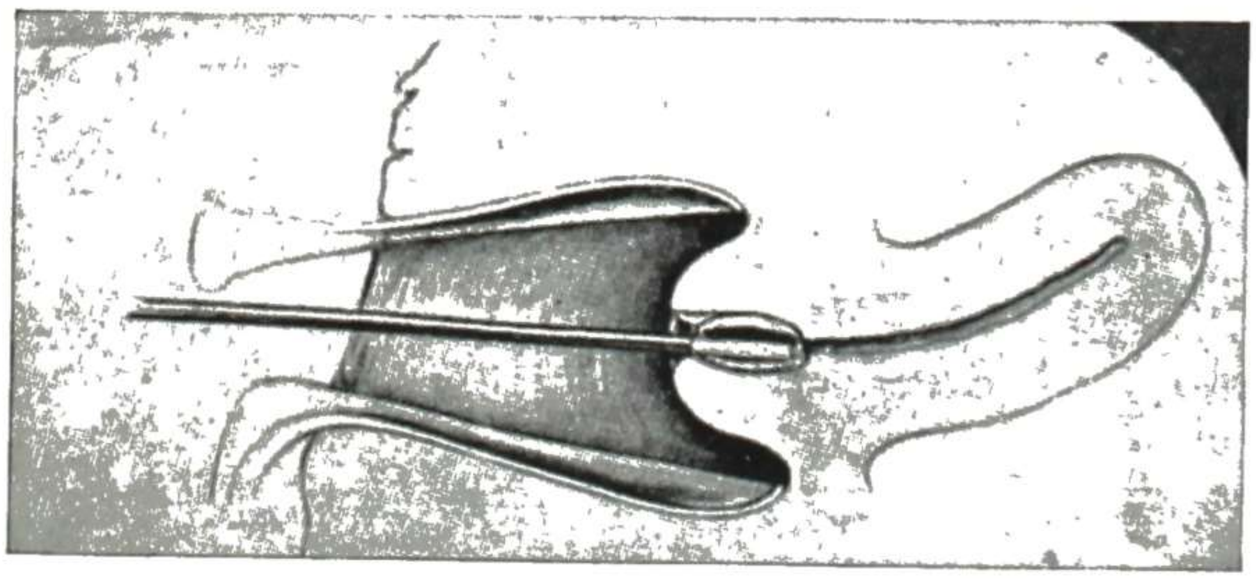


Fig. 525.—Hyams electrode in cervical canal. (From Hyams: Am. J. Obst. & Gynec.)

electrode. The details of this electrode and its use are given in an article by R. J. Crossen, "A New Electrode for Conization of the Cervix," from which the following is taken:

> While the Hyams electrode worked well in nulliparous cases, it was not satisfactory in cases of eversion with wide erosion and cyst formation. Its cutting wire was too close to the silicon tube to allow removal of a good-sized cone of tissue, including all the infected area. In order to overcome this difficulty there was need of a different type of electrode. I drew some sketches of the kind desired and wrote to various diathermy firms but they had none. Finally one of the firms offered to make up some according to specifi-

cations, for trial. After experimenting with different ones, the type shown in Fig. [526] was found to accomplish best the desired excision.

The point of the active electrode is placed in contact with the cervix so that the silicon tube will go into the cervical canal as the cutting proceeds. The foot switch is then closed and the electrode introduced into the canal to the desired depth, and then rotated as shown in Fig. [527], removing a cone of tissue (Fig. [528]). This electrode is shown in comparison with Hyams' in Fig. [529].

The advantages of this electrode and technique are as follows:

1. It enables one to remove all the infected tissue about the external os, including cysts extending outward on the surface.

2. It gives a larger piece of tissue for pathologic diagnosis. Also, the specimen includes the area where the columnar epithelium of the erosion extending outward meets the squamous epithelium, which is the area where carcinoma is most likely to start.

3. It extends the hemostatic cutting-current excision to a large group of cases formerly considered too extensive for it.

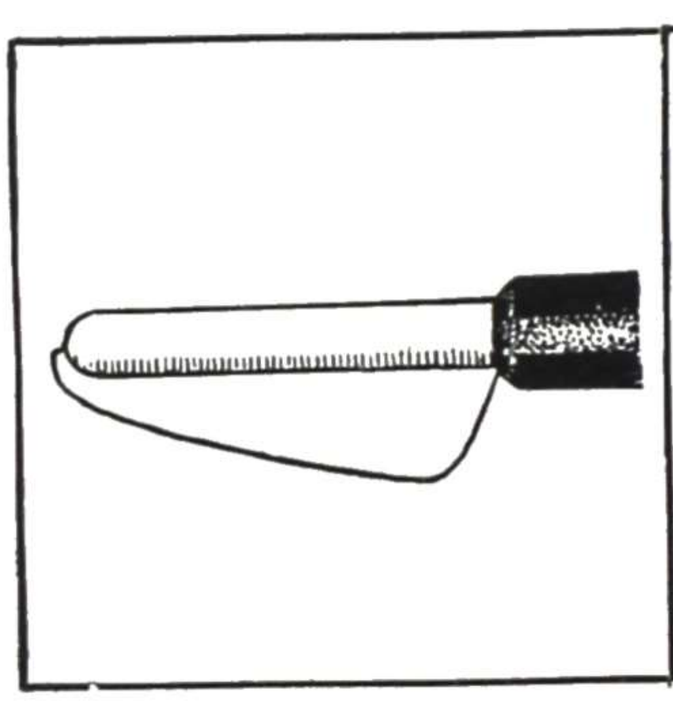


Fig. 526.

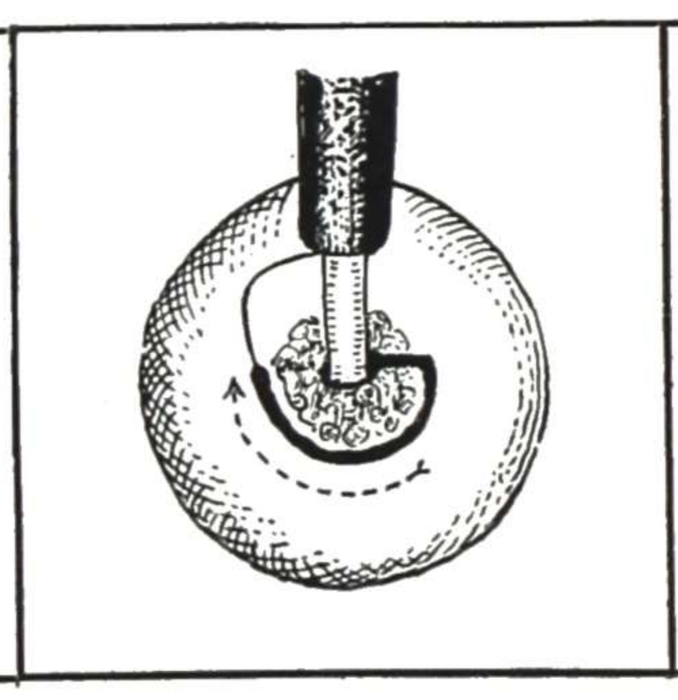


Fig. 527.

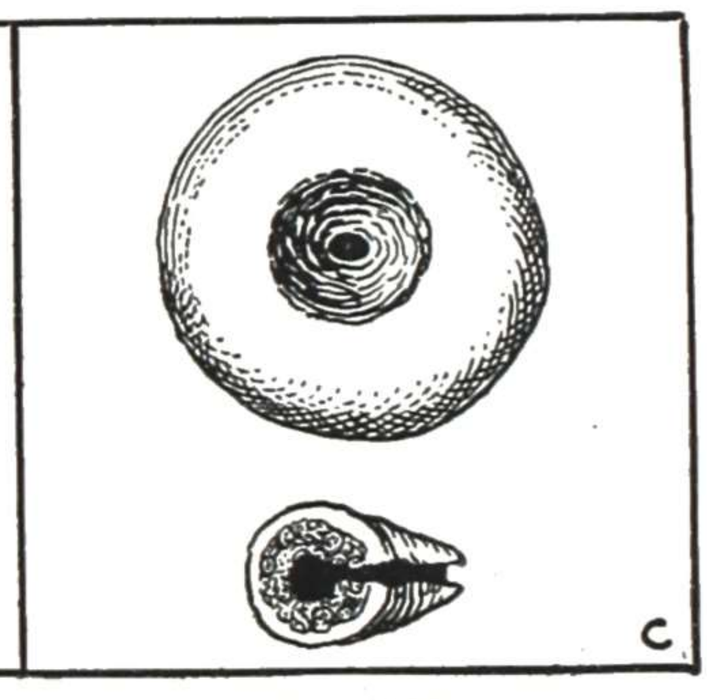


Fig. 528.

Fig. 526.—The new electrode for wider conization.

Fig. 527.—Indicating the method of using the electrode, i.e., a wide excision taking in all of the affected area.

Fig. 528.—The excised cone of tissue; also, the remaining funnel-shaped cavity, which heals rapidly with good inversion.
(From Crossen: J. Missouri M. A.)

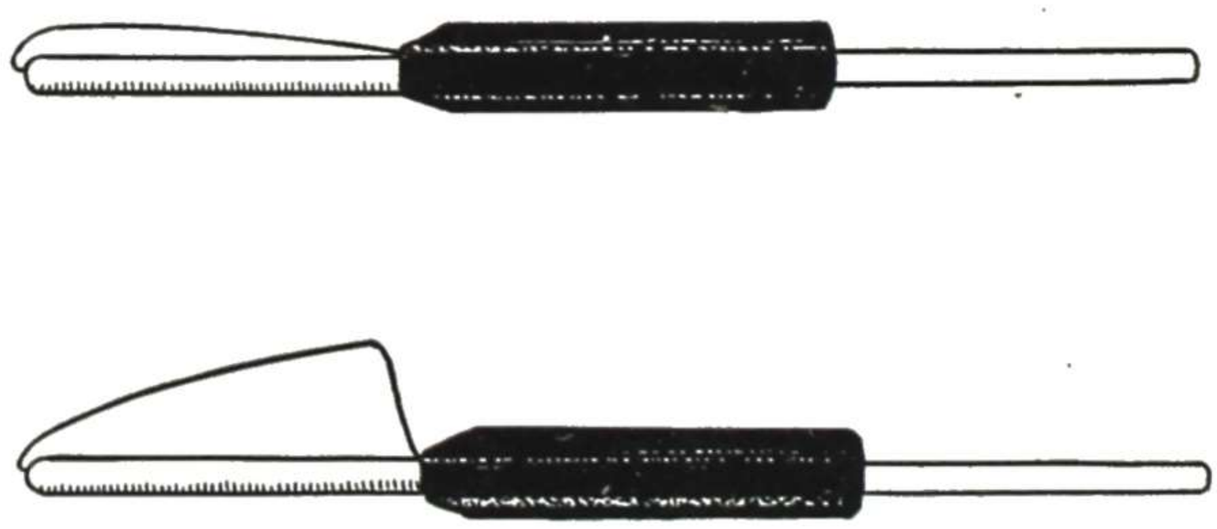


Fig. 529.—Upper electrode is a Hyams; wire is one-eighth inch from the central core. Lower electrode is a medium-sized Crossen used for the wide conization to include all of diseased tissue. (From Crossen: Am. J. Obst. & Gynec.)

This larger group includes two classes of cases: first, those in which the moderate extension of the cervicitis outward from the external os can all be removed by the single rotation of the small size wide electrode, as shown in Fig. 528 and, second, those requiring the larger size electrode, as in Fig. 530, to remove more extensive infiltration and cyst formation.

In these extensive cases it was thought that inversion and rapidity of healing might both be facilitated by turning in the anterior and posterior lips with a Sturmdorf suture, as indicated in Fig. 531. The idea is not to make complete

approximation of the raw surfaces as in conical excision with knife and sutures but simply to start the inversion by drawing the outer margin well in by a single chromic catgut Sturmdorf suture in each lip. This suture also controls any bleeding tendency.

Curettage also is done on these patients and, at times, other operative treatment which can be taken care of in association with the conization, such as radium treatment for myoma and plastic operations for cystocele, rectocele or relaxed floor.

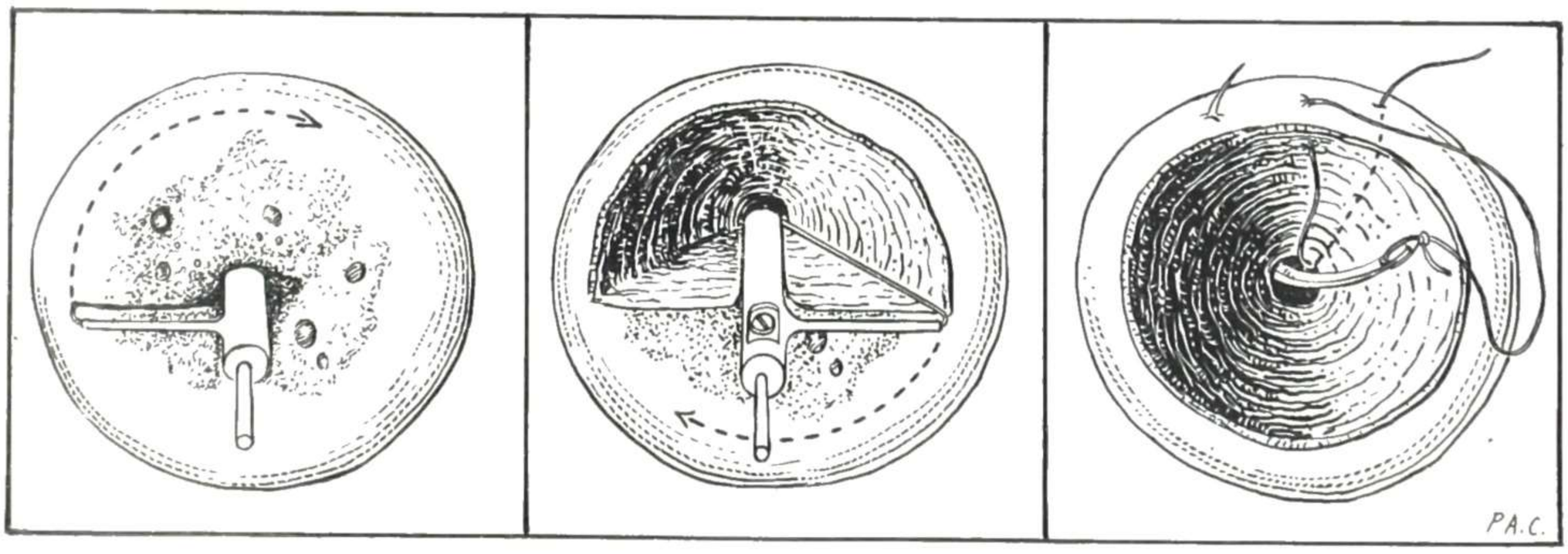


Fig. 530.—Extensive conization with modified Crossen electrode, showing use of Sturmdorf suture on anterior and posterior lips to aid inversion during healing. (From Crossen: Am. J. Obst. & Gynec., January, 1949.)

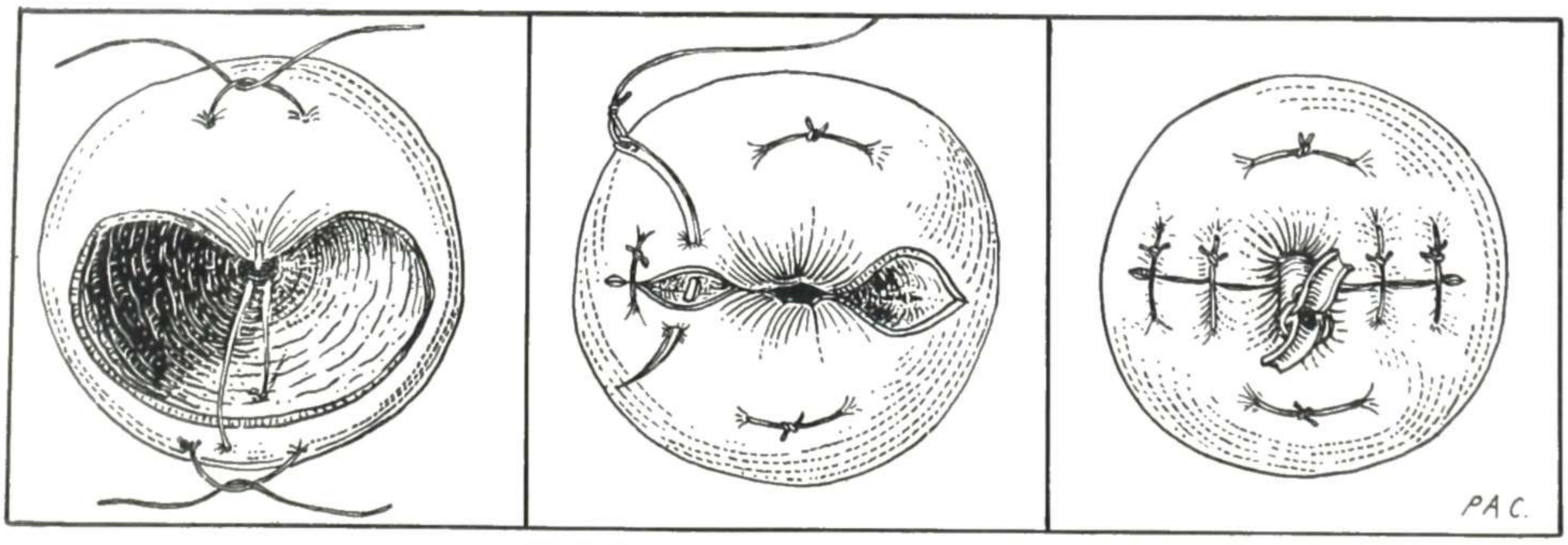


Fig. 531.—Shows lateral sutures and completed procedure with the T tube in place. (From Crossen: Am. J. Obst. & Gynec., January, 1949.)

In a later article we reported a follow-up of one thousand cases of wide conization and also reported an improvement in the electrode made by T. K. Brown (Fig. 532). Our conclusions from this study were as follows:

1. Wide conization with suturing heals as well and gives as good ultimate results as the excellent Sturmdorf operation, and without the profuse bleeding and troublesome hemostatic measures which constitute a regular feature of the Sturmdorf procedure.

2. Postoperative bleeding was not troublesome, owing to the hemostatic effect of the high-tension cutting wire. In the eleven cases in which there was some postoperative bleeding, in one it was not from the cervix but from the endometrium and was stopped by curettage. In each of the other ten cases, it was controlled by a single tamponade. The use of routine suturing, as shown in Figs. [530 and 531], has practically eliminated bleeding. In the series, 727 cases were sutured, the unsutured or partially sutured ones dating largely from the earlier and experimental years.

Stricture occurred in only 16 of the 1,005 cervicitis cases during the periods of observation. Most strictures can be handled by office dilatation, only three of the sixteen in our series requiring retreatment in the hospital. Concerning routine postoperative dilatation as prophylactic for stricture, we have concluded that it is better to leave the internal os undisturbed except when there is evidence of trouble there.

The other additional treatments required for persistent or recurrent cervicitis or for polyp or cyst or other minor condition have been considered in detail in the analysis.

As to the percentage of cures from the primary conization in the 1,005 patients followed for cervicitis, there were 14 who required reoperation, 67 who required some additional minor treatment to effect a cure, and 8 from the questionnaire who still had some undescribed discharge and presumably needed some additional treatment—giving 14 failures and 75 improved. Subtracting the 89 from 1,005 gives 916 (91 per cent) cures by the primary conization. Additional cures were obtained by the secondary treatments.

Wide conization for cervicitis combines well with other operations, both vaginal and abdominal. In those cases in which a hysterectomy must be supravaginal instead of complete, conization is particularly helpful in eliminating the menace of continuing cervicitis in the cervical stump.

Fig. 532.—T. K. Brown's modification of Crossen electrode. Plastic tube substituted for fragile silicon tube. Wire is replaceable.

3. As to the question of conization causing difficulty with subsequent labor, in this series of 1,005 conized patients, there were 63 subsequent deliveries at or near term. Forty-nine of these were first deliveries following the conization, and in none of them were we able to show evidence of trouble from the conization.

Our experience indicates that there is no substantial reason for denying the benefits of conization to women of childbearing age. In fact, we feel it is strongly advisable that they be relieved of the chronic discomfort of cervicitis and of the cancer menace it carries and be thus put in better condition for future childbearing.

4. The importance of the outlined conization procedure in the diagnosis of early cancer of the uterus is shown by the fact that in this series wide conization for cervicitis led to the discovery of early carcinoma in 16 patients (8 cervical and 8 endometrial). Endometrial curettage is combined with wide conization routinely, as explained in the description of our technique. One of the cervix-cancer patients refused treatment and is dead. All the other 15 cancer patients were alive and well because the conization and accompanying curettage brought early discovery of the cancer and prompt treatment.

5. Wide conization for cervicitis definitely reduced the incidence of subsequent cervical carcinoma. None of the 1,005 cervicitis patients developed cervical cancer during the periods of observation.

This type of conization is very useful in removing chronic irritation from the cervix in cases of abdominal hysterectomy where for some reason it has been found advisable to do a supravaginal instead of the contemplated complete hysterectomy. After the abdomen is closed, the patient is arranged for vaginal work, and the irritated area about the external os is coned out, taking care to avoid deep penetration into the cervical stump.

In extensive conizations it is well to insert a tube drain past the internal os with T projections on each end to hold it in place. This is ordinarily left for several days, being removed in the regular examination just before discharge from the hospital.

The tube for the cervical canal is a small item; but unless managed properly it may cause trouble, particularly if it is missing when the time comes to remove it. Has it slipped from the cervix and been washed out with the douche, and thrown away unnoticed, or has it slipped into the endometrial cavity? Those who have experienced this situation appreciate that it means anxiety for the physician and trouble for the patient. To prevent this occurrence two measures are advisable: (1) Make T projections, on *each* end of the tube, to prevent it from slipping up or down. (2) Use red rubber tubing, which is opaque to x-ray, so that if any question arises as to whether the tube is in the uterus, an x-ray film will show its presence and location.

The black rubber tubing ordinarily used for drains cannot be satisfactorily identified by x-ray. Crossen and Scott conducted experiments on the x-ray visibility of drainage materials, and those interested will find full details with illustrations in the article. One of the results was the adoption of red tubing for the various drains used in vaginal and abdominal surgery.

5. Conical Excision With Knife and Suturing.—This is also a safe and reliable method of taking care of extensive chronic cervicitis with the usual accompanying laceration, infiltration, eversion, and cyst formation. It was devised by Sturmdorf and was a marked advance over the methods of repair then in use. This method not only excises the whole cystic area, but also covers over the raw surfaces in a most satisfactory way by means of the special Sturmdorf suture. With improved suture materials and advances in technique, the details as carried out today differ greatly from those first used, but the principles of the operation remain the same. The two important principles are, first, removal of the whole affected area by a cone-shaped excision (Figs. 533 to 535) and, second, turning in of an anterior and posterior flap by means of the ingenious Sturmdorf suture (Figs. 536 to 538). In any method of excising the affected tissue and repairing the cervix, the danger of subsequent stenosis of the canal must be kept in mind and guarded against. The dangerous area in this respect is the region of the internal os. Fortunately, as the laceration is in the lower part of the cervix, the subsequent chronic inflammation and cystic change usually affect only the lower half or two-thirds of the cervical mucosa. It is quite unusual to find much cystic change in the upper third; consequently, the line of excision may be kept well away from the internal os. Laterally, also, the excision of tissue should be limited to what is necessary for removing the chronic irritation. Unnecessarily extensive excision in any direction increases the troublesome bleeding and the chance of later stenosis. In doing the operation the conical excision should include the lower half or two-thirds

of the mucosa, depending on conditions, and laterally just enough to remove the cystic tissue. When the cone is out, the remaining surface is examined, and if any cyst is found it is removed.

Another item of importance is the troublesome bleeding which interferes with the work. The authors experimented in various ways, seeking the best method of control. Preliminary circular ligation of the cervix and other forms

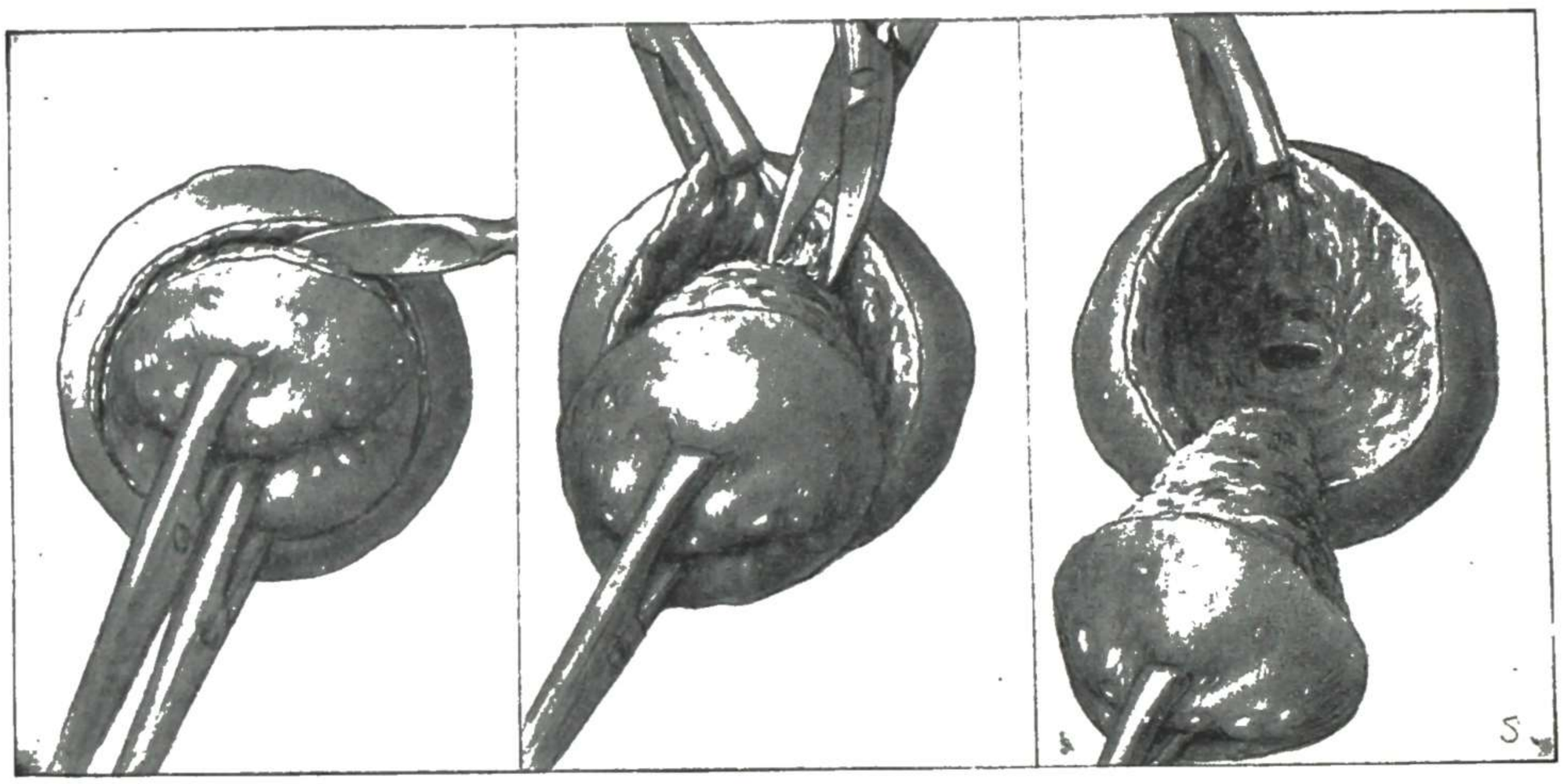


Fig. 533. Fig. 534. Fig. 535.

