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CERVICAL DECIDUA[1]

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OUR present conception of the decidua began in July, 1842, when Coste presented a report to the Paris Academy of Sciences entitled "Origine de la Caduque," stating that there was no evidence to confirm the theories of John Hunter and Matthew Baillie concerning the formation of this structure. He held, on the contrary, that the tubal and cervical orifices in the uterine cavity were patent at the time the egg entered the uterus; and claimed that the membrane in question was not an exudate, but resulted from a characteristic transformation of the pre-existing uterine mucosa. This work of Coste was followed four years later by reports of a similar tenor by Weber in Germany and Sharpey in England. It was reserved, however, for Robin, in 1848, to first describe the finer histological structure of the decidua and to show that each element had its analogue in the endometrium. The better known work of Hegar and Maier dates from 1863, yet it was not until after the appearance of Friedlander's article in 1870 and the Kundrat and Engelmann reports in 1873 that this doctrine obtained general acceptance.

At the present time the uterine decidua is considered to form only as a result of pregnancy. It is believed to be absolutely essential to all uterine pregnancies, since it has been found in all such early specimens, where it would appear that it formed a nidus for the reception and development of the ovum, and takes part subsequently in the formation of the placenta. The teaching of Heinricius, in 1891, that the membrane was intimately concerned in the nourishment of the ovum during the weeks prior to the establishment of the fœtal circulation in the chorion, has received much corroboration from investigators of the same structures in lower animals, most of whom were attracted to it by study of the fate of the glycogen. Others, as Rossi Doria, believe that it also constitutes a barrier to the entrance of syncytium into the maternal body, while Charrin and Goupil (1905) have advanced the theory that it acts as a lymphatic gland in filtering some of the toxic substances passing toward the fœtus.

With our better understanding of the unusual types of pregnancy, there are described many variations in the intensity of the decidual reaction in the uterus. The large thick decidua observed in the non-pregnant side of a double uterus has long been known, as has the similar condition in the uterus with a pregnant and rudimentary horn. Governed largely by such observations, Pozzi and Caseaux stated that the intensity of the decidual reaction in the uterus was dependent on the proximity of the ovum. This view has not obtained wide acceptance, however, although the hypertrophy of uterine muscle would appear to be so influenced. Varying conditions of uterine decidua are seen in tubal pregnancies. Thus the uterus is seldom the site of marked decidual reaction in early tubal abortion, as it is far more apt to present only in localized areas. Indeed it occurs as a well-developed layer with compact and spongy divisions only in such cases as have passed the second month, at which time the decidua of uterine pregnancy would have nearly reached the height of its development. Moreover, the papillary proliferation in the glands, deemed characteristic of normal pregnancy by Opitz, are absent in the uterine decidua of tubal pregnancy (Werth). Less is known of the uterine reaction in ovarian gestation, while none of the few cases accepted as true instances of abdominal pregnancy present detailed study of the uterine content.

As early as 1891, Bland-Sutton had drawn attention to the fact that the decidual reaction in the tube in tubal gestation was not nearly as extensive as has been believed. This view received the support of Füth and Griffiths a few years later, while others, as Kühne, Aschoff, and Kreisch, frankly stated them-

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selves as skeptical of the existence of decidua in certain cases of this category, and claimed that cells frequently described as decidual were in reality of fœtal origin. Although the nihilistic views of these authors have not obtained much acceptance, certain it is that the decidual reaction at the site of tubal pregnancies may appear only in limited extent. There is, however, always the possibility of a larger and earlier area of reaction which has later become decimated by various degenerations. The presence of decidua in tubal pregnancy has been frequently demonstrated, not only in the pregnant tube but also in its fellow of the opposite side, limited for the most part to the tips of the mucosa. The decidua reflexa, or more properly capsular membrane, in consequence may contain but few or no decidual cells. A definite decidua is lacking in ovarian pregnancies, although the possibility of decidual cell formation must be admitted in the first case of Webster.