Fig. 533.—Conical excision of the cervix (Sturmdorf). Outlining the area to be removed. No more cervical tissue should be removed than is necessary to ensure the removal of the chronic irritation.

Fig. 534.—Excising the deeper portions of the cone.

Fig. 535.—The cone excised, showing the resulting large raw surface, which bleeds freely.

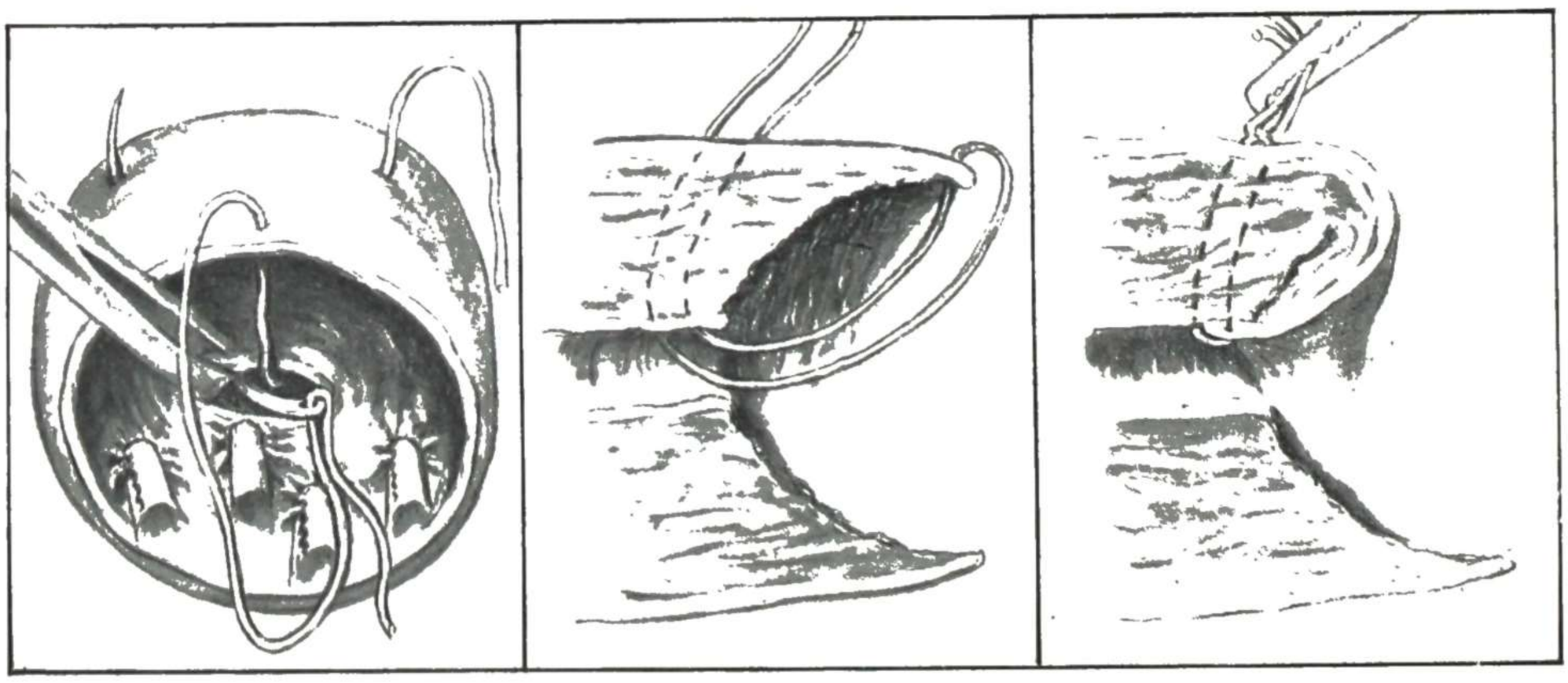


Fig. 536. Fig. 537. Fig. 538.

Fig. 536.—The anterior main suture has caught the anterior margin to be turned in and is being passed back from the canal to the vaginal surface of the cervix.

Fig. 537.—A sectional view showing the course of this Sturmdorf suture.

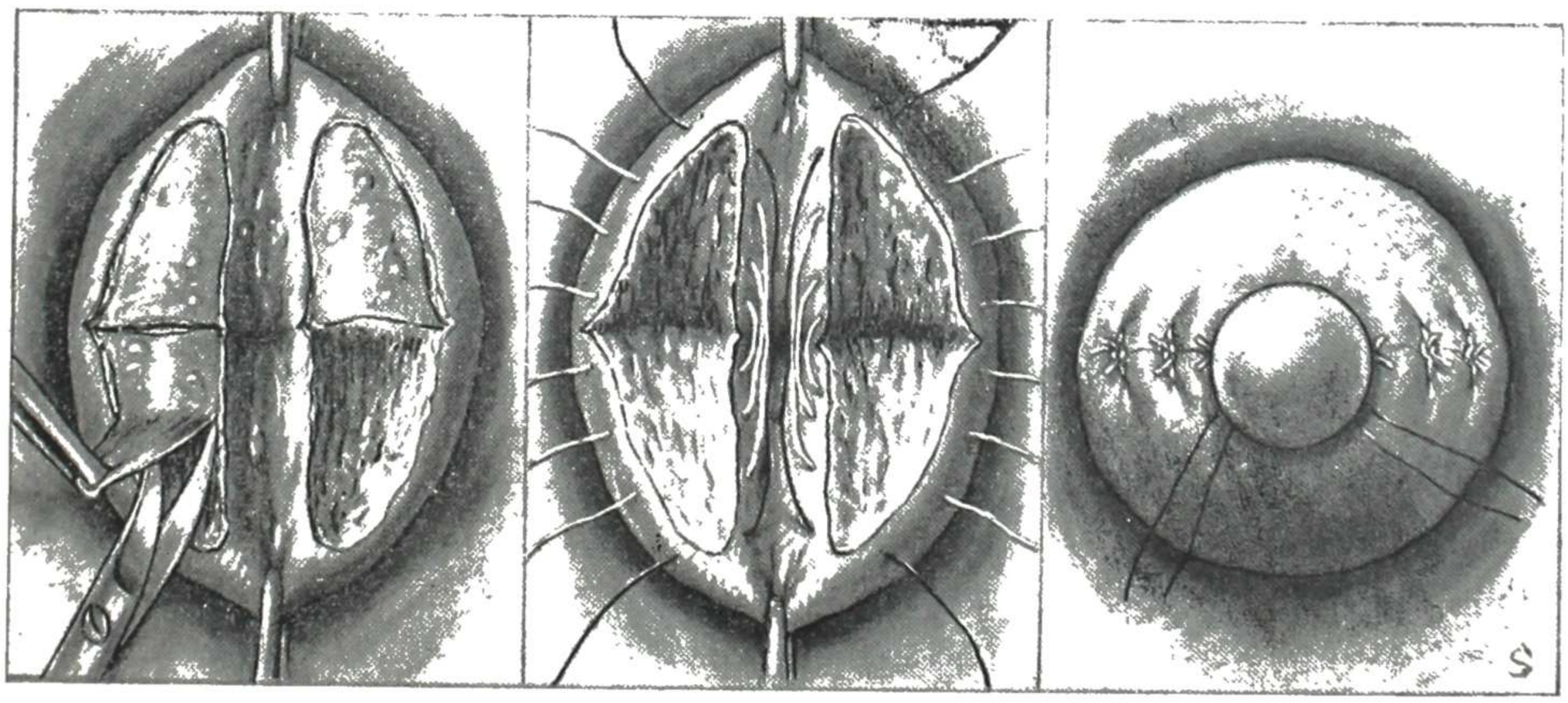
Fig. 538.—The suture tied, doubling in the thinned-out rim of the cervix as a flap over the raw area.

of preliminary ligation or lateral clamping interfered more or less with the excision and suturing. Pressure hemostasis of the bleeding points was finally adopted. It is simple and satisfactory. Though it does not stop all bleeding,

it reduces it sufficiently to permit accurate work and to obviate undue blood loss. As soon as the cone is out, the principal bleeding points are rapidly caught with strong-toothed forceps. By judicious placing of the forceps the bulk of the bleeding may be controlled, usually by six to eight. The forceps are left undisturbed a minute or two for pressure hemostasis, before proceeding with the next steps, shown in the illustrations.

In some cases, particularly where the cervix is fixed by scars, there may be difficulty in passing the main sutures in the regular way, especially the posterior suture. This difficulty may be overcome by putting a needle on each end of the suture and introducing each end from within outward through the canal. Another maneuver for overcoming the difficulty is to bring the needle out at the middle of the raw surface and then take a bite to carry the suture into the canal.

The extension of the field of conization with the high frequency wire loop, as previously explained, has obviated the necessity for this conical excision with knife and extensive suturing in all but exceptional cases. Occasionally the infiltration will be so extensive or the cervix so drawn out of shape by scars, that conical excision with the knife is preferable to attempting the irregular excision with the conization electrode.



A. *B.* *C.*

Fig. 539.—Repair of lacerated cervix (trachelorrhaphy). *A*, Denuding on each side of the canal, with more or less excision of cysts and infiltrated tissue. For this a knife or scissors may be used. A very convenient way is to start the process with the knife and finish with scissors. *B*, All sutures passed and ready to be tied. *C*, All sutures tied and the stem in place.

The operation of trachelorrhaphy (Fig. 539), formerly employed for the repair of the cervix in these cases, has been superseded by the more effective methods just explained. In the cases with enough pathologic change and chronic irritation to require repair it is preferable to remove all the involved tissue, instead of leaving a strip on each lip, as was necessary in the old trachelorrhaphy. Possibly there may be some exceptional cases of unilateral tear or of bilateral tear without much inflammation, in which this lateral denudation and suture would be preferable. But it is now principally of historical interest, as an important step in the gradual development of effective treatment for this condition.

Coagulation.—Another method of removing the affected portion of the cervix is by electric coagulation, with sloughing of the coagulated tissue and subsequent granulation of the wound. This method has had a popular run, reminding one somewhat of the widespread popularity years ago of deep destructive cauterization of the cervix. The latter was finally abandoned on account of serious late results from the extensive scar-tissue formation. Whether or not electric coagulation, with its associated sloughing, will show similar results remains to be seen. For the present, it seems to run counter to an important principle of the handling of suspicious tissue in this area—namely, that such tissue should always be removed in a way which will permit of microscopic investigation of it. Of course, a specimen may be removed before the area is coagulated, but carcinoma may be beginning in another part of it. The safest plan is to remove the whole area as a specimen, and examine all of it, as is done in the other methods. Additional disadvantages of the coagulation method are extensive sloughing, occasional serious spread of infection, and the long period of healing.

Coagulation and the experimentation and clinical work connected with it constitute an important step in the long search for the best method of handling these cervix cases, and much credit is due the men who have conducted the work and carefully reported their results. The authors feel, however, that a judicious consideration of available information at this time indicates the adequacy and decided superiority of the methods advised and described in detail in the preceding pages.

Other methods of treating cervicitis have been employed, including ionization and carbon dioxide snow, but at present the methods already detailed seem definitely the preferable forms of treatment.

In cervicitis during pregnancy it would seem safest to employ palliative measures, to remove the irritating discharge and prevent aggravation of the trouble. There may be exceptional cases, however, in which the irritation is so marked that the danger of allowing it to continue would seem greater than the danger of more radical measures with the possibility of associated miscarriage. King and Touff report a series of 48 cases treated by fairly deep linear cauterization between the twentieth and thirtieth weeks of pregnancy. A biopsy is warranted in cases where the cytology indicates early malignancy.

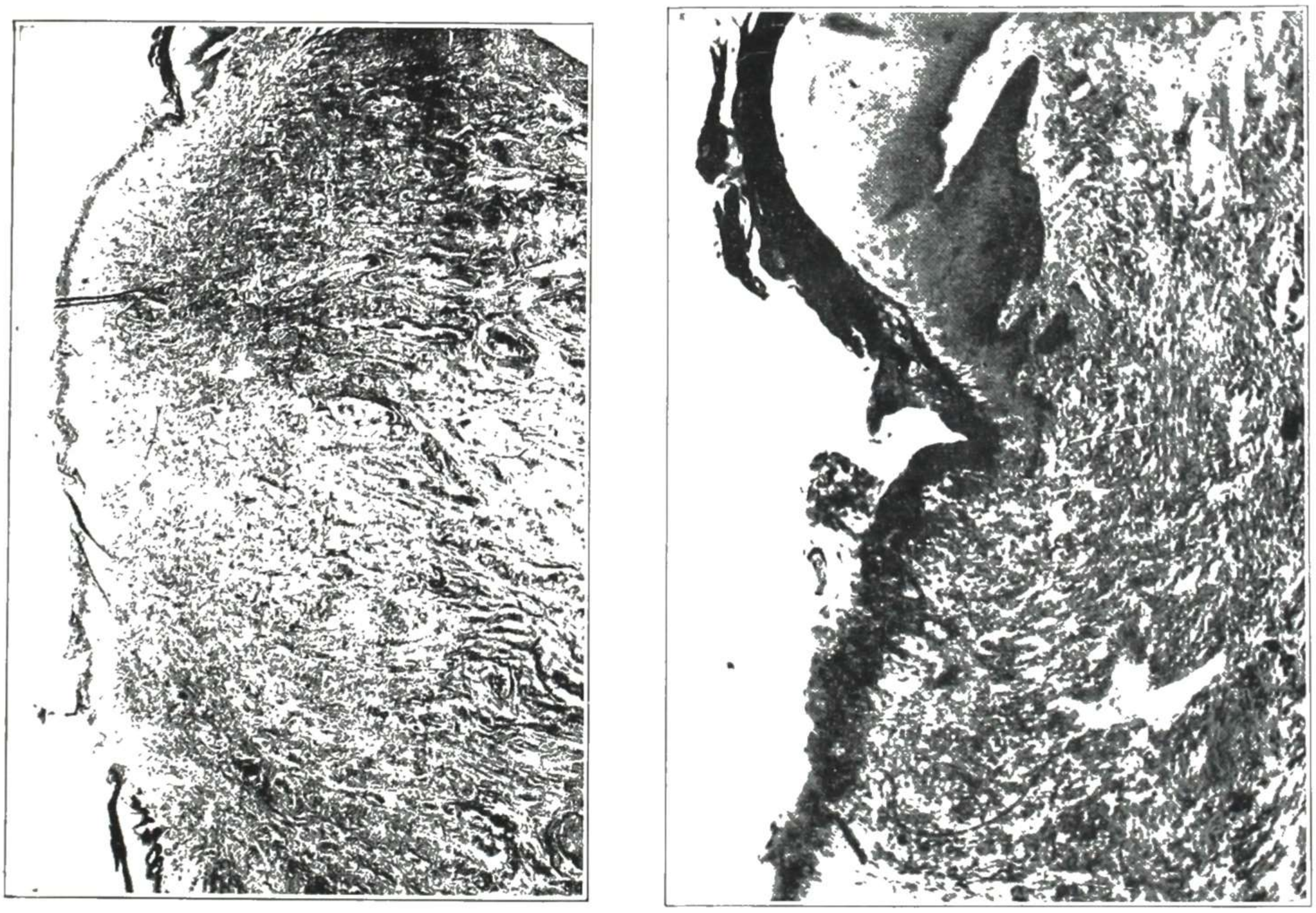
ULCER OF CERVIX

An ulcer of the cervix is an area on the cervix which has lost its epithelial covering down to the connective tissue, the base being formed by granulation tissue or slough.

An ulcer in this location may be due to simple irritation or nutritional disturbance or may be due to chancroidal infection, syphilis, tuberculosis, granuloma inguinale, lymphogranuloma inguinale, or cancer.

The most prominent symptom of ulcer of the cervix is vaginal discharge, which is sometimes streaked with blood. When the cervix is exposed with the speculum, the ulcer on its surface comes into view. The ulceration may be large or small, superficial or deep. It often bleeds when touched.

The conditions that may be confounded with ulcer of the cervix are erosion of cervix and laceration of cervix with eversion of mucosa. In **erosion** the lesion is very superficial and usually surrounds the external os, and the whole surface is still covered with epithelium. The cause is usually apparent and there is no raised clear-cut border or sunken base. In **laceration** of cervix



A. *B.*

Fig. 540.—*A*, An ulcer of the cervix. Squamous epithelium is seen at upper and lower ends but is absent over the surface of the ulcer between. *B*, Upper end of section shown in *A*, under higher magnification. The layer of squamous epithelium terminates abruptly at the edge of the ulcer. Gyn. Lab.

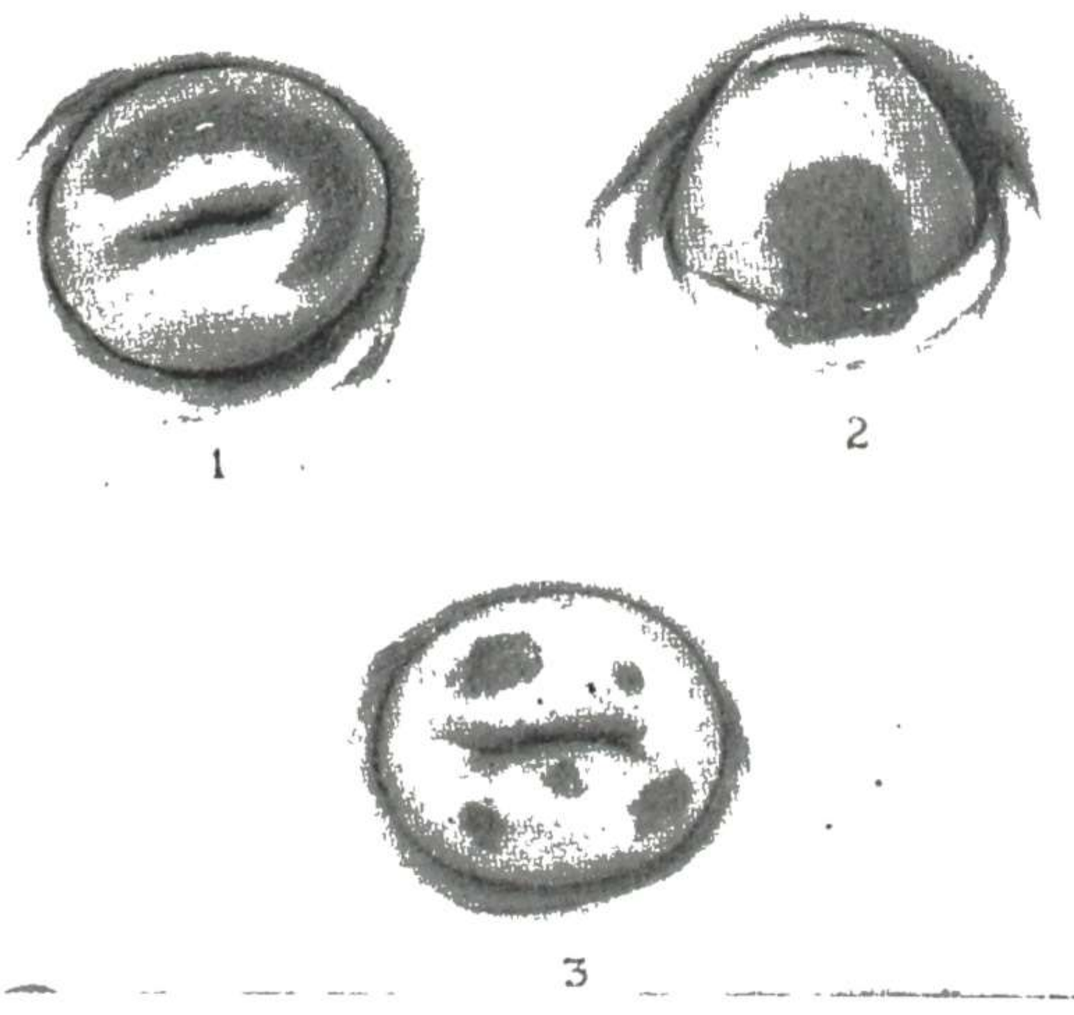


Fig. 541.—Various types of superficial ulcerations seen in some cases of trichomonas vaginalis vaginitis. (From Kleegman: Surg., Gynec. & Obst. **51:** 552, 1930.)

with eversion of mucosa, the laceration is apparent, and by clearing all secretion from the reddened surface and examining it closely, it can be seen that it is mucous membrane and not granulation tissue.

Simple Ulcer.—Simple ulcer of the cervix may be due to either of two etiological factors or a combination of both. One of these factors is local irritation, as from an irritating purulent discharge or the pressure of a pessary or rubbing of clothing on a prolapsed cervix, and the other factor is nutritional disturbance of the protective epithelium by endocrine or vitamin deficiency (Figs. 540 and 541). These causes of ulceration have already been considered under simple ulcers of the vaginal wall, and the same irritations and local nutritional deficiencies are to be looked for about the cervix.

The important thing is not to make a diagnosis of simple ulcer until the other and more serious forms of ulceration have been definitely excluded. On the other hand, an ulceration appearing about the cervix after apparent cure of cervix cancer should not be hastily pronounced cancer recurrence. A microscopic section may show it to be a simple ulcer, due to the combination of hormone deficiency and local radiation effect necessarily associated with curative treatment of cervix cancer.

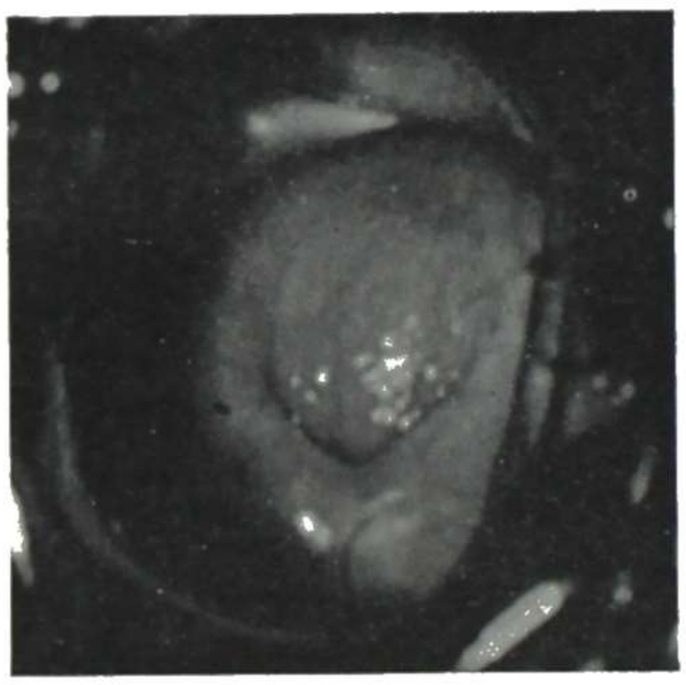


Fig. 542.—Primary lesion of cervix. Positive dark-field test obtained. (Courtesy Dr. Charles S. Stevenson.)

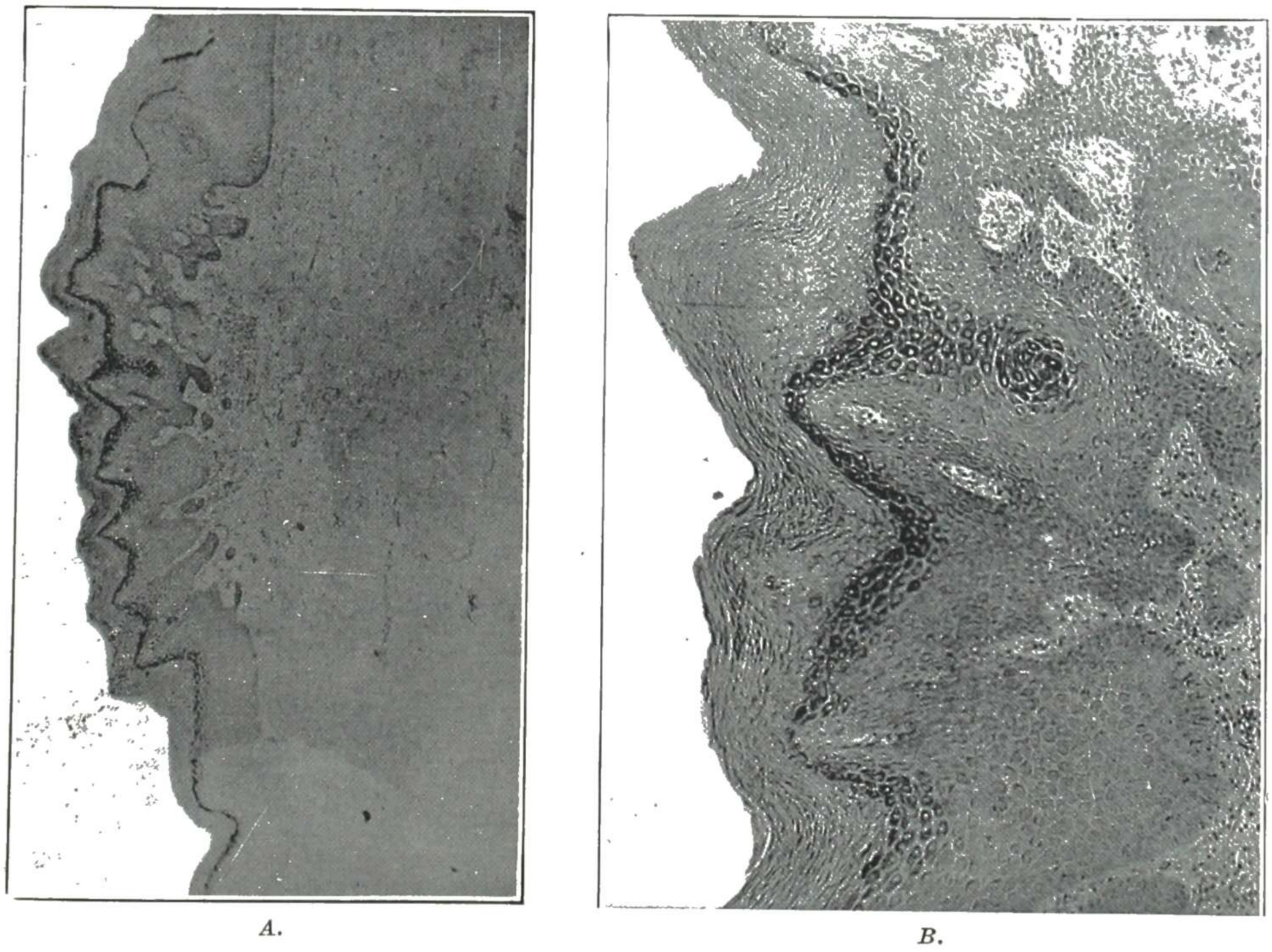
Chancroidal Ulcer.—A rapidly spreading ulcer on the cervix with undermined or punched-out edges, following suspicious intercourse, is probably chancroidal, and will usually have lesions on the vulva, as already described under Chancroid in Chapter 3.

Syphilitic Ulcer.—If the ulcer is syphilitic, there will be other evidences of syphilis and spirochetes may be recovered from its surface. The local findings in syphilis of the cervix depend on which stage of the disease is present.

Primary luetic lesions of the cervix were considered quite rare until comparatively recently. Gellhorn and Ehrenfest in their comprehensive work state that it occurs in 1.5 per cent of all genital lesions, but according to Oppenheim the frequency is 8 per cent. In 1931, however, Davies in a study of primary syphilis in the female found cervical lesions in 44 per cent of the cases. Because of the transitory nature of the lesion it is undoubtedly frequently missed on casual examination. The lesion may be primary chancre, which varies from that on the skin in that it is a deep funnel-shaped sore with rounded edges usually covered with a grayish layer of necrotic tissue. This pseudo-

membrane contains many spirochetes. In Fig. 542 is a case of a primary luetic lesion of the cervix demonstrating the ease with which it could be missed. Stevenson, who sent me this photograph, states that he has had other early luetic lesions which resembled simple erosion or cervicitis.

The secondary lesions may appear as an erosion, macule, papule or ulcer. The tertiary form occurs as a gumma which in most cases has ulcerated and become necrotic, and this is the lesion which is occasionally mistaken for a carcinoma.

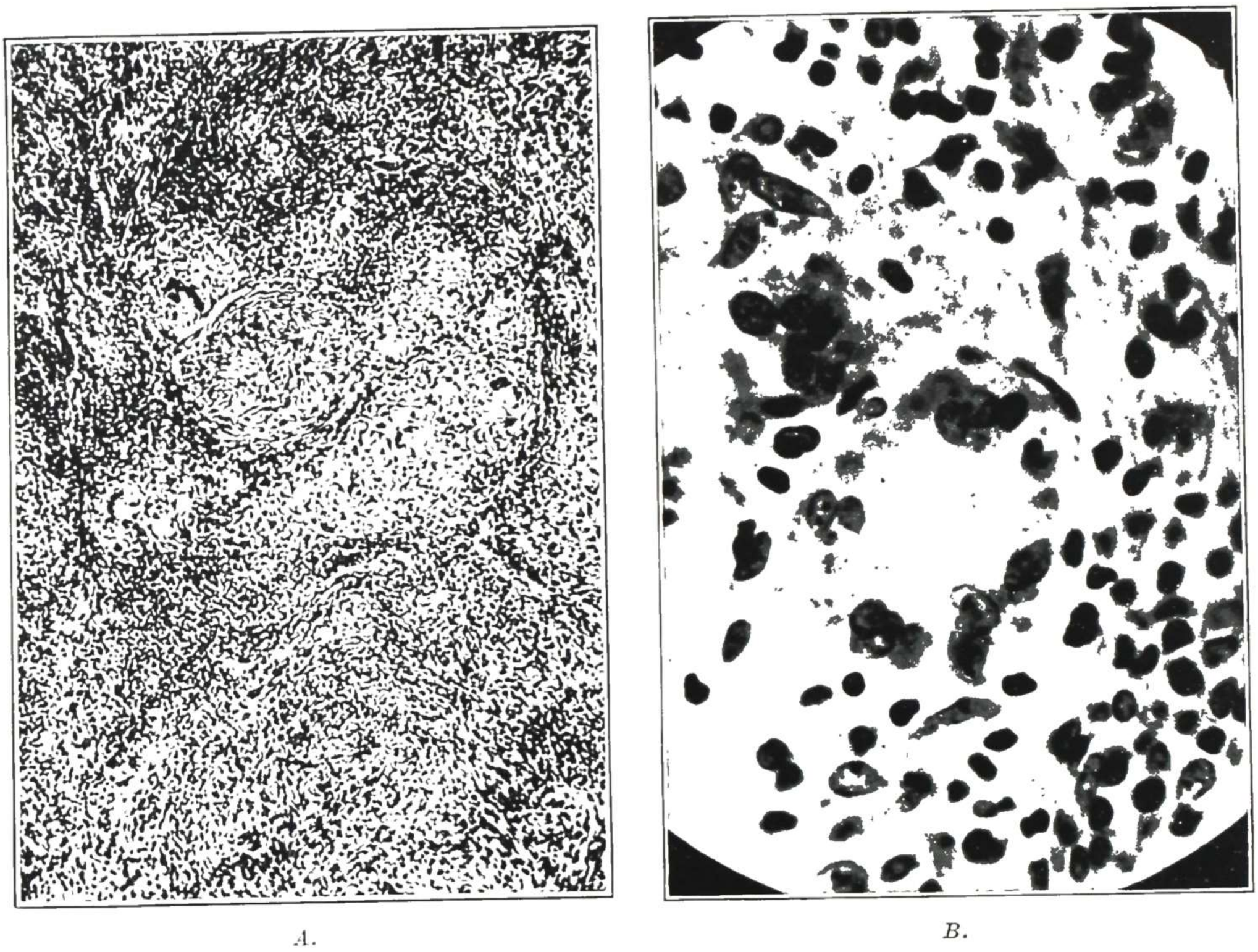


A. *B.*

Fig. 543.—*A*, Syphilis of cervix, secondary. Section through a slightly elevated grayish white plaque a little less than 1 cm. in diameter. At the bottom of the picture the epithelium is practically normal. In the lesion, note the regular character of the epithelium and its line of demarcation, the marked development of the epidermis, and the marked stratum granulosum, which is scarcely apparent in normal cervical epithelium. *B*, High power of the upper central portion of *A*. Shows the squamous epithelium in which the cells have a definitely water-logged appearance. The epithelium is markedly hypertrophic and presents the characteristic underlying irregular surface. Note the large cells of the stratum granulosum and also the well-developed stratum corneum. Gyn. Lab.

By means of routine dark-field examination in all women with infectious syphilis or exposed to infectious syphilis, Guerriero and Mantooth found 10 chancres, 6 erosions, 5 macules, and 3 ulcerations. The diagnosis was made by finding the *Treponema pallidum* by dark-field examination as the serologic tests are not always positive until three weeks after the initial infection. There was only one tertiary lesion found and the diagnosis in this case was made by positive serologic test and biopsy.

In syphilis of the cervix the microscopic findings vary with the lesion present. In the primary stage, there is a marked round cell infiltration especially marked around the blood vessels. Plasma cells and giant cells are usu-



A. *B.*

Fig. 544.—*A*, Syphilis of cervix, tertiary, showing numerous small gummas, each containing a giant cell. *B*, High power of one of the typical giant cells seen throughout this lesion. Gyn. Lab. (From Schwarz: Am. J. Obst.)

Fig. 545.—Tuberculosis of the cervix uteri. Notice the cervical glands at the right and the exceptionally well-formed tubercle with giant cell at the left. There are several tubercles which show a tendency to coalesce. The patient was an eighteen-year-od nulliparous Negro girl. Wassermann was negative, and persistent antisyphilitic treatment had no effect on the lesion. The microscopic picture was typically tuberculous, with the chracteristic caseation which distinguishes these tubercles from the gummas of syphilis. Gyn. Lab.

ally present. There is very little loss of the surface epithelium in this early stage. The second stage, condyloma latum, shows an exaggeration of the first stage plus a loss of the epithelium over the surface, with ulceration. In the third stage (gumma) there is edema and hypertrophy of the epithelium and necrosis. Figs. 543 and 544 show syphilis of the cervix.

Antibiotic treatment for syphilis should be given promptly; this has been discussed under syphilitic lesions of the vagina in Chapter 3.

Tuberculous Ulcer.—In tuberculosis of the cervix, scrapings from the surface should show tubercle bacilli and section of tissue the characteristic tubercles and giant cells, as shown in Fig. 545. Stevenson reported a series of cases, and gave the following summary:

1. Eighteen cases of tuberculous cervicitis are reported, one of which is the sole tuberculous focus of infection in the genital tract, and the only one active in the patient.

2. Tuberculous cervicitis is of chief interest because it clinically resembles carcinoma and it announces the presence of genital tuberculosis.

3. The cervix is involved in from 5 per cent to 8 per cent of the cases of genital tract tuberculosis and thus appears to have a relative immunity to infection. About 90 per cent of the cases of cervical tuberculosis are secondary to upper genital tract infection. A true primary cervical tuberculosis is extremely rare.

4. The two chief symptoms are a persistent offensive watery leucorrhoea and bleeding following coitus or douching.

5. Physically the cervix shows symmetrical hypertrophy and superficial friability, and the portio may show abnormalities ranging from erosion and eversion to ulceration or papillary granulations.

6. The treatment should be surgical when possible and as radical as necessary and as the condition of the patient will allow.

Counseller and Collins reported 109 cases—one of their own and 108 from the literature. Some years later, Collins reviewed the subject and brought the list of reported cases up to 191, and the following quotation as to treatment is from his article:

> The treatment of tuberculosis of the uterine cervix should preferably be of a radical surgical character, such as abdominal panhysterectomy with the possible preservation of one ovary, if the patient's condition and other factors are favorable, because usually extensive tuberculous disease of the upper pelvic part of the generative tract is present and must be eradicated if cure is to result. For that reason and because of the rarity of a primary tuberculous infection of the cervix, local treatment of the cervical lesion is not advisable. For similar considerations roentgen and radium therapy will often prove to be disappointing in their end results.
>
> The contraindications to the employment of surgery are advanced local tuberculous lesions with extensive involvement of the neighboring bladder or rectum, extensive tuberculous salpingitis, marked secondary infection, the presence of active tuberculous foci elsewhere, cardiovascular disease and senility. The ultimate prognosis in this disease entity is dependent on the type of treatment employed and on whether active tuberculosis is present elsewhere in the body.

Since the discovery of streptomycin, reports have appeared of its use by several workers in tuberculosis of the female genital tract. In the report by Herring and King and that by Keettel, the disease seemed to be arrested; in the report by Lubin and Waltman the cervix was normal on the surface but the biopsy almost a year after discharge from the hospital still showed evidence of tuberculosis.

Granuloma Inguinale.—This form of ulceration of the cervix has been reported by different writers. Pund, Huie, and Gotcher found 9 cases of granuloma inguinale of the cervix in 67 Negro patients with noncancerous disease of the cervix requiring specimen excision.

Fig. 546 is from an article by Arnell and Potekin, who gave the following summary:

1. Thirty-eight cases of granuloma inguinale of the cervix were observed at Charity Hospital of Louisiana during the ten-year period ending July 1, 1939, 21 of the number being identified within the last two years. Four of the patients were white, and represent the first instances of this disease to be reported in white women.

2. The clinical and histopathologic features of the lesion are discussed. The diagnosis is dependent upon the demonstration of the pathognomonic cell-containing Donovan bodies, which are most readily identified by the use of fixed biopsy material and the silver impregnation method of Dieterle.

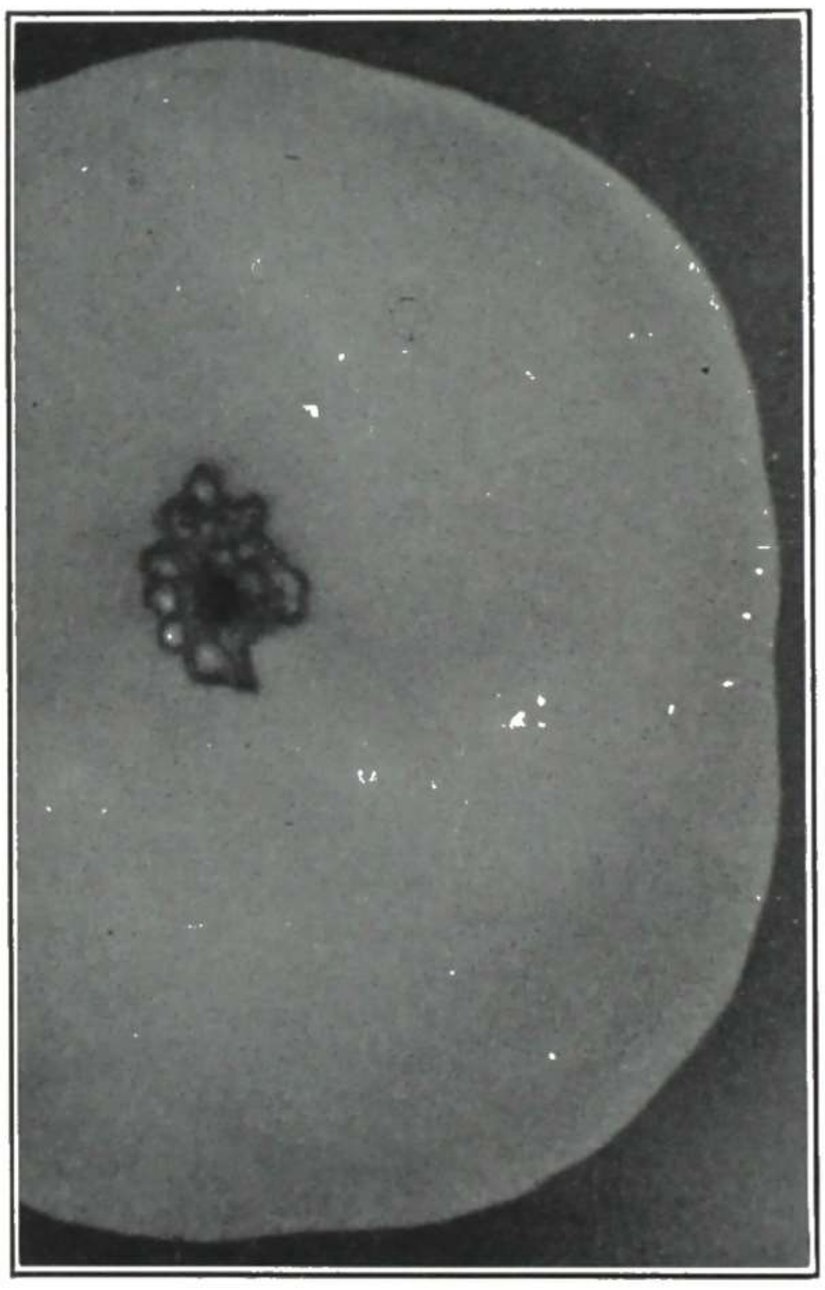


Fig. 546.

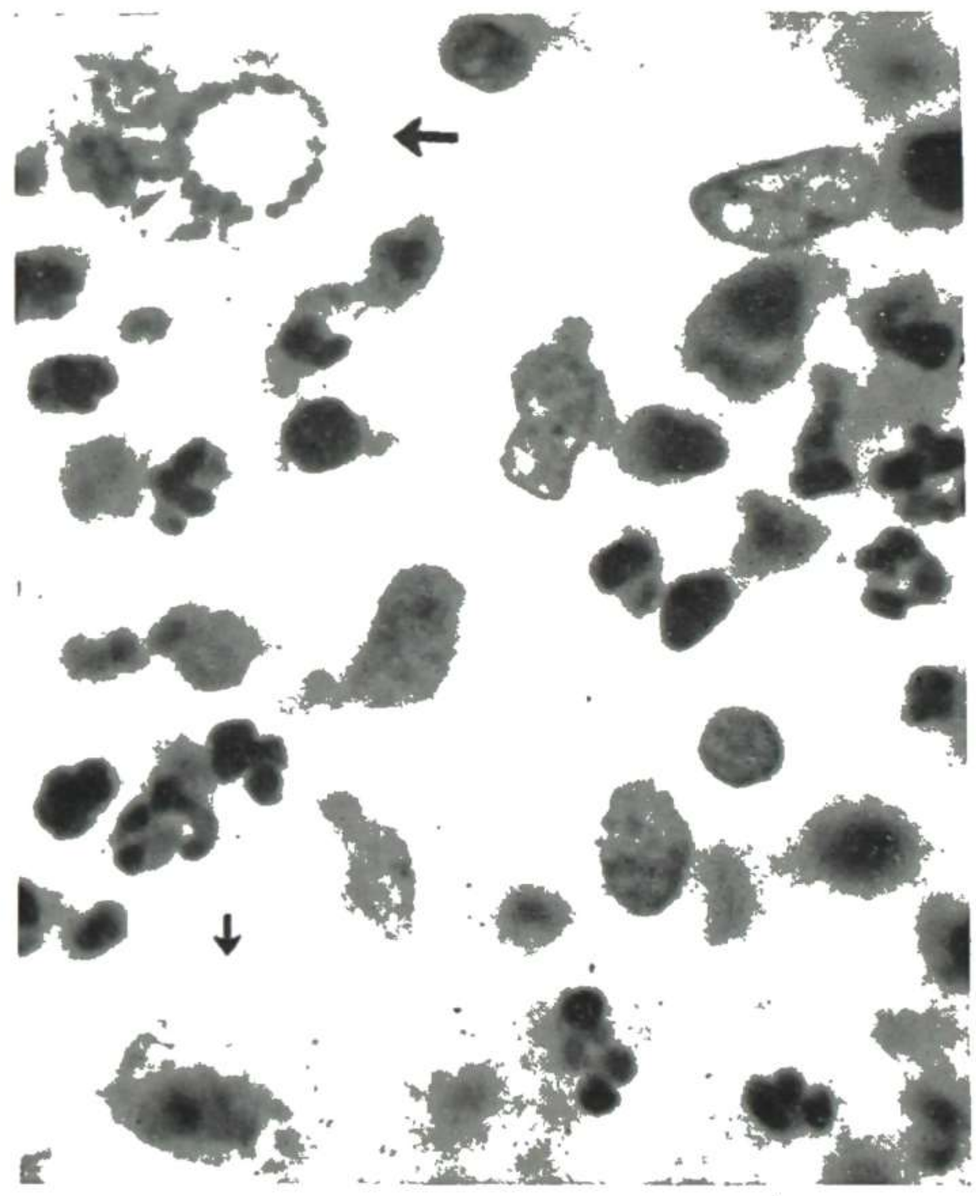


Fig. 547.

Fig. 546.—Early granuloma inguinale of the cervix. Note the close resemblance of the lesion to a cervical erosion. (From Arnell and Potekin: Am. J. Obst. & Gynec.)

Fig. 547.—Section from lesion of cervix. Note characteristic cell of granuloma inguinale and arrangement of bodies within intracytoplasmic cysts, upper left. Two other cells, not in focus, indicated by arrows. Hematoxylin-eosin. Slightly reduced from photomicrograph (×1,440). (From Pund and Greenblatt: J. A. M. A.)

3. Carcinoma of the cervix is easily confused with cervical granuloma inguinale, and 27 of the 38 cases in this series were so diagnosed. The close clinical similarity of the two conditions is responsible for the error.

4. Vaginal bleeding and pelvic pain were the outstanding symptoms.

5. Intravenous antimony therapy is the most effective form of treatment, and tartar emetic gives the best results. The duration of treatment is shortened if large growths are completely excised by means of the cautery knife before specific therapy is begun. Recurrences are common.

6. Granuloma inguinale of the cervix is a clinical entity which demands general recognition and further study. Only by these means will the true incidence be established and improved methods of diagnosis and treatment be evolved.

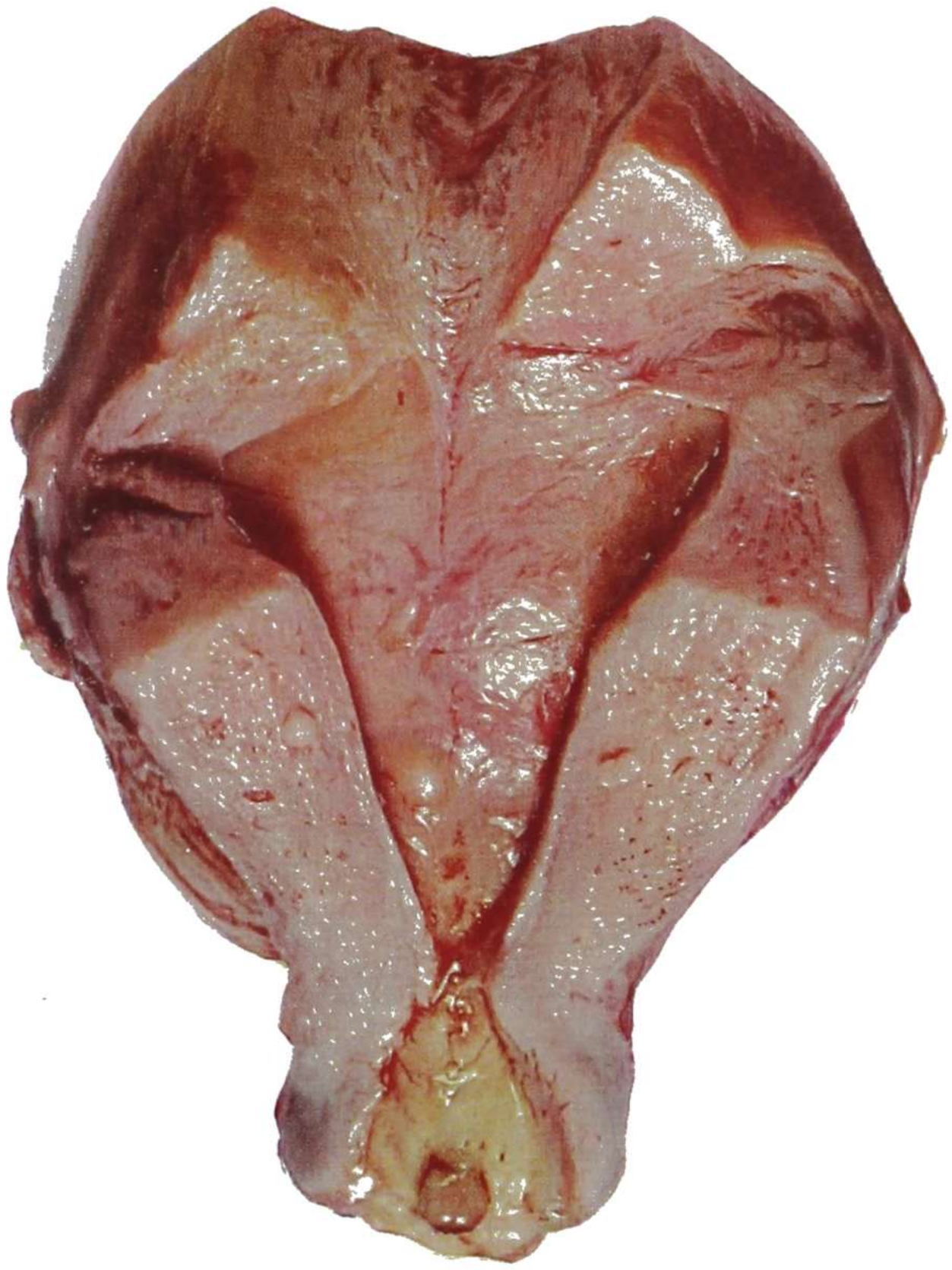


Fig. 548.—Colored photograph of a fresh specimen, showing various points in gross pathology. A typical cervical polyp (mucus polyp) arises below the middle of the cervical canal and hangs to near the external os. It was not in sight on speculum examination of the patient in the office.

The opened uterus and cut surfaces give a good idea of the marked thickening of the walls, which enlarged the organ to the size of a fist. There is a diffuse myomatous process, with scattered small myoma nodules. Two of these show in the lower half—a sectioned one on the cut surface and a small submucous one projecting from the posterior wall. The operation was for disabling myomatous uterus with pressure symptoms. Gyn. Lab.

Speiser has recently called our attention to the danger of mistaking the lesion for carcinoma; he reports four cases in which this mistake was made.

The antibiotic therapy for granuloma inguinale has been discussed in Chapter 3. Nestarez and Romeiro report a cure of cervical granuloma inguinale by the administration of streptomycin. Complete healing occurred and there was no recurrence during the two years of observation.

Fig. 547, showing the microscopic features, is from an article by Pund and Greenblatt.

Lymphogranuloma Inguinale.—Ulceration of the cervix due to this cause would be accompanied with the more common lesions of this disease, which are described in Chapter 3.

Chancroid.—This lesion is rare; two cases have been reported by Day and two by Guerriero and Mantooth. The diagnosis and treatment have been discussed in Chapter 3.

Actinomycosis.—This vegetable fungus, known as the ray fungus and capable of causing extensive ulceration, has been found in the cervix. Jaffe reports a case and discusses actinomycosis of the uterus.

Diphtheria.—In 1944 Beacham and Rice reported a case of diphtheria of the cervix. They were unable to find a previous report of this condition in a search of the literature. In 1947 Bottomley and Christie reported a fatal case.

Cancerous Ulcer.—In any ulcer of the cervix, the determination as to whether or not it is a beginning cancer must be made promptly, excision of the area for microscopic examination being carried out if necessary.

Treatment of Ulcer of Cervix

The treatment of an ulcer of the cervix is indicated by the diagnosis as to the type of ulceration, which has been discussed above. The treatment of the various diseases causing noncancerous ulceration has been considered in Chapter 3 under ulcerations of the vulva and vagina. Cancer of the cervix is considered in Chapter 8.

CERVICAL POLYPS

Cervical polyps is the term applied to small nonmalignant tumors found in the cervix uteri (Fig. 548). They are usually simple adenomas of the cervical mucosa and hence are frequently designated as "mucous polyps." Occasionally, a small myoma of the cervix or from higher will become pedicled and projected from the cervix, constituting a polyp.

Ordinary cervical polyps are usually infected and frequently are of inflammatory origin. In the gross they resemble the cervical mucosa. Microscopic examination reveals a surface covering of cervical columnar epithelium. The polyps contain numerous cervical glands, many of which are cystic. The stroma shows a marked hyperemia, inflammatory infiltration, and edema. Round cells and plasma cells are numerous, and speak for the inflammatory nature of this condition. The microscopic features are shown in Figs. 549 and 550.

We had one case of mucous polyp in which the polyp was so long that it protruded outside the vagina for two inches. It would fill with mucus gradually, and intermittently it would empty through a small opening.

Diagnosis and Treatment

The principal symptoms are bleeding and leukorrheal discharge. It is surprising what troublesome and persistent bleeding will sometimes be occasioned by a small polyp in the cervix.

Fig. 549.

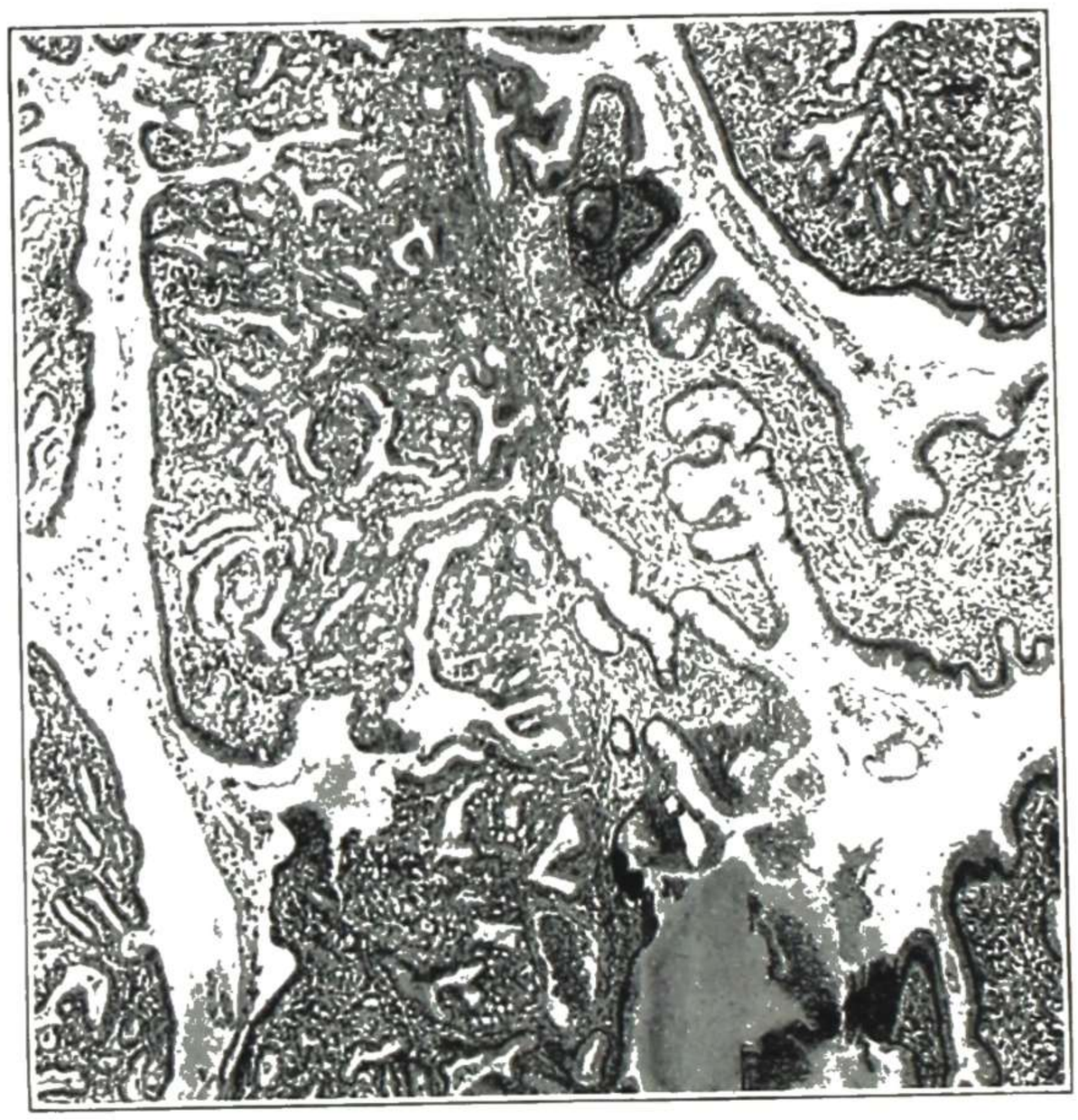


Fig. 550.

Fig. 549.—Cross section of a cervical polyp. This is the solid type with no dilated glands showing.

Fig. 550.—High power of a cervical polyp of the glandular type. Gyn. Lab.

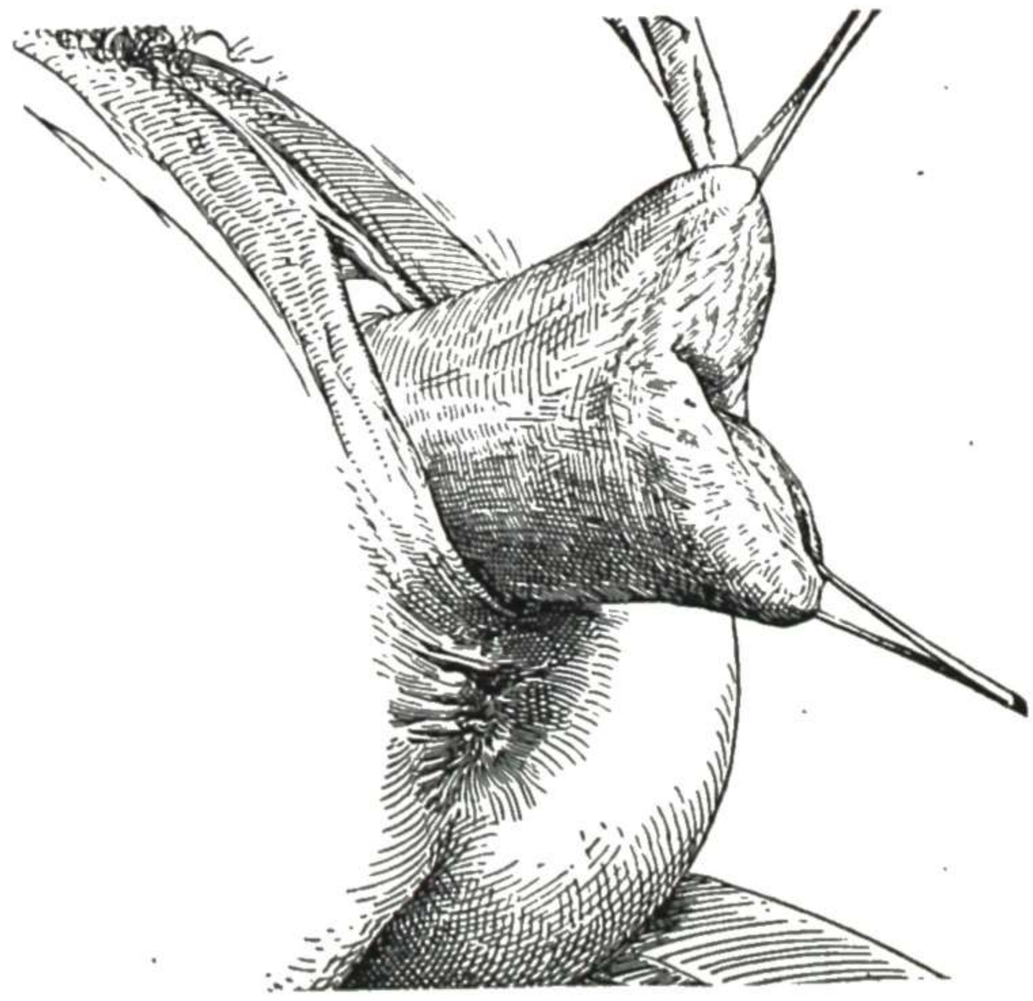


Fig. 551.—Hypertrophy of the infravaginal portion of the cervix. (From Kelly: Operative Gynecology.)

On digital examination, the polyp may often be felt as a small soft mass projecting from the cervix or obstructing the external os (Fig. 551). In some cases the polyp is so soft that it is not noticed on palpation, until the exam-

ining finger is moved slowly back and forth across the external os, when it will be felt to slip under the finger.

In the examination through the speculum, the polyp is seen (when low enough in the canal) as a small rounded red mass, projecting from the external os.

The important thing in the diagnosis is to distinguish beginning malignant disease from simple polyp. Not infrequently in malignant disease of the cervix, small projections form within the cervical canal and appear at the external os, presenting almost the same appearance as the simple polyp. Such a polyp is shown in Chapter 8, under Sarcoma of the Uterus.

The treatment is removal and microscopic examination. The little mass of tissue may usually be grasped with the long dressing forceps and twisted off. The base of the polyp should then be cauterized to prevent recurrence. If there is much bleeding, a few drops of 1:1,000 Adrenalin on the end of a tampon is placed against the cervix, or a small bit of Oxycel cotton or gauze may be used.

It must be emphasized that other causes of bleeding should be considered; too often the polyp is assumed to be the source of the bleeding, causing one to miss submucous myoma, endocrine bleeding, and carcinoma.

All tissue removed from the cervix uteri should be sent for microscopic examination as already explained in Chapter 2. If not a projection from malignant condition in the uterus, it is at least a product of chronic irritation and should be investigated. Though malignant change is not frequent, Israel in a series of 117 polyps of the cervix found two carcinomas, an incidence of 1.7 per cent.

If the polyps recur or there are a large number of them with additional evidence of cervicitis, then conization is indicated.

HYPERTROPHY OF CERVIX

The term "hypertrophy" or "idiopathic hypertrophy" is applied to enlargement of the cervix independent of laceration and the resulting inflammation or of definite tumor formation. As this form of hypertrophy results principally in elongation, it is sometimes spoken of as "elongation of cervix." It is a rare affection.

Etiology, Symptoms, Diagnosis

The cause of this marked increase of tissue and elongation of the cervix is not definitely known. In some cases of prolapse of the uterus, the vaginal walls which prolapse at the same time drag on the cervix and elongate it, but not to the extent here contemplated. It may occur in the married or unmarried. It occurs oftenest in nulliparas, and this brings up the question of congenital or developmental defect.

There is an increase of tissue in the cervix but principally in a way that gives greatly increased length. If the hypertrophy takes place only in the infravaginal portion of the cervix, the body of the uterus and the vaginal walls remain in approximately normal position, the long cervix projecting along the vagina or even outside of the vagina. Fig. 550 shows such a con-

dition. If the hypertrophy is confined to the supravaginal portion, the vaginal walls, both anterior and posterior, are pushed downward by it, as in prolapse. The body of the uterus, however, remains in about the normal position. If the hypertrophy is confined to the intermediate portion, the anterior wall and the base of the bladder will be pushed down as in prolapse, the posterior wall remaining stationary. Retroversion of the uterus and more or less prolapse are usually present also, and are caused by the dragging of the heavy cervix and the vaginal walls.

Examination reveals a mass with the characteristics previously mentioned. From prolapsus uteri it is distinguished by the body of the uterus being in approximately normal position. From uterine tumor, projecting into the vagina, it is distinguished by its form and by its central cavity. From inversion of the uterus, it is distinguished by the body of the uterus being in about the normal position, and by its central opening.

Treatment

The treatment of extensive elongation of the cervix, causing troublesome disturbance, is either amputation of the cervix or hysterectomy, the choice depending on the complications present.

STRICTURE OF CERVIX

Stricture of the cervical canal may be congenital or acquired. Less than 10 per cent are developmental and they are due to an incomplete canalization of the distal end of the fused müllerian ducts. The acquired strictures may be due to infection, trauma, radium, new growths, or senile contraction.

The symptoms enumerated by Melody in an excellent summary of this subject are as follows: cryptomenorrhea, dysmenorrhea, menorrhagia, leukorrhea, senile vaginitis, postmenopausal bleeding, infertility, hematometra, pyometra, endometriosis, conglutination of the external os, cervical dystocia, and postpartum pyometra. Frank reported a mucocele of the cervical stump due to stricture.

The treatment consists of dilatation of the cervix and maintenance of the dilatation by means of a tube pessary or one of the types that can be left in for several months. In persistent recurrence, the Dudley plastic operation or a hysterectomy may be required for relief.

Pyometra, though rather rare, is usually associated with a stricture of the cervix. An excellent study of the bacteria present in cases of pyometra was reported by Carter.

HYPERPLASIA OF ENDOMETRIUM

Hyperplasia of the endometrium is a persistence and exaggeration of the growth phase of the monthly cyclic change. It is not an endometritis, though inflammation may be present as a complicating condition. In its various forms it has received various designations, being confused principally with endometritis. The former confusion regarding the pathology of the endometrium was due chiefly to the lack of knowledge concerning the details of the cyclic changes associated with menstruation.

Olshausen in 1846 first described the condition and called it "endometritis fungosa." In 1853, Brennecke again described the condition and noted that there was an absence of corpora lutea in the ovaries. He suggested that the ovarian disorder was the cause of the endometrial changes. For a time it was thought to be caused by inflammation, but Cullen in 1900 recognized it as a benign condition distinct from endometritis. The fundamental work of Hitschmann and Adler on the changes in the histologic picture of the endometrium during a normal cycle, and the later work of Schroeder, laid the foundation for the understanding of this interesting endometrial lesion. Schroeder's work in Germany and the contributions of Cullen, Novak, Fluhmann, Burch, and many others in this country have done much to make our knowledge of this condition more complete.

Etiology

Endometrial hyperplasia is due to a disturbance of the normal changes that take place in the endometrium, which in turn are dependent on the ovarian-pituitary hormonal influences associated with ovulation and corpus luteum formation. The particular hormonal influences which seem most responsible are excess formation of estrin (endometrium growth hormone) and deficient formation of progestin (corpus luteum hormone). The particular ovarian lesion most likely to be associated with endometrial hyperplasia is the "cystic" ovary resulting from nonrupture of follicles. In the nonruptured follicle the ovum dies, but the zona granulosa continues to function, resulting in excess estrin and abnormal growth of the endometrium.

In most cases of hyperplasia in which the ovaries have been examined, there is an absence of a recent corpus luteum corresponding to the menstrual period. This fact led to the conclusion that the failure of ovulation in some way was responsible for the hyperplasia. Novak stressed the importance of persistent and excessive stimulation by estrin as a cause of the condition. Failure of follicle rupture caused a persistence of the follicle containing estrin and an absence of corpora lutea. Proof of these contentions has been produced by Burch, Williams, and Cunningham experimentally in rodents. They were able to produce hyperplasia by the injection of estrin, and also by using the fluid obtained from cystic ovarian follicles. Kaufmann produced hyperplasia in the human castrate by large amounts of the estrogenic hormone. Werner in this country has also succeeded in producing it. Burch studied specimens of endometrium from cases of hyperplasia of the endometrium in human beings at various times in the cycle. In one case a previous instrumentation evidently caused ovulation, so that when another specimen was removed in the premenstrual period the endometrium showed typical premenstrual changes, whereas with the previous periods it had shown a hyperplastic endometrium.

Concerning the primary cause of the failure of follicle rupture, that has been discussed under the physiology of the pituitary-ovarian cycle (Chapter 1).

The cause of the bleeding in hyperplasia has been the subject of much discussion. There is a distinct difference between menstrual bleeding and the bleeding in these cases. In normal menstruation, the withdrawal of the estrin causes a cessation of growth and vitality of the entire endometrium, causing a necrosis and desquamation down to the basal layer, and the resulting bleeding

stops in a few days. With the hyperplastic endometrium the necrosis occurs in small, widely separated areas and gradually extends so that two or three months may elapse before desquamation is complete, or it may never be complete. It seems that the failure of the endometrium to desquamate properly may be the important factor in the prolonged bleeding, for when curettage is done and the endometrium removed down to the basal layer, the bleeding usually stops.

Pathology

In hyperplasia the endometrium is markedly thickened (Figs. 552 and 553) and the glands are numerous and vary greatly in size and shape, some being much dilated. The mucosa may be so redundant as to form folds or even polyps. In curetting one usually obtains a large amount of endometrial tissue. When a large piece is seen, it is ordinarily a strip of fairly uniform thickness, instead of the chunky broken pieces obtained in endometrial carcinoma. Occasionally, however, there are polyps or other irregular thickenings which give the curettings the gross appearance of malignancy.

Fig. 552.

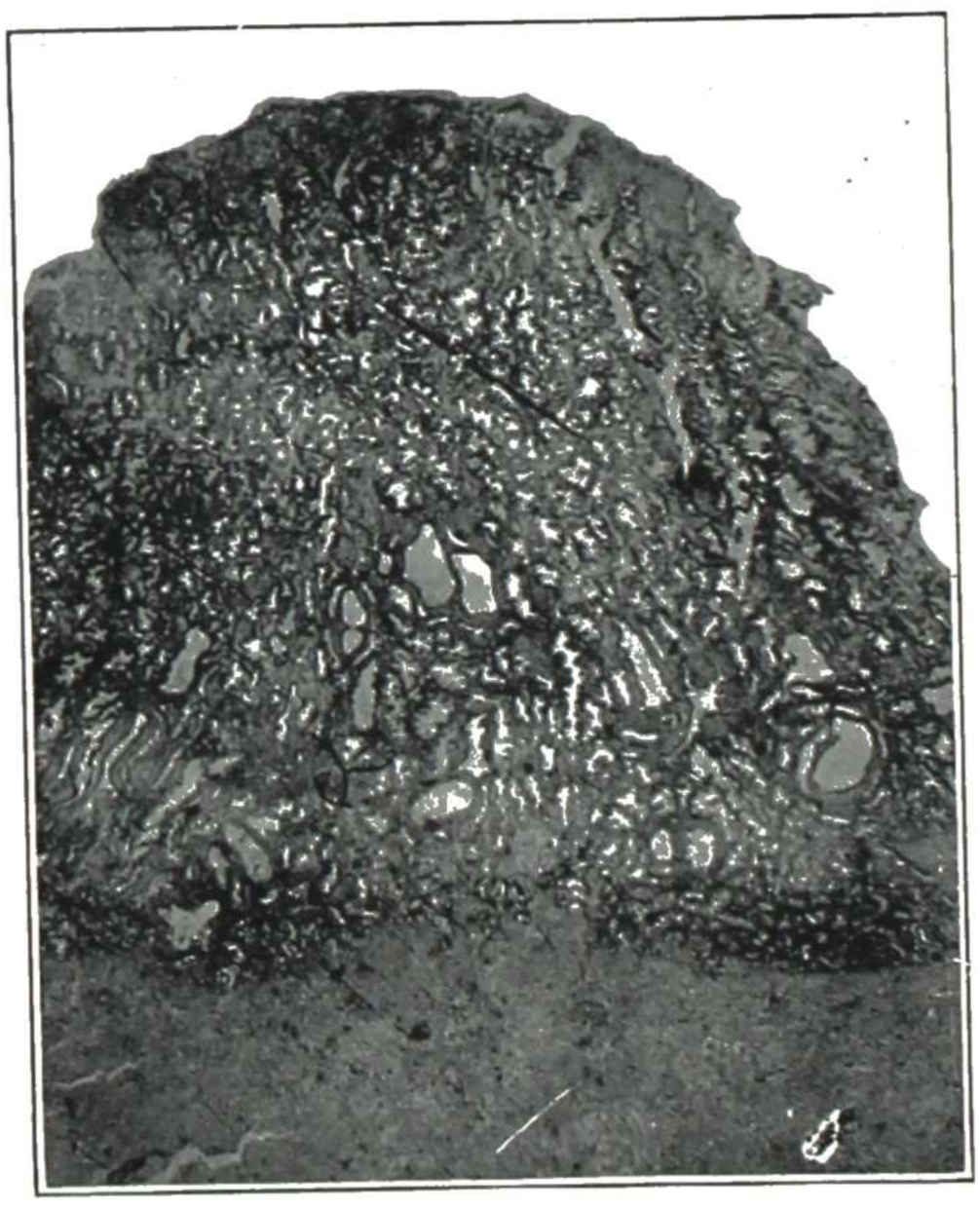


Fig. 553.

Fig. 552.—Hyperplasia of endometrium. Gross specimen showing greatly thickened endometrium, which is distributed in velvety folds. Gyn. Lab.

Fig. 553.—Low-power picture of the endometrium in Fig. 552. Notice the thick endometrium, the greatly dilated glands, and the compact superficial layer. Gyn. Lab.

In hyperplasia there is evidence of varying degrees of excessive growth. In the mild form there is merely an increase in the number of glands and cells. The glands present no consistency in form. Some are in the early growth stage, others may be of the "saw-toothed" stage, and some are cystic. The epithelium lining the glands varies from a flattened single layered epithelium to one which is pseudostratified, containing ciliated cells. Mitotic figures are very commonly seen. They are usually areas of edema, hemorrhage, and necrosis. The stroma may or may not show hyperplasia.

Fig. 554.—Hyperplasia of the endometrium of the "Swiss cheese" type described by Novak. Note the large cystic glands scattered throughout the endometrium. Gyn. Lab.

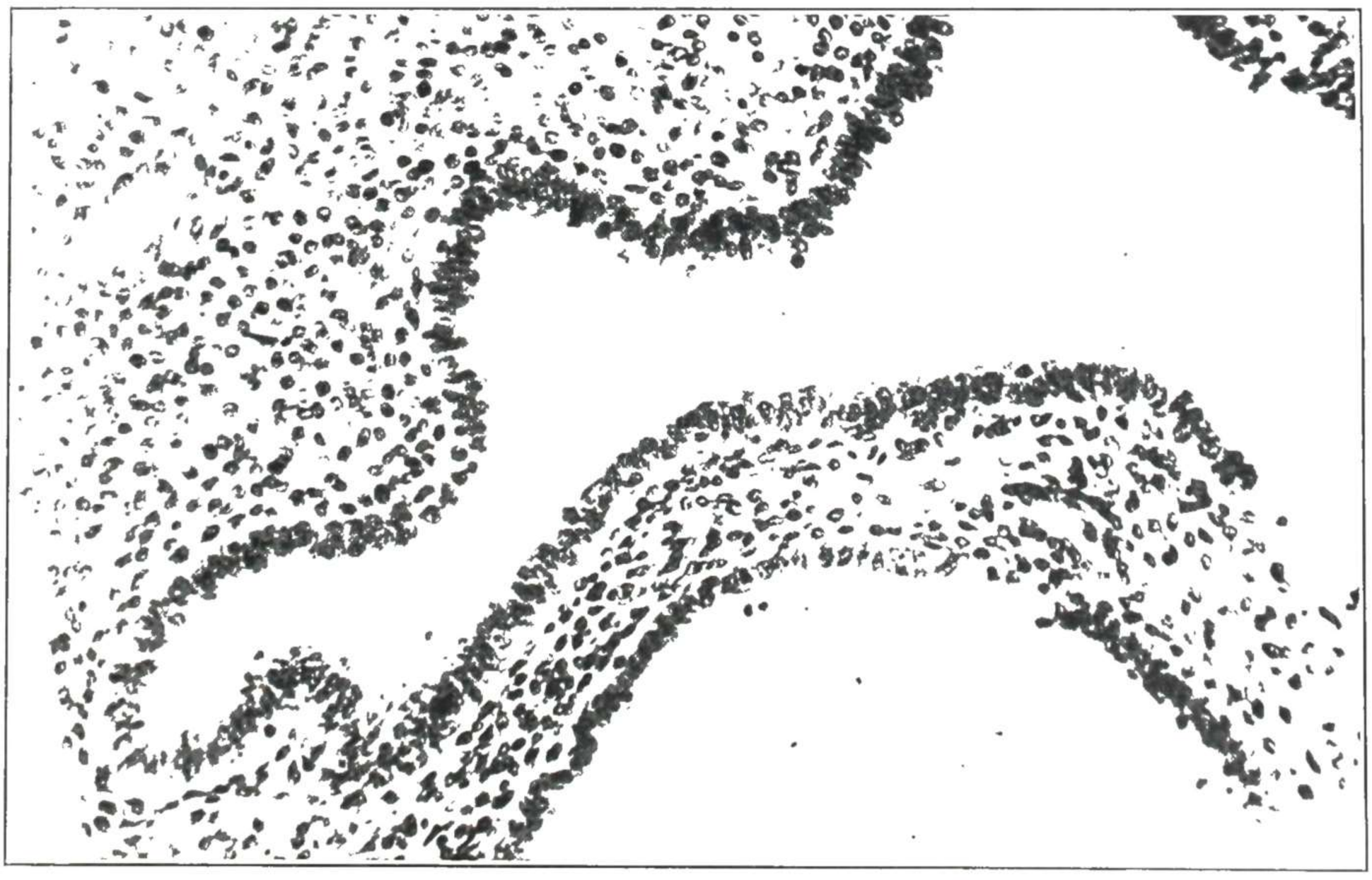


Fig. 555.—Hyperplasia of the endometrium. High power of Fig. 554 taken from an area a little to the right and above the center of the picture. Shows the character of the cells lining the endometrial glands and the surrounding stroma. Gyn. Lab.

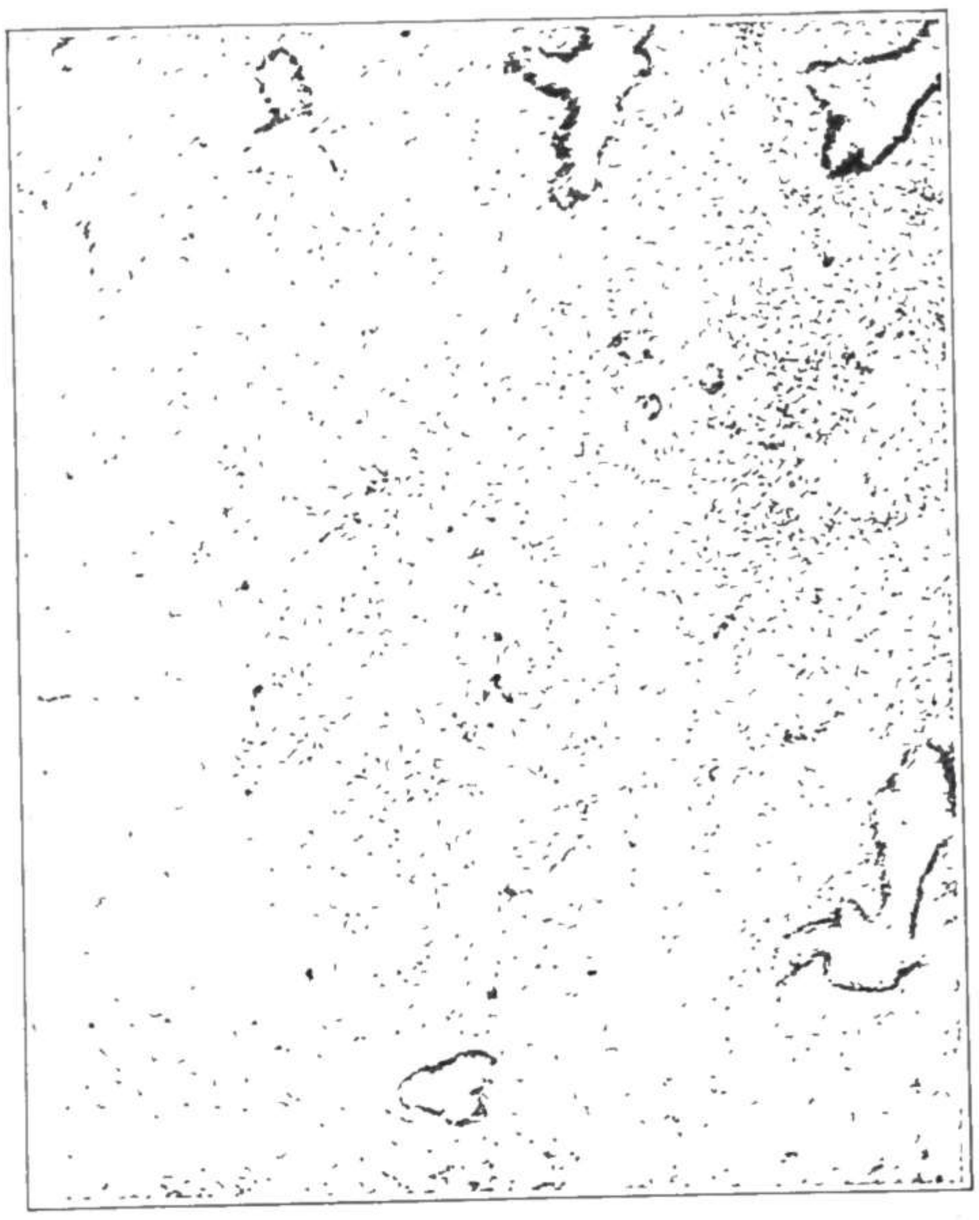


Fig. 556.

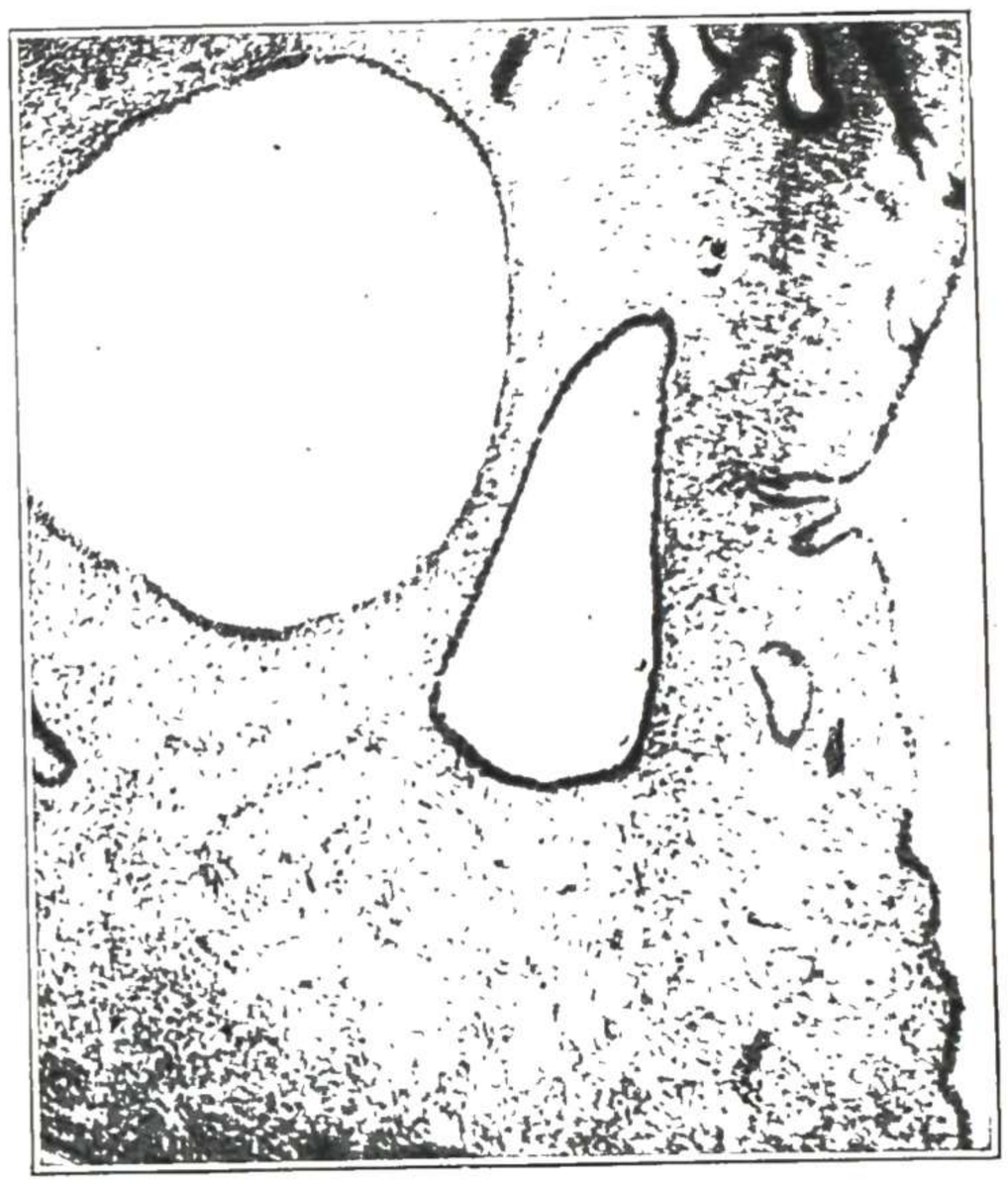


Fig. 557.

Figs. 556 and 557.—Curetting. Fig. 556, Hyperplasia of endometrium with increase in stroma.

Fig. 557.—Hyperplasia of endometrium, with cystic dilatation of glands. Gyn. Lab.

Fig. 558.

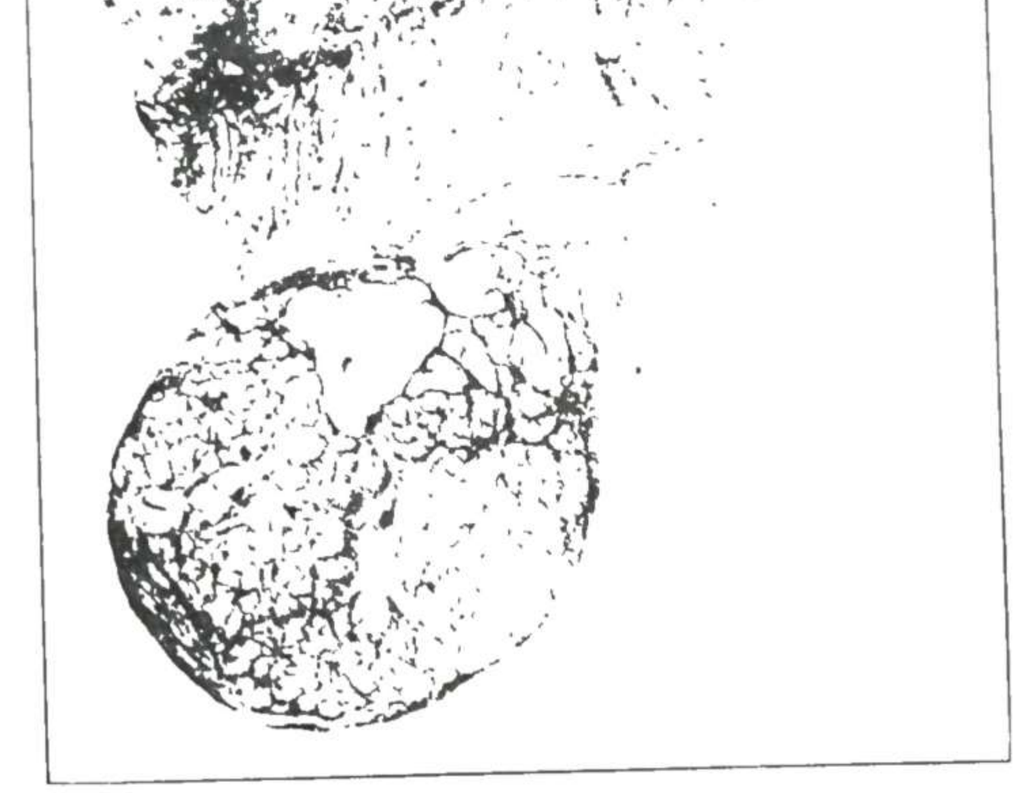


Fig. 559.

Fig. 558.—Hyperplasia of the endometrium, which has extended to polyp formation. Photograph of gross specimen. Gyn. Lab.

Fig. 559.—Photomicrograph of the specimen shown in Fig. 558. Notice that the polyp is strictly endometrial. Gyn. Lab.

In the more severe cases there is a greater variation in the size of the glands, producing the well-known "Swiss cheese" appearance described by Novak. Glands are present representing all stages of the menstrual cycle, instead of all the glands being in about the same stage. The free border of the epithelial cells lining the glands is usually clear-cut, and there is little evidence of secretion. The epithelium may be single or many layered. The necrotic areas are very noticeable in the advanced cases. This point has been stressed by Schroeder. Figs. 554 to 557 show the microscopic characteristics of different types of endometrial hyperplasia.

The fact that there is usually hyperplasia of the uterine vessels accompanying cases of endometrial hyperplasia was brought out by Schwarz and Sherman. Dr. Suntzeff and the author produced the same condition associated with a marked hyperplasia of the endometrium and endometrial polyp formation in an old monkey by prolonged estrogen administration. Bainborough, in a study of the changes in the cervix associated with hyperplasia of the endometrium, found that squamous metaplasia and carcinoma were more commonly associated with hyperplastic endometria than they were with normal endometria.

Polyps of Endometrium.—When endometrial polyps are present, there is usually associated general hyperplasia; in fact, the polyps apparently represent local exaggerations of the hyperplasia. The gross appearance and the microscopic characteristics of endometrial polyps are shown in Figs. 558 and 559. A polyp may act as a foreign body in the uterus, causing uterine contractions. If the pedicle becomes sufficiently elongated, the polyp is extruded through the external os, and can be seen on speculum examination. In such a case the pedicle may slough and the polyp be expelled spontaneously.

Occasionally a sarcoma or carcinoma of the endometrium will form a polyp which projects from the cervix and may be removed as a supposedly simple cervical polyp, hence the importance of microscopic examination of all tissue removed from the uterus, even apparently simple cervical polyps.

Symptoms and Diagnosis

Bleeding is the most common clinical disturbance from endometrial hyperplasia. In the typical cases associated with nonovulation, the bleeding loses the cyclic character dependent on ovulation and may persist for weeks at a time. Also there may be periods of amenorrhea between the spells of bleeding —that is, the absence of ovulation removes the cyclic influence which normally starts the flow as well as the influence which normally stops it.

This type of bleeding occurs principally in young persons in whom the normal endocrine cycle is not fully established or in the menopause period as the cycle is ceasing. In the active childbearing period with full establishment of ovarian-pituitary physiology, bleeding is more likely to be due to some local lesion, such as inflammation, or tumor, or local circulatory disturbance, though the local metabolic disturbances from these conditions may perhaps cause some hyperplasia.

The exact diagnosis of endometrial hyperplasia is dependent on microscopic examination of curettings, though the condition may be inferred in persistent bleeding in the young, as menstruation is being established, and in

later life as it is ceasing. The clinical differentiation of this type from other types of uterine bleeding, by symptoms and observation and medication, is taken up in detail under Menorrhagia and Metrorrhagia in Chapter 13.

Treatment

The plan of medicinal and endocrine treatment for uterine bleeding, along with differential diagnosis as treatment proceeds, is given later under functional bleeding, as just stated. If the bleeding persists in spite of other measures, then curettage is indicated.

Curettage

For Endometrial Hyperplasia, Chronic Endometritis, Uterine Bleeding, and Intrauterine Diagnosis

Attention must be called to the dangers of curettage, which is not the simple and harmless procedure many suppose. The uterine wall is easily perforated by the curette, or sound, or forceps, and the perforation may cause fatal peritonitis. Curettage may cause serious aggravation of conditions in cases of pelvic inflammation or of tubal pregnancy. In other words, uterine curettage carries the dangers incident to a surgical procedure within a vulnerable organ situated in the peritoneal cavity, and it must be used with due skill and for proper indications only. Indiscriminate curetting of the uterus has done much harm through lack of skill in technique and lack of judgment in the choice of cases.

After the patient has been prepared on the operating table and draped, it is well to make bimanual palpation and record the findings, as this deep palpation under anesthesia or analgesia may help to clear up some doubtful point as to conditions in the pelvis.

After the cervix is exposed by introduction of the retractors and grasped with tenaculum forceps, the cervical canal is cleansed with an antiseptic solution. The canal is then dilated with dressing forceps sufficiently to admit the large-bladed dilator, or with graduated dilators as preferred. When the cervix is sufficiently dilated, the endometrial cavity is swabbed with an antiseptic solution on cotton held in the uterine forceps. At the same time the depth of the uterine cavity is determined with the cotton-tipped forceps, the distance from the external os, marked with the finger, to the end of the withdrawn forceps being measured with the graduated sound. This is much safer than using the sound in the uterus, for the tip of the sound may perforate the uterine wall on very slight pressure, which serious accident has happened many times.

The dilatation of the cervix should be carried out slowly and carefully, the direction of the dilatation being changed several times, to secure gradual dilatation in all directions and prevent rupture of the cervix. The cervix should, in this manner, be dilated sufficiently to admit the medium-sized curette easily.

In certain cases in which the cervix is abnormal, it may suddenly tear at some point and the blade of the dilator will pass through the wall of the cervix into the periuterine connective tissue. To prevent this accident it is well to keep the set-screw, at the handle between the blades, set so that there can be no sudden wide separation of the dilating blades.

When sufficient dilatation of the cervix has been secured, inject into the vagina some of the citrate solution (2 per cent solution of sodium citrate, to prevent clotting on the tissue-specimens, which is troublesome in the laboratory work) so that it will be carried into the cavity with the curette. The medium-sized curette is then introduced and the soft

endometrium scraped away. The curette should be held tightly between the thumb and the fingers, in the same manner as a pen (Fig. 560). A mark on the handle indicates in which direction the cutting edge lies. The interior of the uterus should be gone over systematically, so that no part of the surface is missed. The pressure must be applied carefully. It must be firm enough to remove the softened diseased tissue, but not firm enough to remove any of the firm tissue beneath it. The fact that comparatively healthy firm tissue has been reached is indicated by the grating sensation imparted to the curette. As a rule, this is easily recognized and after some practice the uterus may be cleared out rapidly and safely. In exceptional cases, however, the wall of the uterus is diseased to a considerable extent and softened, and great care is necessary to avoid perforation of the wall.

After the surface of the cavity has been gone over carefully with the sharp curette, the débris is brought into the vagina with the curette, and then worked out of the vagina into the specimen basin by forcible injection of citrate solution with the tip of the syringe in the vaginal vault back of the cervix. The uterine cavity is then swabbed with dry cotton or gauze to gather up any loose fragments remaining. Save *all* of the curettings for microscopic examination.

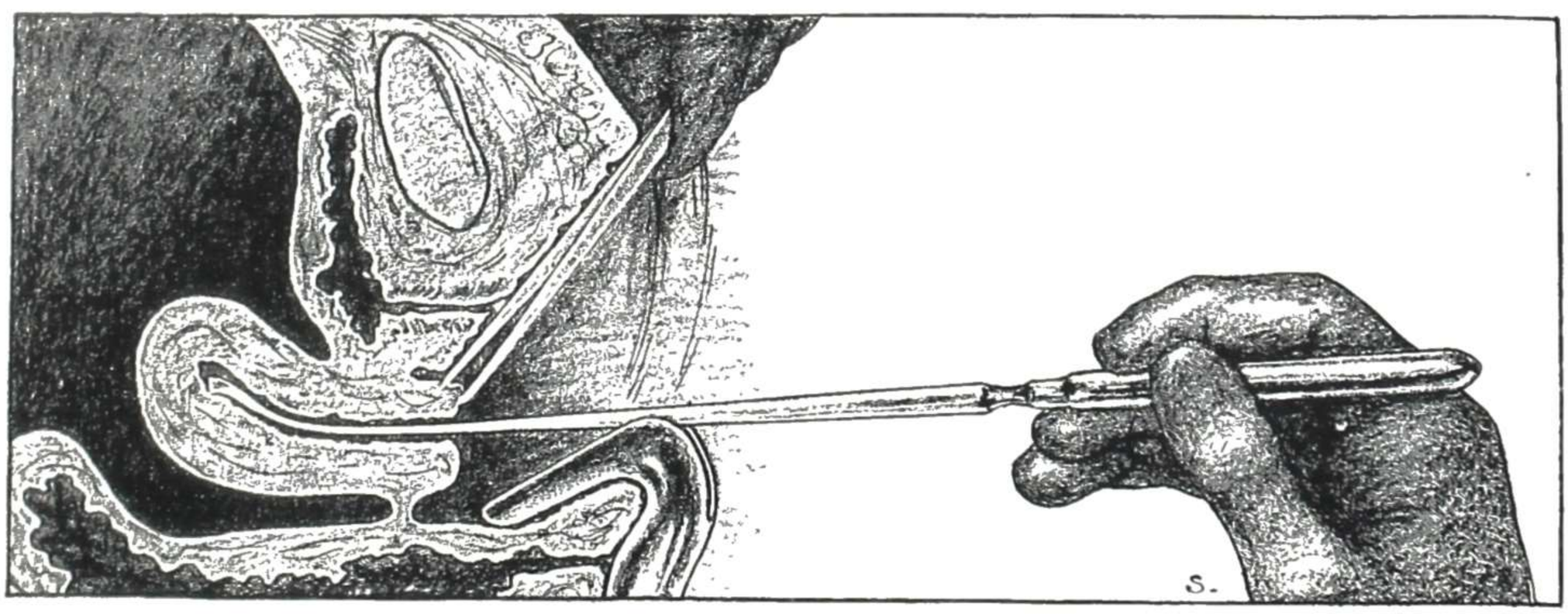


Fig. 560.—Showing the most satisfactory way of holding the curette. Grasped thus with the sensitive portions of the fingers and thumb like a pen, irregularities within the uterus may be easily appreciated and also the force used may be more delicately adjusted than when the curette is grasped with the whole hand as is the custom with some operators. In some cases a little unusual pressure will force the curette through the uterine wall into the peritoneal cavity. This accident has happened a number of times.

When the cavity is believed to be clean, it is well to introduce the uterine forceps, open widely in the cavity, rotate some, close, and remove. In this way may be caught an attached shred or a loose roll that is not brought out by the swabbing. This little maneuver has saved the embarrassment of leaving in remnants on several occasions—one time the principal part of an incomplete miscarriage.

When the endometrial cavity is clear of remnants, it is well to make an astringent and antiseptic application, to check bleeding, kill bacteria carried in from the cervix or cancer cells that may be in the cavity, and to seal lymph and blood spaces to prevent metastasis. For this purpose an application of carbolic acid (95 per cent) followed immediately by an application of alcohol has proved satisfactory; this is done in the following way: A small wisp of cotton is grasped in the tip of the uterine dressing forceps and then twisted around the tip as is done in making a swab. This is moistened with one drop of carbolic acid and then the excess is removed by squeezing it with a dry cotton ball. After drying out the uterine cavity with a dry cotton swab the uterine dressing forceps is introduced into the uterine cavity and moved

around so that the surface of the cavity is lightly cauterized by the carbolic acid. Immediately after the carbolic swab has been withdrawn, the cavity is thoroughly swabbed with a well-soaked alcohol swab. If there is persistent undue bleeding, the uterine cavity may be packed with gauze: otherwise packing is not needed.

In cases where carcinoma is suspected, a fractional curettage is indicated so that one can be sure concerning the exact origin of the cancer. This is done by curetting the cervical canal first; these curettings are kept separate from those obtained by curetting the uterine cavity.

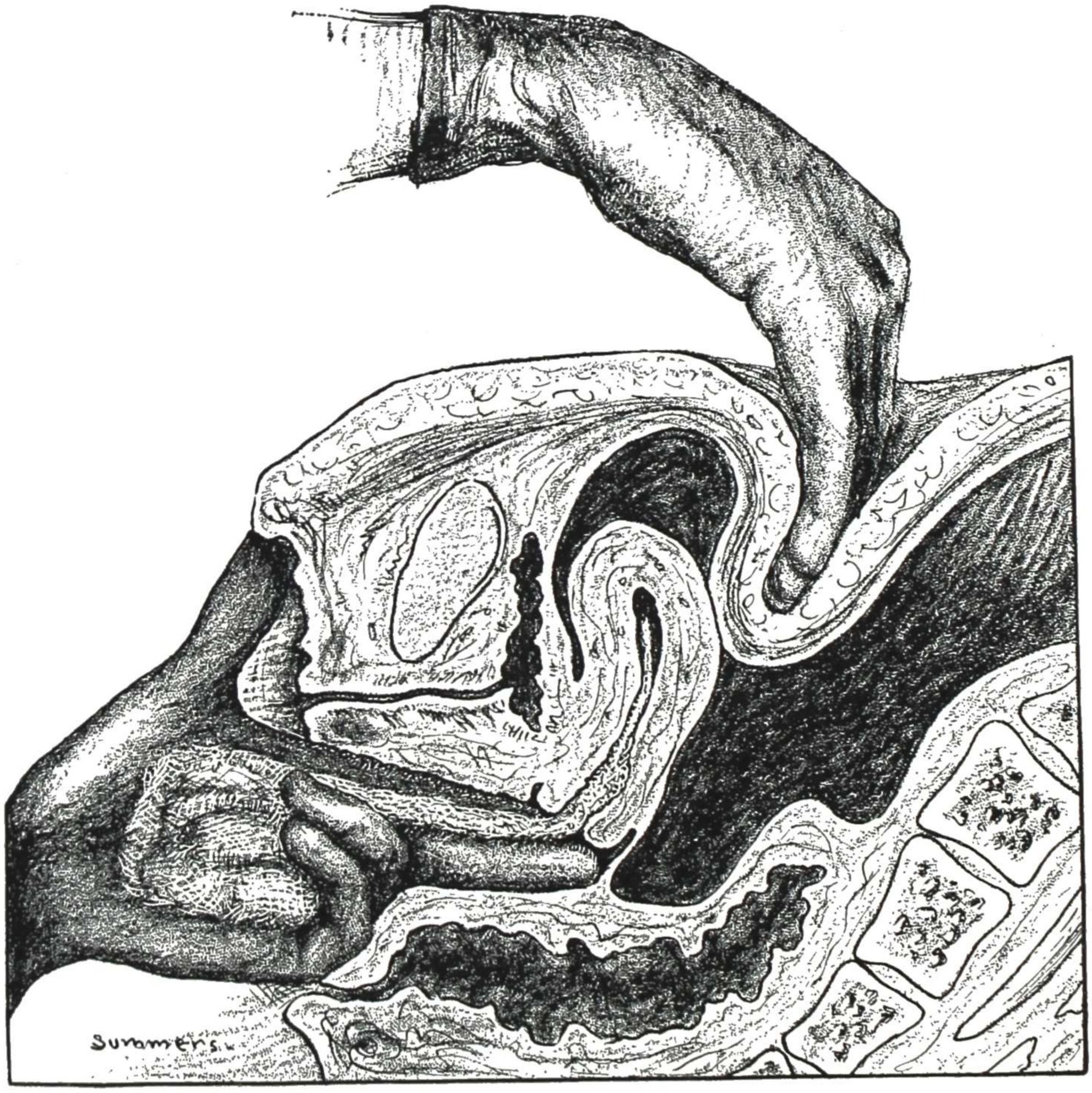


Fig. 561.—Even when an intrauterine hemorrhage-packing is necessary, the uterus may still be restored to normal position at close of operation by holding the vaginal portion of the gauze in the hand, as here shown.

When the operation is finished, cleanse the vagina, remove the speculum, introduce two fingers to the cervix and bring the fundus uteri well forward by bimanual manipulation (Fig. 561). In the curettage, the uterus is drawn downward somewhat and the fundus sometimes goes backward. Unless the uterus is brought forward into normal position at the close of the operation,

it may remain in retrodisplacement and cause trouble. If intrauterine packing is used, the vaginal portion may be held in the palm of the hand (Fig. 561) during the replacement of the uterus.

After curettage the epithelial covering of the uterine interior is quickly regenerated from the epithelium of the remnants of glands remaining, and gradually the whole endometrium is restored.

Aftercare.—The vaginal and uterine packing is removed in about twenty-four to forty-eight hours (Fig. 562), and an antiseptic vaginal douche is given once daily. The vulvar dressing is continued for a week. The patient may ordinarily get up the next day after curettage, except when there is some associated disease that would be benefited by longer rest in bed.

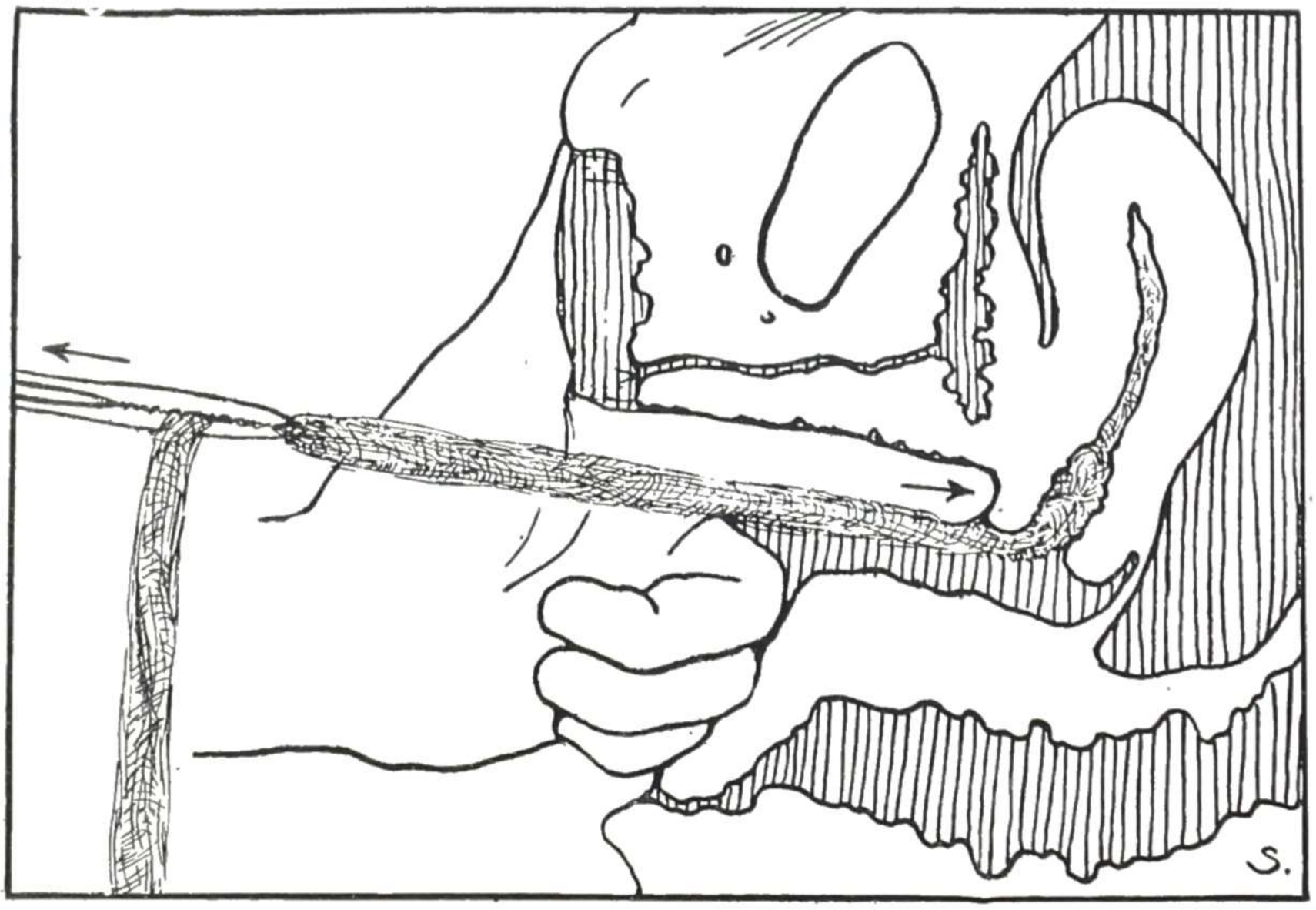


Fig. 562.—In postoperative care, when a hemorrhage-packing or other intrauterine packing is being removed from the cervix, the cervix should be held well back in the pelvis by the finger as here indicated. Otherwise the cervix will be drawn forward and the corpus uteri thrown backward into retrodisplacement.

Curettage is only one step in the treatment. After that, endocrine investigation and treatment and other measures required for the condition should be carried out. Associated pathologic conditions, such as malposition of uterus, laceration of cervix, laceration of pelvic floor and pelvic inflammation, must also be corrected as far as possible, for if allowed to continue, the uterine congestion resulting therefrom will tend to delay recovery and may result in the re-formation of a thickened bleeding endometrium.

The hormone therapy in hyperplasia and functional uterine bleeding is given in detail in Chapter 13 under functional disturbances.

The relationship of endometrial hyperplasia to carcinoma is discussed in Chapter 8 under carcinoma of the endometrium; suffice it to state here that our investigations and clinical experience have led us to feel that delayed menopause which is frequently accompanied by hyperplasia of the endometrium is an indication of endogenous estrogen production past the normal age for its reduction or cessation. The stimulation of this endogenous estrogen on the

endometrium at an age when the growth-limiting factors present in the younger person are weakened is, we feel, a very important factor in converting a hyperplasia of the endometrium into a carcinoma of the endometrium. We advise stopping the menstruation in cases of delayed menopause.

MEMBRANOUS DYSMENORRHEA

Membranous dysmenorrhea is the term applied to that form of painful menstruation accompanied by the expulsion of membrane from the uterus. The membrane is usually passed in small pieces, though occasionally it is thrown off as a complete cast of the interior of the uterus. It consists of the superficial layers of the uterine mucosa (endometrium), and is thrown off en masse as the result of nutritive changes which are not yet fully understood.

The pains come with the flow and are paroxysmal—of the same character as the pains of mechanical dysmenorrhea, but very severe, resembling labor pains. After these have continued for several hours or a day or two, pieces of the membrane are expelled. There is then relief unless other pieces pass. The membrane, mixed with the menstrual flow, is the diagnostic sign of this form of dysmenorrhea. Care must be exercised not to confound it with miscarriage. It usually recurs every month or so and may last for years.

The condition may appear at puberty or at any time during menstrual life. It is more common in sterile women; the same functional disturbance causing the membranous dysmenorrhea may be a factor in the sterility.

Etiology and Pathology

Hitschmann and Adler proved that it was not of inflammatory origin and Aschheim confirmed this, finding that the endometrium was bacteriologically sterile. Halban feels that there is an endocrinologic factor which causes premature uterine contractions with separation of the endometrium en masse at the level of the functional layer. Others have suggested that excessive progesterone is a factor.

Gross.—These specimens are usually brought in by the patient in a piece of paper or cloth all dried out. Patients who complain of passing tissue with each period should be instructed to place the tissue in a bottle of 10 per cent formalin immediately after it is passed.

The membrane as a whole does not stain as clearly as it does in uteri removed at operation or in curettage specimens. There is marked decidual reaction in the stroma, as a rule, and this is easily mistaken for an early abortion. The presence of trophoblasts and chorionic villi is the decisive point in the differentiation of these two conditions. The differentiation from ectopic pregnancy is very difficult and usually has to be made from the history and clinical examination. Fig. 563 shows the microscopic characteristics of the expelled membrane. Fig. 564 shows a remarkable membranous cast which not only outlines the endometrial and cervical cavities but has portions also from the tubal cavities.

Diagnosis

Membranous dysmenorrhea must be distinguished from early abortion and extrauterine pregnancy, in both of which conditions there may be bloody dis-

charge, with much pain and the passage of shreds of membrane. If this happens to take place near the menstrual time, the patient naturally supposes it is simply a menstruation somewhat delayed. In membranous dysmenorrhea there is usually a history of the expulsion of membrane at several menstrual periods, whereas with abortion there is the history of a missed menstruation

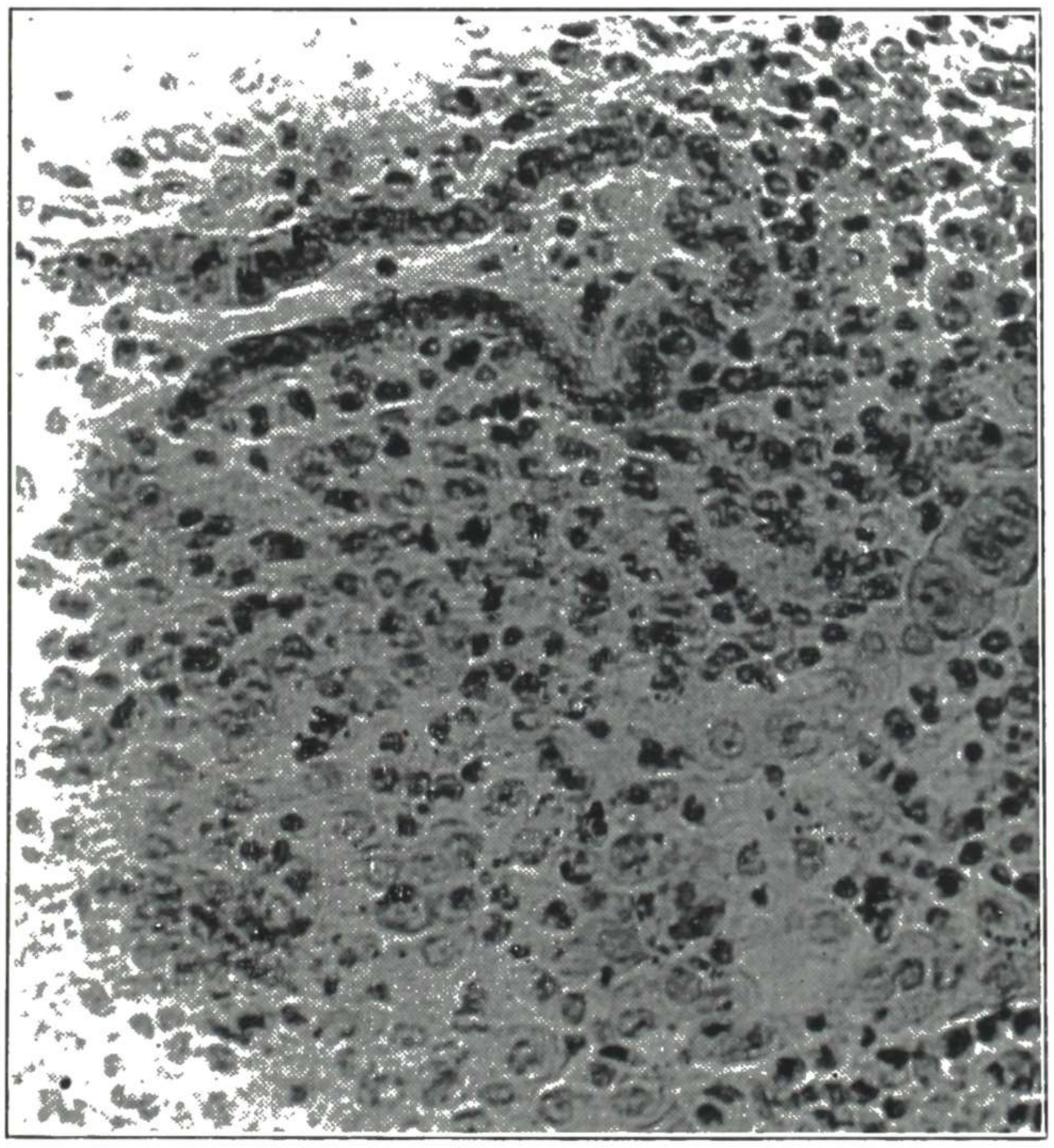


Fig. 563.—Membranous dysmenorrhea. Note the gland in the upper left corner showing beginning disintegration and the ghostlike remains of a gland in the right lower portion of the figure, with its edematous lining cells. Gyn. Lab.

Fig. 564.—Photograph of a remarkable specimen consisting of a membranous cast of the endometrial cavity with cervical and tubal extensions. (The constriction at the upper part of the endometrial portion was produced by string used in mounting.) (From Williams: Am. J. Obst. & Gynec.)

and of morning sickness. Also the blood clots are much more numerous in abortion, and with the membrane can usually be found a small sac and embryo. The bleeding from abortion persists indefinitely until the uterus is emptied, whereas in membranous dysmenorrhea it lasts only about the usual menstrual time. Microscopic examination of an expelled membrane or of shreds removed by curettage in abortion shows chorionic villi. In extrauterine pregnancy there is no previous history of membranous dysmenorrhea and the patient, previously regular, has now gone overtime for one or more weeks. The pain is due to intraperitoneal bleeding, of which it presents the characteristics.

Treatment

The treatment is symptomatic for the pain, and otherwise is largely for complicating or associated conditions. As to curative treatment directed to overcoming the local disturbance of metabolism, endocrine and general nutritional measures are to be considered. Curettage may assist by improving the local nutrition and by overcoming any cervical stenosis which aggravates the painful expulsive uterine contractions.

Some years ago, Lawrence called attention to its frequent association with tubal inflammation, and reported 42 cases of membranous dysmenorrhea in which there was present tubal or ovarian disease requiring operation. In 19 cases the disease was unilateral and in the remaining ones bilateral. In 33 of the 42 cases the trouble appeared, from the history, to have started from an attack of scarlatina, measles, mumps, rheumatism, or smallpox. In nearly all (the report is not definite) there was no further membranous dysmenorrhea after the removal of the pelvic disease. He concludes that membranous dysmenorrhea is due to trophic changes in the endometrium secondary to adnexal disease, and that this adnexal disease is usually a sequela of one of the exanthemas occurring near puberty. He concludes also that the adnexal disease is usually unilateral at first and may be prevented from extending to the other side by prompt attention. As a result of these conclusions, he holds (a) that tubal and ovarian complications occurring with the exanthemas near puberty should be watched for and treated, (b) that in every case of membranous dysmenorrhea a careful history should be obtained with that point in view, (c) that when unilateral adnexal disease is found, prompt operation should be carried out to prevent the trouble becoming bilateral.

ACUTE ENDOMETRITIS (NONPUERPERAL)

Etiology and Pathology

Nonpuerperal acute metritis is usually due to infection with the gonococcus, as ordinarily this is the only germ that will, on mere contact, implant itself and grow and spread upward in the nonpuerperal genital tract. Gonorrhea involves the cervix in a large proportion of the cases of vaginal gonorrhea. Its extension upward from the cervix to the endometrium may be spontaneous or induced. Spontaneous extension upward may take place immediately following the infection of the cervical mucosa, or the inflammation may remain limited to the cervix for weeks and months, with the possibility of the extension upward at any time. During or immediately following the menstrual flow is the favorite time for the progress upward of the gonococci.

Infection of the endometrium with other inflammatory bacteria (staphylococcus, streptococcus, colon bacillus, etc.) is usually due to sounding the uterus or other intrauterine instrumentation, the germs being carried in from

outside the body or from the vagina or from the cervical canal. Endometritis so caused was rather frequent formerly when the uterine sound was passed by touch, but not so now, since the uterus is not so often sounded, and when it is sounded care is taken to do the sounding in an aseptic way.

While extension upward of ordinary bacteria without the intervention of pregnancy or instrumentation is a rare occurrence in the period of functional activity and normal tissue resistance, it occurs more frequently before puberty and after the menopause. Several cases of fatal peritonitis in children from extension upward of streptococci have been reported.

Symptoms and Diagnosis

In the gonorrheal cases, after the vaginitis or cervicitis has continued a few days or several weeks, as the case may be, the patient complains of "cramps" in the lower abdomen and of soreness in the pelvis when walking, and of increased vaginal discharge. Sometimes the pain is quite severe and occasionally the patient is confined to bed for a few days. There may be moderate fever (101° to 102° F.), but the fever is rarely marked as in puerperal endometritis. By close questioning, we can usually obtain a history of symptoms indicating gonorrhea within the last few weeks or months.

If there is any discharge from the cervix or urethra or vulvovaginal glands, spread preparations are made on slides, which can later be stained and examined for the gonococcus. In the form due to ordinary pus bacteria, the symptoms are about the same, with a history of preceding labor or miscarriage or intrauterine instrumentation.

Digital and bimanual examination show that the body of the uterus is tender on pressure. If the disease is still limited to the uterus, there will be no decided tenderness outside the organ. If the trouble has extended to the adnexa, there will be marked tenderness and perhaps a mass about the tube involved. Through the speculum, the mucopurulent discharge may be seen coming from the cervix.

Treatment

The patient should be put to bed, if not there already, and kept at rest until all acute symptoms subside, with the hope of checking the process before it extends to the tubes. Prompt antibiotic therapy, as outlined under Gonorrhea, gives the best chance of stopping the process. Local heat or cold application may relieve local pain, or a mild sedative may be required. Lactic acid douches and tablets to restore normal vaginal pH, as detailed under Vaginitis in Chapter 3, will remove the purulent discharge and minimize vaginal irritation.

PUERPERAL ENDOMETRITIS

Though this is an obstetrical problem, the gynecologist is frequently called in consultation; hence a brief summary will be given.

Since the work of Schottmüller, it is now generally recognized that the large majority of cases of puerperal sepsis are caused by anaerobic streptococci which the patient harbors in her vagina. This work has been confirmed by Schwarz and Brown and others.

Through the work of T. K. Brown this infection has almost been eliminated on the service at Washington University Medical School by the use of vaginal instillations of a solution of 1 per cent acriflavine in glycerin, during labor. The treatment which was worked out by Schwarz and Brown consists of removal of infected tissue from the uterus with a sponge forceps and, following this, with an intrauterine douche of 1:2,000 potassium permanganate plus 50 c.c. of normal sulfuric acid solution, at a temperature of 110° F. In the preantibiotic days the results of this therapy were a little short of miraculous. Prior to the use of the intrauterine douche the patients were critically ill, sometimes for weeks; after its use was started, the average hospital stay was under a week and the temperature usually fell to normal in a few days.

Antibiotics are recommended by some workers during labor for prevention of infection. When the patient is definitely infected, antibiotics should be used in large doses.

CHRONIC ENDOMETRITIS

Chronic endometritis is inflammation of the endometrium due to bacterial invasion. It is not nearly as common as was formerly supposed, when the term was used to cover most of the pathologic conditions of the endometrium and some of the physiologic. Bacteriologic investigations have shown that it is comparatively infrequent. This relative immunity of the endometrium to chronic inflammation has been ascribed to the fact that it is regularly desquamated at periods, thus tending to cast off any infective agent present. When present it is usually associated with chronic inflammation of the cervix or tubes, due to the original infection.

Pathology

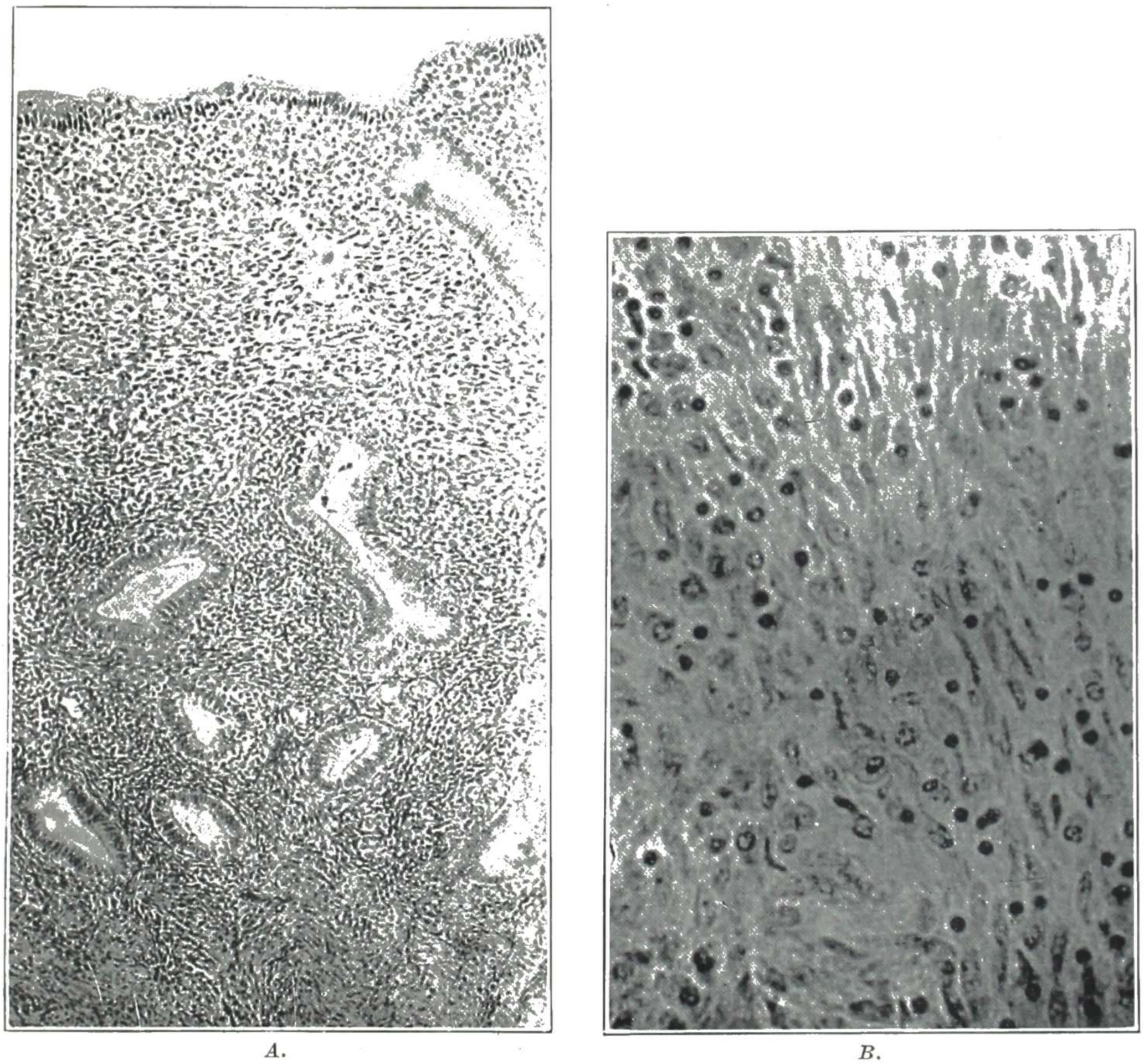
The microscopic details of chronic endometritis are shown in Fig. 565, the distinguishing feature being the extensive round-cell infiltration composed chiefly of plasma cells. The plasma cells indicate chronic inflammation, and they are identified by the fragmented nucleus eccentrically placed, shown to some extent in Fig. 565, *B* but shown better (higher magnification) in a section from a tube (Fig. 761). The gross characteristics are shown in Fig. 566.

CHRONIC METRITIS

Prior to the oustanding work of Fletcher Shaw a blanket term of fibrosis uteri was applied to benign diffuse enlargement of the uterus. He described three distinct lesions: chronic metritis, subinvolution, and hypertrophy. This was confirmed by Schwarz in an intensive study of the material in our gynecologic pathology laboratory at Washington University.

Chronic metritis comprises 15 per cent of the cases of benign enlargement of the uterus, subinvolution about 80 per cent, and hypertrophy the remaining 5 per cent or less.

As mentioned in the early part of this chapter, Taylor has recently attempted again to lump benign enlargements of the uterus under a single symptom complex which he has named the congestion-fibrosis syndrome. Schwarz in commenting on Taylor's article states that there is need for more detailed study of the microscopic pathology of the uteri in the series presented by Taylor before it is possible to evaluate the opposed viewpoints.



A. *B.*

Fig. 565.—Chronic endometritis. *A*, Notice the foci of round cell infiltration. The glands are practically normal—none of the dilatation and bizarre shapes seen in hyperplasia. *B*, High power of one of the foci in *A*. The infiltration is composed chiefly of small round cells and plasma cells. The plasma cells are seen as rather large cells with a more or less fragmented nucleus eccentrically placed. The characteristic details of plasma cells are better shown in Fig. 761. Gyn. Lab.

Fig. 566.—Chronic metritis. Thickness of entire wall 20 mm. (myometrium 18 mm., endometrium 2 mm.). The thickening is moderate but is due entirely to round cell infiltration and increased fibrous tissue. Gyn. Lab. (From Schwarz: Am. J. Obst.)

Symptoms and Diagnosis

The patient comes complaining of a vaginal discharge (leukorrhea) which she has had for several months or years. This may be free and troublesome or very slight, and it may be the only symptom. Usually, however, there are menstrual disturbances—painful menstruation, increased menstrual flow, and irregular menstruation. The menses may last a week or ten days, and bleeding between times may appear. Hemorrhage is especially marked when there is an associated hyperplasia or polypoid condition of the endometrium.

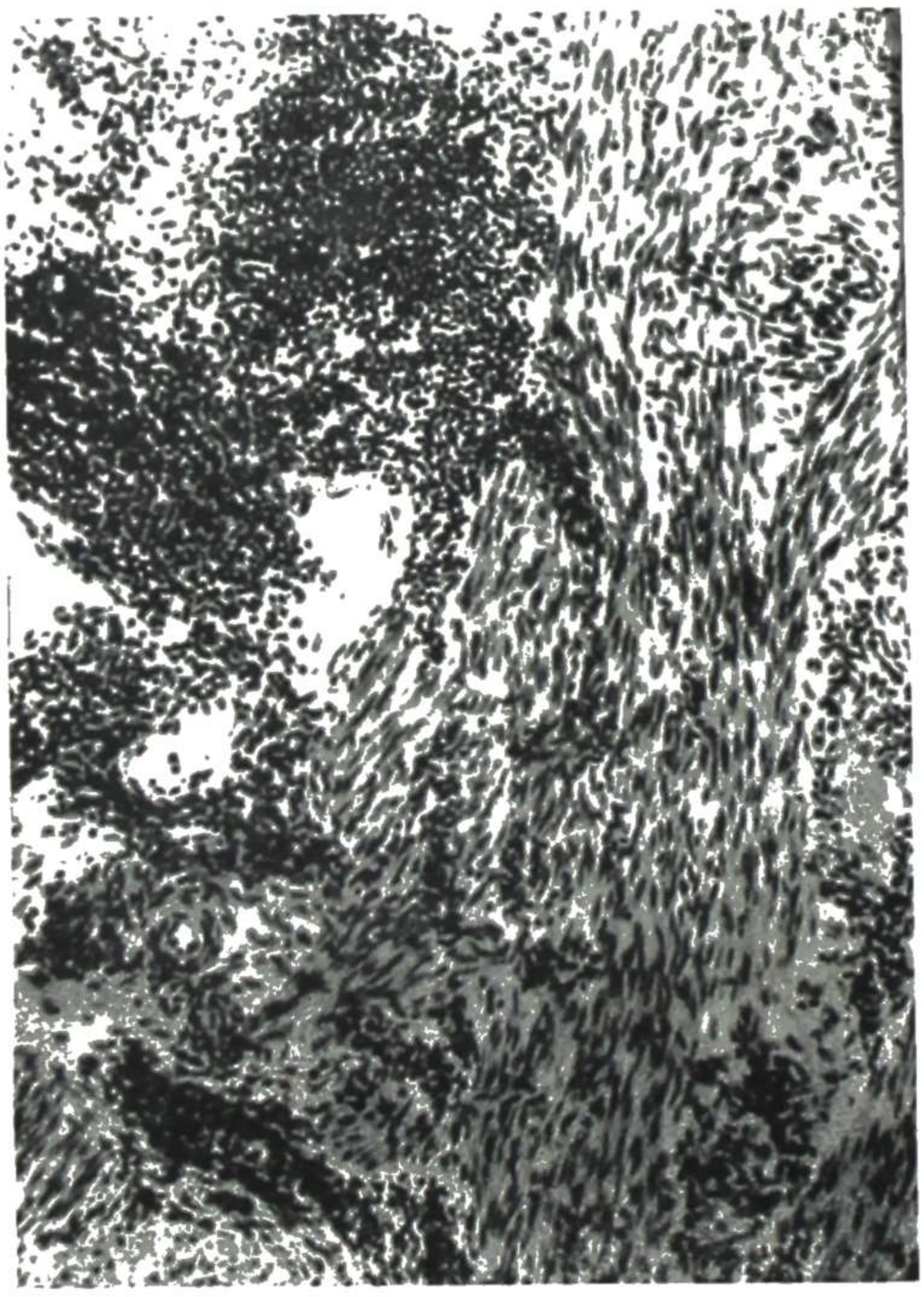


Fig. 567.

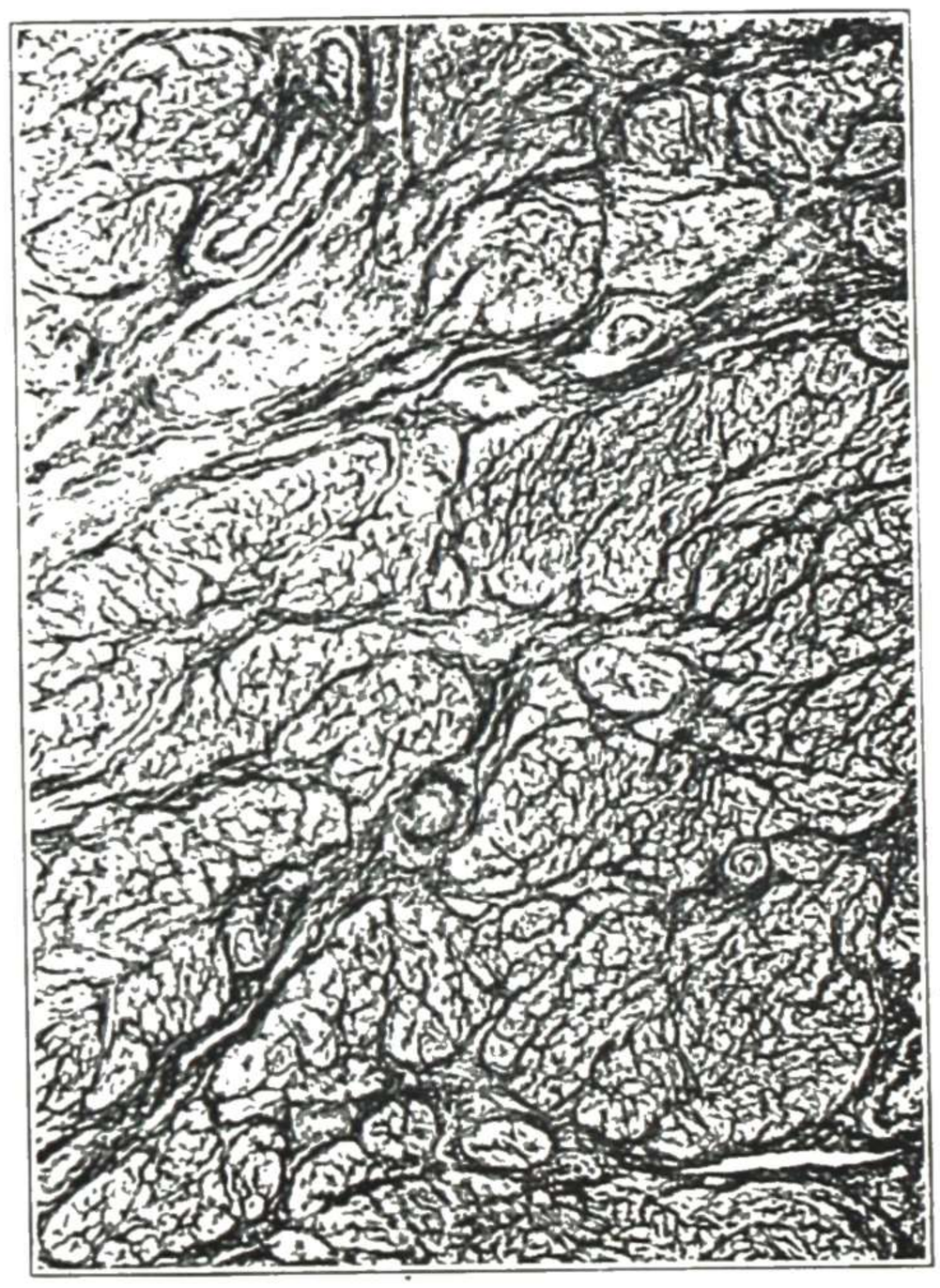


Fig. 568.

Fig. 567.—Chronic metritis. (Hematoxylin and eosin.) A marked infiltration of inflammatory cells throughout the myometrium. These are chiefly small round cells though one sees a sprinkling of plasma cells. In long-standing cases the plasma cells become less prominent. This condition is almost always secondary and results after general pelvic endometritis, and endometritis associated with salpingitis; in other words, it is usually a part of a general picture. (From Schwarz: Am. J. Obst. & Gynec., April, 1951.)

Fig. 568.—Chronic metritis. Orcein van Gieson. The black material is the markedly increased connective tissue. In the section it appears bright red against the yellow background of smooth muscle. Note how the connective is working its way between small muscle strands. In some sections this is so striking that the muscle strands actually appear to be choked off. Gyn. Lab.

On the other hand, if the metritis has advanced to the stage of shrinking from scar-tissue formation in the wall, the menstrual flow may be scanty and painful and bimanual examination shows a small sclerotic hypersensitive uterus, the so-called "irritable uterus."

Pathology

Since the specimens of these conditions appearing in our previous editions were described by Dr. Otto Schwarz, I shall use the descriptions from his recent article on the subject.

"The uterus is only moderately enlarged. The cut surface is smooth, and the silvery strands against the duller muscle tissue indicate increased fibrous tissue. With special staining this can readily be brought out. Normally the upper uterine wall has a ratio of muscle tissue to fibrous tissue approximately as 80 is to 20. In marked cases of chronic metritis this can almost be reversed. Histologically, one sees a diffusion of small round cells and plasma cells throughout the wall. [Fig. 567.] The increase in fibrous tissue can be readily seen by the marked increase in red staining material with Van Gieson stain indicating fibrous tissue." [Fig. 568.]

Treatment

Vigorous endocrine treatment may relieve the subjective disturbances some, though not much organic change can be expected in a sclerotic uterus. Otherwise treatment is symptomatic. If there is discharge and excessive menstrual flow in spite of medication, curettage may be indicated as a therapeutic measure, and it may be required before that as a diagnostic measure to exclude cancer. When, in spite of other measures, there continues a persistently hypersensitive and disabling uterus, hysterectomy may be required to give relief.

SUBINVOLUTION OF UTERUS

Subinvolution is the term applied to that condition of the uterus found in cases in which, after labor or abortion, it fails to return to its normal size. It remains large and heavy, and its walls are greatly thickened (Figs. 569 and 570).

Etiology

As mentioned at the beginning of this chapter, there is a group of organic disorders of the uterus which has occasioned considerable difficulty in classification because not due to the commonly recognized causes of structural change, such as infection, traumatism, tumor formation, or developmental defect.

On consideration it is evident that each of these disorders is due to some marked disturbance in the local metabolism—so marked as to produce structural change. This furnishes a basis for group designation, and also indicates the direction in which to look for the underlying etiologic factor. The article by Taylor mentioned above gives the best summary of the possible etiologic factors. This group includes subinvolution of the uterus, hyperinvolution of the uterus, hyperplasia of the endometrium, and hypertrophy of the myometrium.

Subinvolution is due to some interference with the retrograde changes that normally follow labor. These retrograde changes that normally take place consist of atrophy of the muscular and connective tissue. Fatty degeneration, which was formerly supposed to occupy such a prominent place in the process, has been found to be a subordinate feature. The retrograde changes may be interfered with by anything that prevents proper contraction and retraction of the uterus or that causes chronic congestion.

A uterus which becomes infected after labor does not return to its normal size unless the infection is overcome. Retained membranes or placental remnants also interfere with the process of involution, even without infection. General diseases, producing an impoverished condition of the blood may,

following labor, so interfere with the nutrition of the uterus as to cause subinvolution. Retrodisplacement of the uterus after labor or abortion is a factor in subinvolution, which is favored by anything which interferes with the circulation or the metabolic processes by which waste products are removed and

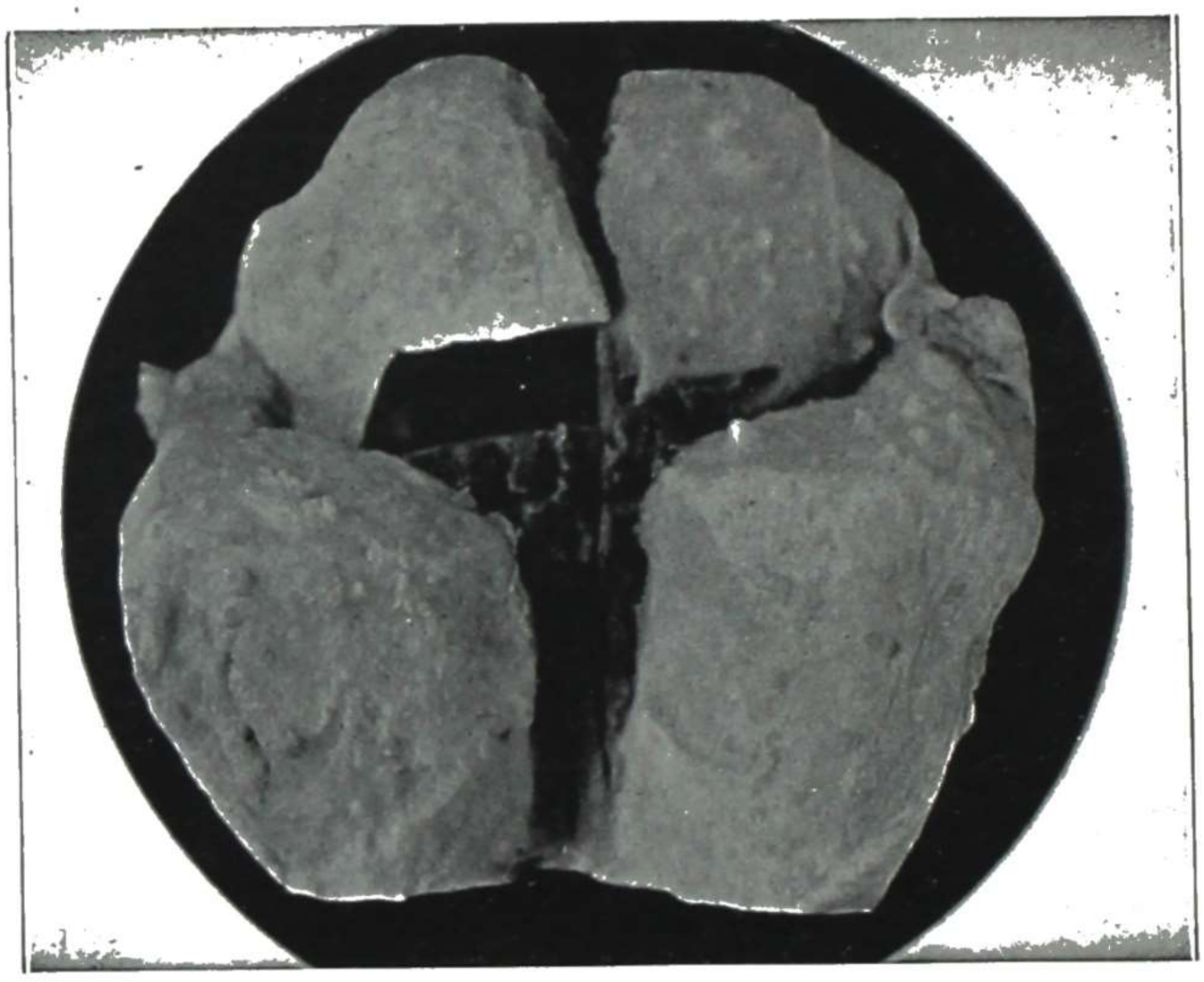
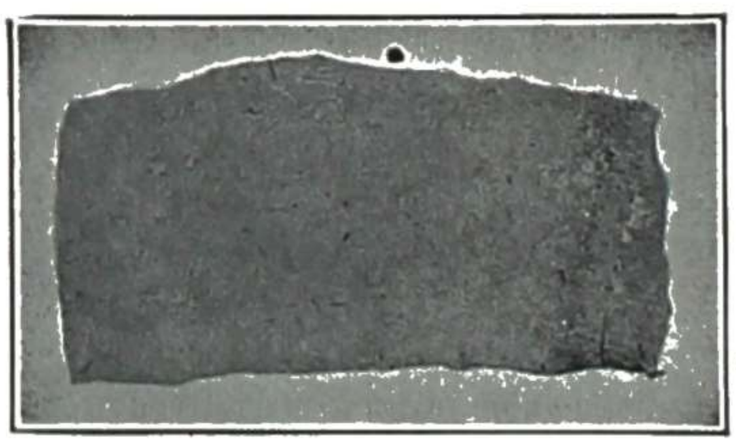


Fig. 569.—Subinvolution of the uterus. Gross specimen, showing marked thickening of the uterine wall and numerous large thickened projecting vessels. Gyn. Lab. (From Schwarz: Am. J. Obst.)

A.



B.

Fig. 570.—Uterine wall from a case of chronic subinvolution (*A*) contrasted in thickness with a normal wall (*B*), both being magnified to about the same extent. In this case of subinvolution the uterine wall was 40 mm. thick (myometrium 31 mm., endometrium 9 mm.). The thickness of the wall is due chiefly to subinvolution abnormalities of vessels and muscle and connective tissue. Gyn. Lab.

nutriment supplied to the elements of the uterine wall. The uterine-contraction stimulus furnished by nursing is probably a factor in normal involution, and its absence a factor in subinvolution.

Symptoms and Diagnosis

The symptoms of subinvolution are simply a sense of weight and pressure and weakness in the pelvis, with menstrual disturbances (usually increased flow). As a rule, the most prominent symptoms are those due to complications, such as hyperplastic endometrium, cervicitis, or retrodisplacement. In practically all cases of infection following labor or abortion there is more or less subinvolution.

The enlarged uterus is usually found low in the pelvis and not particularly tender, unless there is a complicating metritis. The uterus may be retroverted, and there is often laceration of the pelvic floor. The history connects the trouble with a previous labor or miscarriage.

Pathology

Subinvolution is, at best, a relative term, for every parous uterus shows some evidence of "subinvolution." There is never a complete restitution to the virginal uterus. With succeeding pregnancies there is an increasing amount of connective tissue deposited, while the blood vessels seldom regress to their former condition. The changes occurring in normal and abnormal involution were described in a masterful monograph by Goodall in 1910.

Grossly the uterus is enlarged 25 to 100 per cent. On cut surface the old subinvoluted vessels appear as small projections. The following description of the microscopic findings is from Schwarz's article:

"Pathology of Chronic Subinvolution: Grossly the uterus is usually definitely enlarged from a 25% enlargement to 100%, the uterus sometimes being twice the normal size. On cut surface there appear small projections. These are the old subinvoluted vessels.

"Using Orcein Van Gieson stain the arteries of the inner third are seen either with complete brownish collars surrounding them or as large tags of the same staining material which represent the whole unabsorbed old artery or its remnants. [Fig. 571.] The picture of the vein is that the wall per se is thickened, this dead tissue appearing in the walls, but more especially in the periphery of the vein and infiltrated into the interstitial spaces immediately adjacent. This dead confluent material as in case of the artery stains a deep brown color with Orcein Van Gieson stain. This same dead material with similar staining properties appears in the interstitial spaces in the outer third of the uterus. These spaces contain fibrous tissue and a considerable amount of elastic tissue. [Figs. 572 and 573.] During pregnancy, they increase in amount; in other words hypertrophy, and during involution much of this tissue is absorbed. As in the case of the artery and the vein, if absorption does not take place to any great degree, the dead tissue remains permanently and stains similarly."

Prophylaxis of Subinvolution

Subinvolution is one of those diseases which may, in a measure, be anticipated and often prevented. The measures to be employed in the puerperium to avoid subinvolution are as follows:

1. Prevent infection following labor or abortion by careful attention to asepsis.
2. See that the uterus is emptied of placental remnants and membranes.
3. Repair all lacerations of the pelvic floor. Unrepaired lacerations of the cervix also favor infection and subinvolution.
4. Keep the uterus fairly well contracted. If it shows a tendency to remain unduly relaxed during the puerperium, tone it up by proper medication.

Fig. 571.—Chronic subinvolution. Artery, inner third, orcein van Gieson stain. Note the black collars around the sharp new vessel with a fine internal elastic membrane. The black material stains actually brownish black, and consists of degenerated material of the old vessel wall, muscle tissue, connective tissue, and elastic tissue. In its unabsorbed state this dead material peculiarly stains as elastic tissue, the same sort of material being seen around the veins, in between the muscle bundles of the outer third. Background, light stains, yellow muscle tissue, no increase in connective tissue which would be present in black stain.

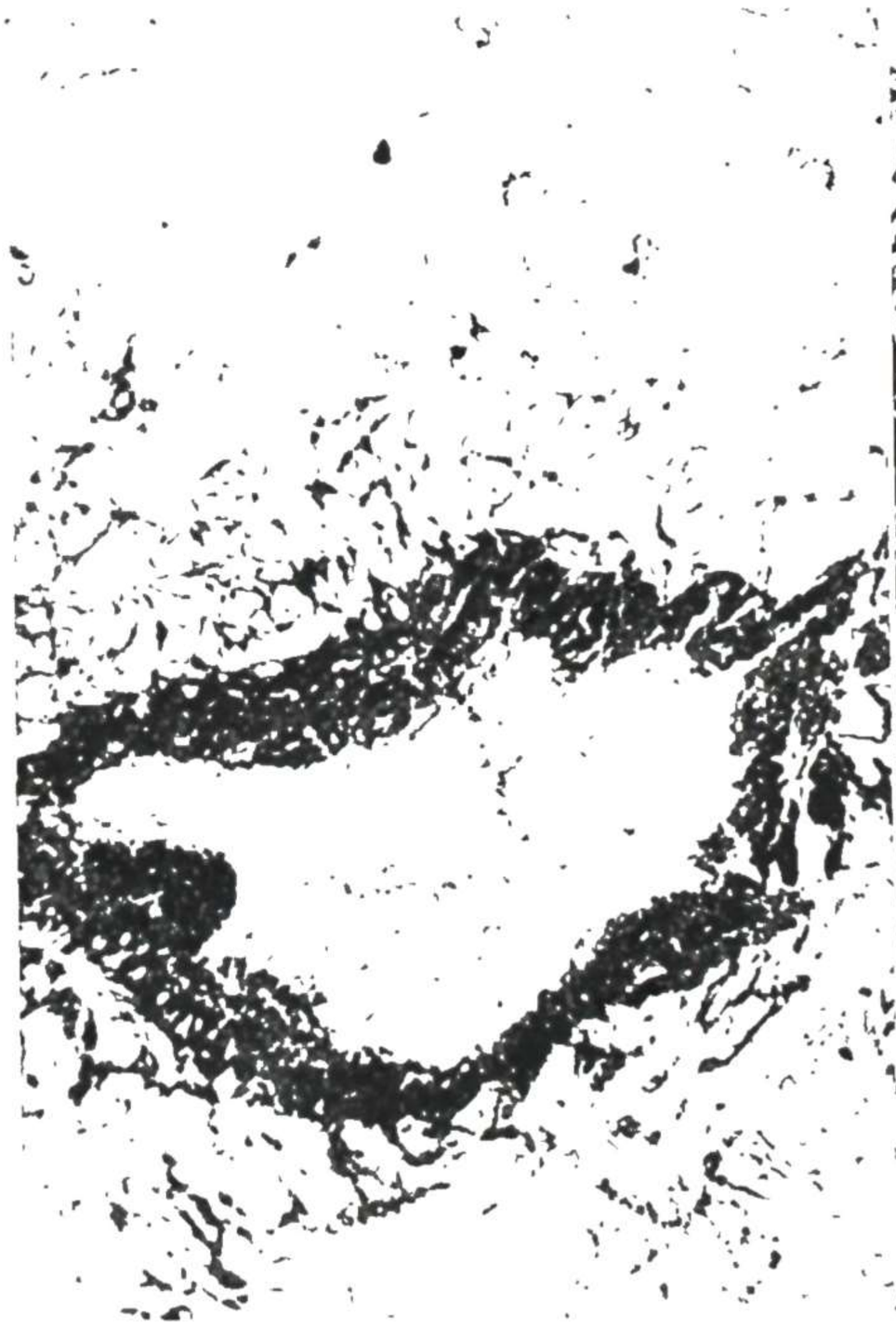


Fig. 572.

Fig. 573.

Fig. 572.—Chronic subinvolution. Vein, middle third, showing elastic tissuelike material, that is, it stains as elastic but is the same sort of dead material as in the artery. When the vein and the artery in Fig. 573 reach this stage, the material is there permanently and does not absorb later.

Fig. 573.—Chronic subinvolution. Peritoneal surface, interstitial spaces. Orcein van Gieson stain. Dark brown-black material is degenerated material unabsorbed during involution. If it were connective tissue, it would also be black in the picture, but in the stained slide connective tissue is pictured. (From Schwarz: Am. J. Obst. & Gynec., April, 1951.)

5. Prevent retrodisplacement of the heavy puerperal uterus and improve its circulation by the routine use of the knee-chest posture at the proper time in postpartum care. Krebs, in a series of over a thousand postpartum cases in which a Findley pessary was placed to hold the uterus in the forward position during involution, found that the incidence of subinvolution was much less than it was in a control series.

6. Lessen pelvic congestion by overcoming constipation, removing any irritating discharge with douches, prescribing periods of rest during convalescence, and continuing the knee-chest posture as long as there is any tendency to retrodisplacement.

Treatment

The principal disturbances accompanying subinvolution come from the associated diseases; consequently the treatment is directed largely to the associated conditions. The following measures tend to tone up and improve the condition of the uterine wall:

1. Improve local tissue nutrition and circulation by building up general health with vitamins, endocrines, and other indicated medication.

2. Curettage is the most effective local measure for influencing the circulation and nutrition of the uterine wall. Curettage should be followed by the other remedial measures, such as douches, laxatives, uterine astringents internally, and local measures indicated. Treatment for cervicitis, restoration of pelvic floor support or operation for uterine prolapse or retrodisplacement may be required.

HYPERINVOLUTION OF UTERUS

A rare syndrome of hyperinvolution of the uterus and ovaries associated with persistent lactation was first reported by Chiari et al., and Frommel in 1882 gave a detailed description of the syndrome. In the current literature the condition bears the name Chiari-Frommel syndrome.

Hyperinvolution is a very rare condition in which the process of involution following labor does not stop at the normal limit, but continues until the uterus is much reduced in size. The uterus sometimes becomes so small as to measure only an inch in depth. The cause of this trouble is deficient ovarian function. Obviously the condition in its more aggravated form is associated with amenorrhea.

Some years ago Dr. H. S. Crossen saw an interesting case of hyperinvolution of the uterus and adnexa. The patient was thirty years of age. Three years previously she had had a severe infection following the birth of her child, and there had been no menstruation since. Pelvic examination showed the uterus to be very small. On account of other trouble it was necessary to open the abdomen, and thus the opportunity was given of inspecting the internal genital organs. All of them were atrophic—the ovaries, uterus, tubes, and round ligaments. The uterus was about half normal size.

Treatment.—The hope of improvement lies in endocrine treatment. The striking results obtained with judicious use of endocrines in underdeveloped uteri encourage the trial of such treatment for uteri which have receded from

a former functioning condition. Kaufmann and also Clauberg have shown that an atrophic uterus may sometimes return to normal size under the use of estrogenic hormones. Mendel reported a case in which the milk in the breast disappeared, the menses started, and the uterus returned to normal size on administration of stilbestrol, 5 mg. twice daily for five days out of the month. These results were obtained within a period of three months.

HYPERTROPHY OF MYOMETRIUM

This condition consists of a uniform hyperplasia of the myometrium. The muscle fibers as well as the fibrous tissue take part in the hyperplasia. The diagnosis can be made only in uteri where previous inflammation and pregnancy can be excluded. There is no inflammation or subinvolution. There may or may not be an accompanying hyperplasia of the endometrium. The work of Kaufmann and of Clauberg, previously referred to, showing that atrophic uteri can be made to return to normal size by use of the estrogenic hormones, would point to an excess of estrogen as one of the factors in hypertrophy.

Fig. 574.—Hypertrophy of myometrium. Gross specimen from a nullipara, aged forty-one years. The endometrium is only 3 mm. in thickness and shows moderate hyperplasia. The myometrium is 19 mm. thick and the increased thickness is due entirely to hypertrophy of the muscle and connective tissues. Gyn. Lab. (From Schwarz: Am. J. Obst.)

The muscle fibers are the same as those found in a normal uterus with the exception that they are longer and a little larger. The vessels are numerous but contain none of the degenerated elastic material characteristic of subinvolution. A gross specimen of this rare condition is shown in Fig. 574, and the microscopic characteristics are shown in Figs. 575 and 576. Schwarz gives the following description:

"This lesion also has its distinct features. The uterus may be moderately or considerably enlarged. This enlargement is usually associated with a hyperplasia of the endometrium. In *some* instances the uterus is two times the normal size. On microscopic examination the relationship of the muscle to connective tissue is as in the normal uterus. There is an

increase in the number of cells as well as an increase in their size. I believe that many cases of so-called diffuse adenomyosis of the uterus have passed through this stage.''

If the condition should cause disturbance, the treatment would be the same as for a troublesome uterus enlarged from subinvolution or metritis. In fact, the diagnosis of myometrial hypertrophy, instead of the more common causes of uterine enlargement, could be established only after removal and microscopic investigation of the enlarged uterus.

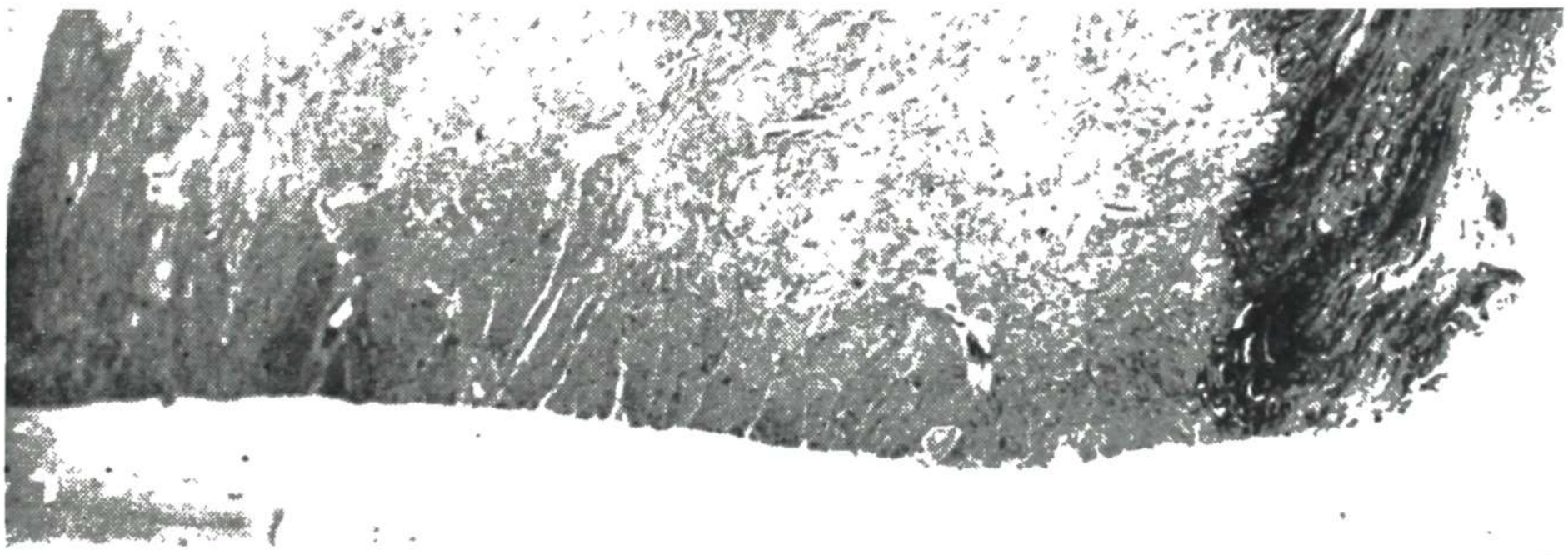


Fig. 575.—Hypertrophy. Uterus, twice normal size, that of an 18-year-old nulliparous girl. On cut section the surface appears coarse, somewhat like the surface in a case of diffuse adenomyosis, but involving the entire uterus. The muscle bundles are coarse, and the interstitial connective tissue less compact. (From Schwarz: Am. J. Obst. & Gynec., April, 1951.)

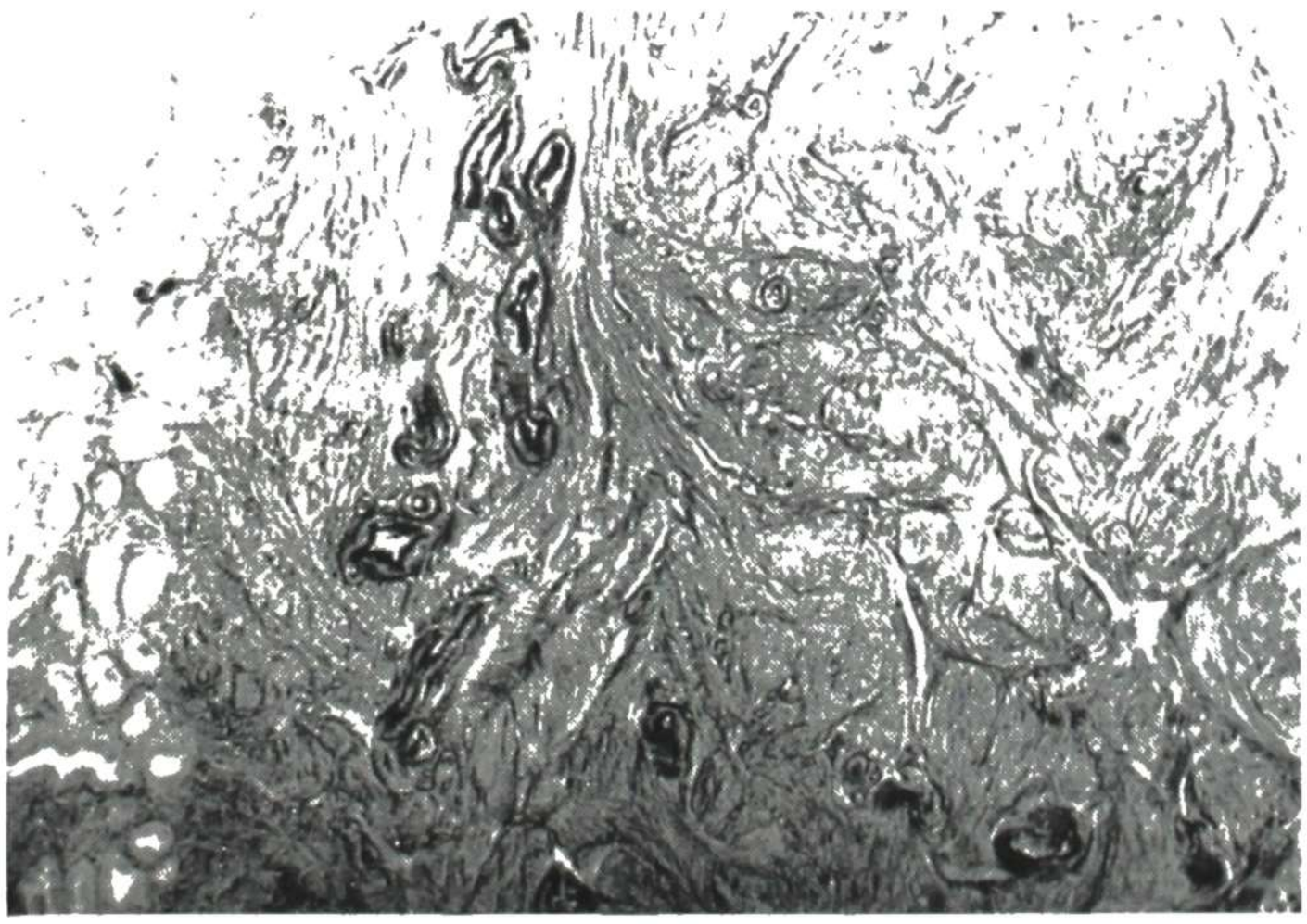


Fig. 576.—Hypertrophy. Orcein van Gieson stain. Section in myometrium at junction with endometrium. Inner third of myometrium. First note blood vessels, normal, precise internal elastic membrane. The fine black-streaked material is connective tissue, which of course stained red. The relationship of muscle to connective tissue in hypertrophy is normal. This is normal. Compare it to the markedly increased amount in chronic metritis in Fig. 568 and to the strikingly inconspicuous amount in chronic subinvolution in Fig. 573. (From Schwarz: Am. J. Obst. & Gynec., April, 1951.)

SENILE ATRESIA OF UTERINE CANAL

In this condition, apparently largely nutritional, senile atrophy of the uterus with elimination of the endometrium continues to the point of atresia of the canal and obliteration of more or less of it. It is quite different from the inflammatory atresia found with pyometra, which may occur at any age and is rather frequent with advanced carcinoma.

The senile atresia here referred to presents no inflammatory symptoms or signs. The sides of the canal lose their protective mucosa at points of contact and the opposed surfaces adhere. As there are no symptoms, the process is of importance principally from the pathological standpoint. It is found occasionally at autopsy, usually in individuals of advanced age. It is encountered at times when endeavoring to dilate for curettage in an aged patient presenting some indication for intrauterine investigation.

It may be accompanied with cystic change in the thinned endometrium, in which case it is designated occlusive cystic atrophy ("endometritis atrophica cystica" of former times). Fig. 577 shows this condition in an autopsy specimen, with reproduction in exact size of the uterus and the cysts and the occluded portion of the canal.

Fig. 577.—Atrophic (senile) atresia of the uterine canal. This autopsy specimen from an aged woman presents also an unusual number of retention cysts from occlusion of atrophying endometrial glands. This condition was formerly designated "atrophic cystic endometritis," but we know now that inflammation, if present, is only incidental and that senile atrophy is the essential feature. Knowledge of this occasional atrophic occlusion of the canal in the aged is important in interpreting the findings when an attempt at diagnostic curettage is blocked at the internal os. Gyn. Lab.

TUBERCULOSIS OF UTERUS

This term is applied to tuberculous disease of the uterine mucosa and myometrium. When the tuberculosis affects only the peritoneal coat of the uterus, it is classed as peritoneal tuberculosis.

Etiology and Pathology

Tuberculosis of the female genital tract is almost always secondary to a focus elsewhere in the body, though there have been a few isolated instances which would suggest an ascending infection. The primary site is most frequently the lungs, and the infection is carried from there via the blood stream to the mucosa of the fallopian tube, which is usually the primary pelvic or peritoneal focus (Fig. 578). According to McDonald the extension progresses into the fundus and then to the opposite tube.

In a study of 200 proved cases of genital tuberculosis Greenburg found the frequency of involvement to be as follows: 1 per cent in all gynecologic cases, 8 per cent of pathologic fallopian tubes.

In pelvic tuberculosis, Penworth states that the tubes are involved in almost 100 per cent of the cases, the uterus in 65 per cent, the ovaries in 30 per cent, and the cervix in about 5 per cent. Most workers feel that the ovaries are more resistant than are the uterine and tubal mucosa; hence the 30 per cent ovarian involvement seems a little high. The microscopic picture in the endometrium is seen in Figs. 579 and 580.

Symptoms

The disease usually attacks in the second or third decade of life. The symptoms are menstrual disturbances, leukorrhea, sterility, and in some cases dysmenorrhea. The general symptoms are those of tuberculosis in general and usually depend upon the extent of the disease. There is little to differentiate the symptoms of tuberculosis of the endometrium from ordinary endometritis.

The menstrual disturbances may be scanty flow or amenorrhea, or menorrhagia, or metrorrhagia. In 66 cases of genital tuberculosis studied by Murray, 41 per cent had altered cycles; of the 13 endometrial cases 58 per cent had normal periods, 16 per cent menorrhagias, 8 per cent oligomenorrheas, and the balance amenorrheas.

Fig. 578.—Tuberculosis of the endometrium. Gross specimen, showing the thickened endometrium, and also the accompanying tubes which were tuberculous. From a white woman in whom a part of the right tube had been removed in a distant city some years before and found tuberculous. Notice the stump of right tube in the photograph of the specimen. Gyn. Lab.

Various interpretations have been placed upon the cause of the amenorrhea and this was the subject of a study by Achard. He divides the amenorrhea of patients with tuberculosis into the active and the silent forms; in the former group the patients exhibit symptoms usually associated with the menses, and in the latter there is no menstrual molimina. In the first group the endometrium is usually not involved but the amenorrhea is due to the toxic effect of the tubercle bacillus on the hormonal balance; in the second group the endometrial involvement interferes with its response to the hormones.

In Norway a good deal of importance is attached to the fact that cases of pelvic tuberculosis run a low-grade fever with the period, while cases of

nonspecific pelvic infection do not. This is an important diagnostic point in a differential diagnosis.

Sharman, Schockaert, Murray, and others studied the relationship of tuberculosis to sterility. The consensus is that about 5 per cent of sterility cases show endometrial tuberculosis on biopsy. Murray gives the incidence of sterility in cases of proved tuberculosis as 41 to 78 per cent. Wood in a series of cases of pelvic tuberculosis found that there was a coexistence of tuberculous salpingitis in all cases of endometrial tuberculosis. He feels that premenstrual endometrial biopsy will establish the diagnosis of endometrial tuberculosis in 85 per cent of the cases and that all of the positive cases will have bilateral tubal involvement.

Fig. 579.

Fig. 580.

Fig. 579.—Tuberculosis of endometrium, low power. A tuberculous area in the endometrium is well shown.

Fig. 580.—Tuberculosis of endometrium. High power of a section from Fig. 579, showing typical tubercles and giant cells. Gyn. Lab.

Diagnosis

Unless the patient has general symptoms or signs of tuberculosis, the fact that the pelvis is involved in a tuberculous process is usually missed; even at operation unless there is an evident lesion the diagnosis is seldom made. Greenburg found that a correct preoperative diagnosis was made in only 13 per cent of a series of 200 cases of proved tuberculosis; and in half of those in which a correct diagnosis was made there were ascites and other signs of tuberculous peritonitis present.

As mentioned, while I was visiting in Norway, Wetterdahl pointed out to me on ward rounds the fact that the patients with ordinary pelvic inflammation had no change in the temperature with periods, while the patients with pelvic tuberculosis ran a low-grade fever with each period. This finding is considered to be very important in the differential diagnosis.

Treatment

Until recently the treatment of uterine tuberculosis, if one could be fairly certain that the disease was limited to the pelvis, was radical surgery. Some authors advised removal of the uterus, tubes, and ovaries regardless of age. Since the ovaries are much less susceptible to invasion by the tubercle bacillus than the tubes and the uterus, every effort should be made to spare at least one ovary in young women. The fact that many of these cases are unrecognized at operation and are treated merely as chronic pelvic inflammation, leaving the ovaries, and that most of these cases do well postoperatively, would seem to justify this slight deviation from the completely radical operation in young women. Drainage should be avoided in all cases because of the danger of fistula formation.

X-ray therapy has been used extensively in South America and to some extent in this country. Campbell reports the results of deep x-ray therapy in 20 dogs that had been experimentally inoculated with bovine tubercle bacilli resulting in pelvic tuberculosis. He states: "In the entire series of twenty dogs, there was no doubt that radiation therapy tended to limit the disease to the pelvis and had a direct effect upon the absorption of the exudate and reduction of secondary inflammation." In seven of his patients treated by deep x-ray he felt that the treatment was a cure in most cases and in those requiring surgery it was a helpful adjunct. Of course x-ray should never be employed until the diagnosis is established. Murray employs a stimulating dose of x-ray, resorting to surgery if the x-ray is not effective. Six per cent of his cases became pregnant after x-ray therapy, but only one of these patients went to term. Jameson has shown that tuberculous women are adversely affected by menstruation, hence it is difficult to see why the stimulating dose recommended by Murray should be beneficial.

In the past few years there have been a number of reports on the use of streptomycin in pelvic as well as in general tuberculosis. Although there are not enough cases as yet to estimate its value, the reports of Schaupp, Revilla, Mulvaney, and others indicate that it is valuable as a cure in some cases and as an adjunct to surgery in others. For other recent reports on streptomycin, see Tuberculous Ulcer of Cervix earlier in this chapter.

In markedly debilitated patients and those with a lung lesion, a prolonged course of constitutional therapy is indicated before any surgical measures are attempted. Also in surgical cases the operation should be followed by general measures used in the treatment of tuberculosis.

SYPHILIS OF UTERUS

In a most exhaustive monograph Gellhorn and Ehrenfest have presented the entire problem of the involvement of the internal female genitals by syphilitic infection. Our actual knowledge concerning the syphilitic lesions of the uterine body is extremely meager. Primary and secondary manifestations

have not been observed in the uterus. There are a few instances on record of gumma in the uterine wall, also of a gummatous endometritis. This infrequency of tertiary lesions is rather a matter of surprise, for the uterus, more than any other internal organ of the body, is exposed to direct infection. Spirochetes may reach the endometrium from the vagina or from cervical lesions. Spirochetes, at least during pregnancy, undeniably circulate through the uterine wall as is proved by the fact that an actively syphilitic mother invariably infects the fetus in the uterus. Syphilis is a common cause of abortions.

ECHINOCOCCUS DISEASE OF UTERUS

Echinococcus disease affecting the uterus is a curiosity, and yet it is not so rare that it can be ignored in diagnosis. Undoubted cases have been reported in early life and in middle life and later. The liver is the organ usually affected in echinococcus disease. Many other organs, however, have been affected, with or without coincident affection of the liver, and among the organs occasionally affected is the uterus.

Fig. 581.

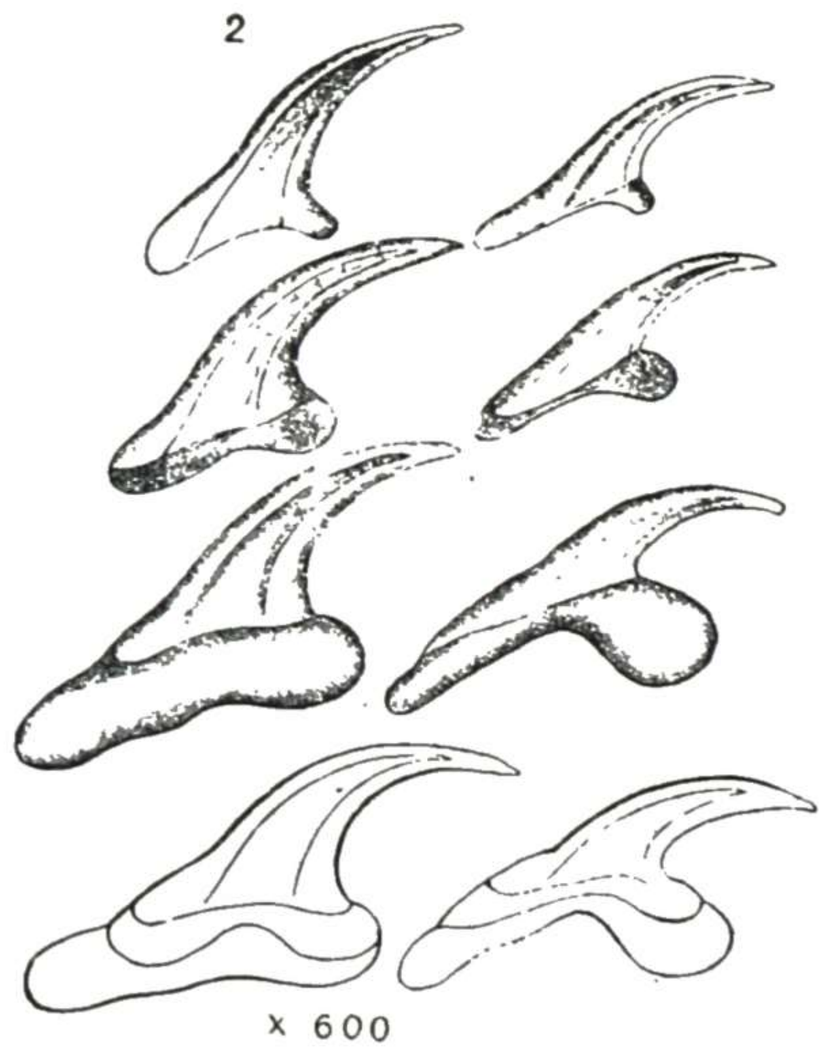


Fig. 582.

Fig. 581.—Echinococcus disease of the uterus. Gross specimen showing an echinococcus cyst of the uterine wall. (From Turenne: Surg., Gynec. & Obst.)

Fig. 582.—Echinococcus hooklets. The diagnosis of echinococcus disease depends upon finding these characteristic hooklets in the cyst fluid.

The disease, at first, many resemble chronic endometritis with hemorrhagic tendency. As the cysts become larger, a tumor or several tumors become palpable, and the case may be considered one of uterine fibroids. When the masses become still larger, fluctuation may be detected or rupture into the uterine cavity (Fig. 581) may take place with the discharge of clear fluid and hooklets (Fig. 582) and daughter cysts. If rupture takes place into the peritoneal cavity, fatal peritonitis is probable. The process may stop at any stage and the lesion undergo partial absorption. Suppuration may take place in the lesion, forming abscesses. In some cases the symptoms resemble pregnancy: The uterus becomes enlarged and softened, the cervix presenting a bluish aspect. The uterus enlarges, progressively and symmetrically, the breasts enlarge and may contain milk, while there are, not infrequently, reflex disturbances of the stomach. It is the occurrence of these symptoms which has generally caused infections of the uterine cavity by echinococcus to be looked upon as

pregnancy, and the resulting cysts to be designated as degenerated ova. In practically all of these cases, however, the usual amenorrhea of pregnancy is absent, while the patient complains of more or less constant dribbling of blood from the uterus. While this is true, the fact must be recognized that infection of the uterine cavity may coexist with pregnancy, as

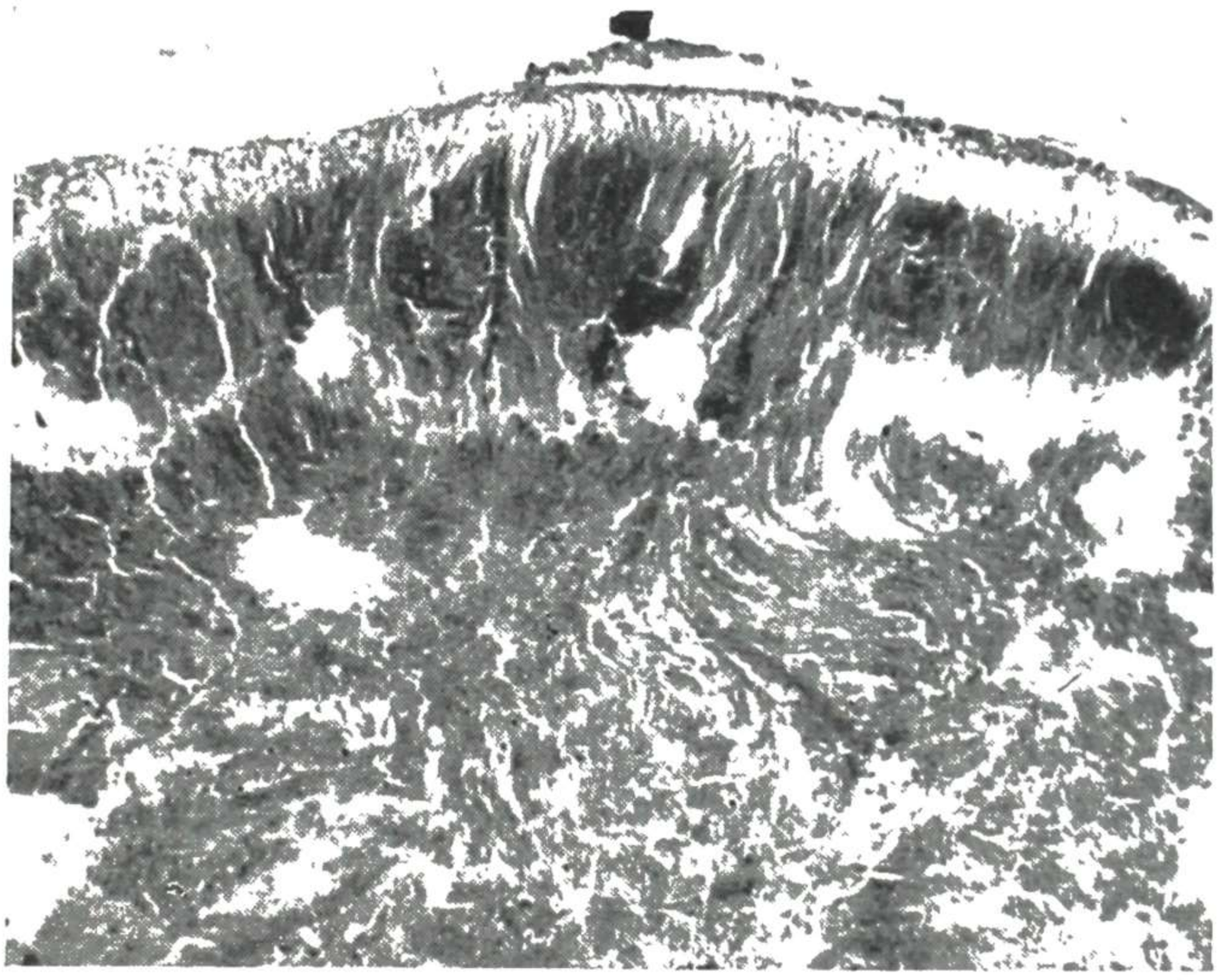


Fig. 583.—Actinomycosis of the endometrium, nongranular type. A senile endometrial gland is shown enmeshed in a thick infiltrate of blood and polymorphonuclear chained organisms, and some areas show a homogenous strata of filamentous, coarse material which takes a basophilic stain.

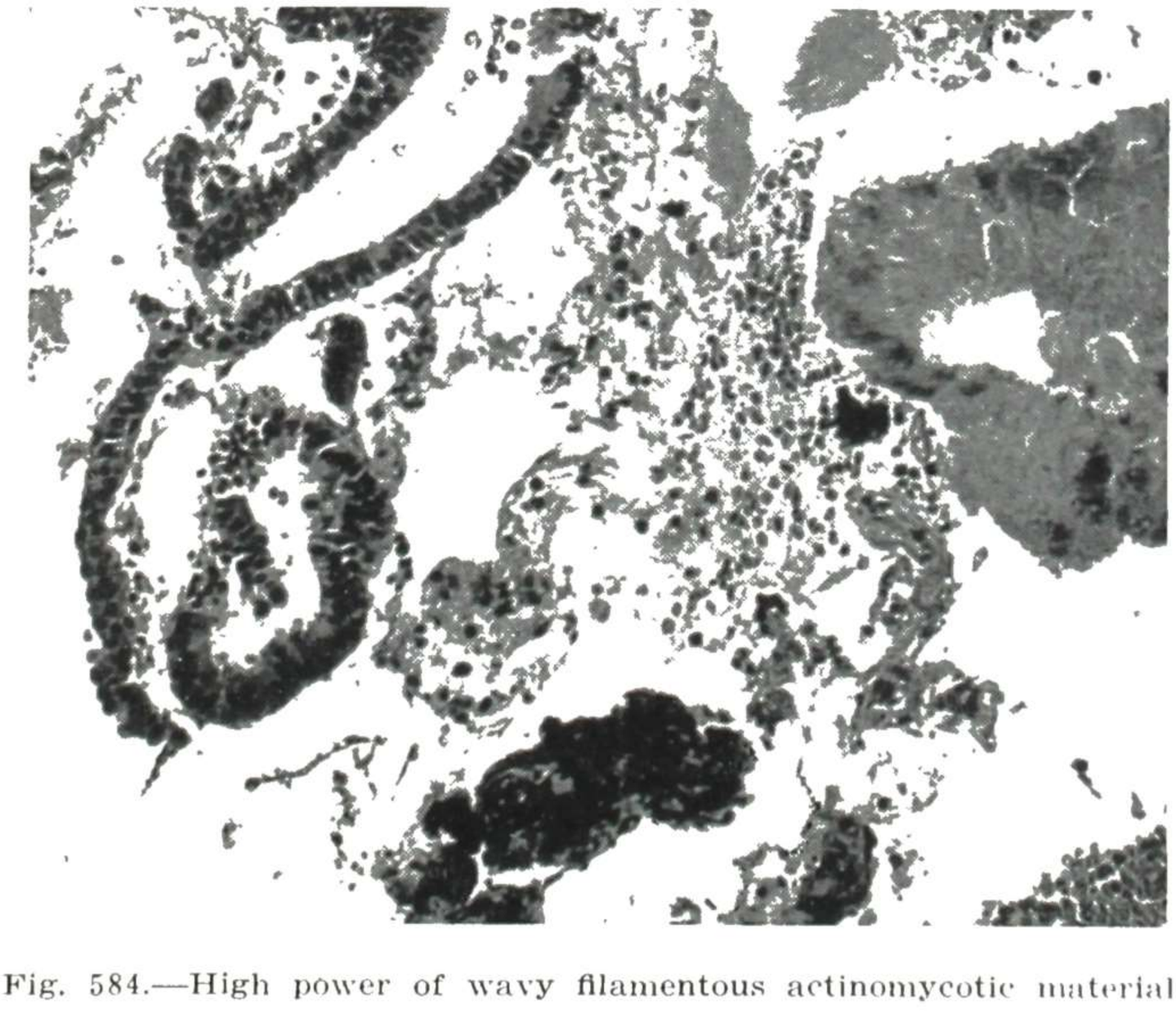


Fig. 584.—High power of wavy filamentous actinomycotic material.

was true in MacNeven's case, in which a large echinococcus cyst was expelled intact, during a true labor and immediately preceding the rupture of the amniotic sac. The exact diagnosis cannot be made without the demonstration of the hooklets.

The treatment of echinococcus cysts of the uterus is hysterectomy, unless there is general involvement of other organs.

ACTINOMYCOSIS OF UTERUS

Actinomycosis involving the uterus is usually secondary to abdominal actinomycosis. We have had an interesting case of actinomycosis of the endometrium with no evidence of the disease elsewhere (Figs. 583 and 584). This case was cured by intensive treatment with penicillin and sulfadiazine.

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Chapter 7
NONMALIGNANT TUMORS OF THE UTERUS

Nonmalignant tumors of the uterus comprise myoma (including adenomyoma) and a miscellaneous group composed of other types, such as lipoma and the growths arising from remnants of the wolffian duct extending into the uterine wall.

MYOMA OF UTERUS

Myoma of the uterus is a tumor composed of muscular and fibrous tissue. It is often spoken of as uterine "fibromyoma" and as uterine "fibroid." As Mallory has pointed out, it is a true tumor of muscle tissue, and the term "myoma" is the accurate designation.

Uterine myoma occurs more frequently than any other tumor in women. Kolb found that it was present in 20 per cent of women over thirty-five years of age and in 50 per cent of all women over fifty years old. Gusserow found 38 per cent occurred between the ages of thirty and forty years.

The tumors vary in size from minute pea-sized nodules to the myomatous mass weighing 89 pounds reported by Cullen. Beacham et al. recently reported one weighing 55 pounds.

Etiology

Age.—Though myomas may occur at any age, their highest incidence of occurrence is in middle life during the active sex and reproductive years. Torpin, Pund, and Peoples in a series of 1,741 cases of myoma found the highest incidence in white patients to be between the ages of 37 and 46 years and in Negro patients between the ages of 29 and 42 years. The high incidence during the period of life when hormonal secretion is at its peak and the fact that myomas are more frequent in nulliparous women led Moench to suggest that the persistent estrogenic stimulation of the uterus in the absence of pregnancy was an etiologic factor. Later Witherspoon found that hyperplasia of the endometrium was present in 55 per cent of his cases of myoma. He felt that since excessive estrogen had been shown to be a factor in the production of endometrial hyperplasia, his findings confirmed the theory of Moench. He also suggested that chronic pelvic infection played an important part in the excess production of the estrogens. Although this work was confirmed by numerous workers, more recent series in which the criteria of Cullen and of Novak and Martzloff were used in making the diagnosis of hyperplasia, have definitely discounted this high incidence of association. Brewer and Jones in a careful histologic study of 100 cases of myomas found the cystic glandular hyperplasia present in only one case and Torpin et al. found it to be present