The decidual reaction was long supposed to be limited to the uterus and tubes. Gradually, however, other sites were described until we find it recorded:

1. In the mucosa of the uterine body during ectopic pregnancy.
2. In the mucosa of uterine adenomyomata during uterine pregnancy.
3. In the cervix.
4. On the posterior uterine wall, or in the cul-de-sac beneath the uterine peritoneum.
5. In the non-pregnant tube during ectopic pregnancy and in both tubes during uterine pregnancy.
6. In the ovaries and parovarian cysts.
7. In the omentum.
8. In the appendix.
9. In the serosa of the intestine.
10. In peritoneal adhesions.

It is of interest to recall that normal pregnancy is not essential for the production of decidua. The structure has been seen with hydatid mole pregnancy and also with chorioepithelioma, although in the latter instance there is always the question whether the decidua was really not preserved from the former pregnancy.

It has long been recognized that the cervix may show decidual change, although the majority of texts deny the possibility and voice the opinion of Gebhart that the internal os represents the lower limit of decidual formation. For the most part the positive cases quoted below were recorded either in articles devoted to the discussion of the origin of the lower uterine segment or else in consideration of the production of placenta prævia centralis from primary implantation of the egg in the region of the internal os. The majority of these observations are therefore in association with cases of placenta prævia.

Decidual tissue in the cervix was demonstrated by Bayer in the folds of the arbor vitæ in two cases. This observation, recorded in 1885 in an article on "The Physiology and Pathology of the Uterus," excited but little comment, possibly because it did not come to general notice. Nor did the report of Ahlfeld of a similar condition in the upper cervix of a placenta prævia arouse more interest six years later. The majority of case reports credit v. Weiss with being the first to control such observation with specimens, although it is clear that Weiss's report in 1897 is antedated 12 years by Bayer's observations. In Weiss's case the cervical mucosa appears to have furnished at least a part of the decidual serotina, which is surmounted by a firmly attached placenta prævia. Keilmann, five weeks later in the same year, reported a similar condition, although his deductions were based only on clinical findings and were not controlled by specimens.

Von Franque in 1897 presented two cases, one of which was associated with placenta prævia at the tenth month of pregnancy. The specimen was obtained from a VIII-para 4½ hours after delivery. The placenta was on the anterior uterine wall. Sections from the posterior cervical wall, 3 cm. from the external os, showed many decidual cells, between which were thin walled blood-vessels. The sections taken over an area 2 cm. long contained many developed glands containing unchanged high cylindrical epithelium. His second case is of greater interest, as it showed decidual cells in the cervix of a six months' pregnancy with a normally implanted placenta. The space between the decidua of the body and the cervix proper was unchanged

for 3 to 4 mm., below which on the crest of the arbor vitæ were seen areas of typical decidual cells, even as far down as the external os. The cervix appeared very vascular.

Ponfick in 1899 presented two cases associated with cervical placenta prævia. In the first specimen the entire upper portion of the cervical division was filled with placental tissue, which extended down as far as the external os in tongue-shaped processes, closely adherent to the underlying tissue. The second case also presented a cotyledo prævia with a condition in the cervix similar to his other case.

Krönig in 1901 describes the lower uterine segment and cervix of a 19-year-old girl who died in the ninth month of pregnancy from cardiac disease. The child was recovered by Cæsarean section during the death agony. The placenta was normally situated. Some areas of decidual cells were seen in the upper cervix.

Volk in 1903 presented a case of unusual interest. During the examination of a luetic II-para the everted cervix was found to be the seat of several reddish patches of millet-seed size which bled upon slight trauma. A section was taken for diagnosis three weeks before the onset of labor at term. The cervical tissue presented considerable œdema, while the plaques under investigation were found to consist of decidual tissue. Similar areas were seen underneath the healed erosions. In order to ascertain the frequency of decidual reaction in the cervix in placenta prævia, he removed a section from the anterior cervical wall of a woman recently delivered. The gross appearance of this lip suggested the presence of decidua, which was subsequently demonstrated by sections.

Waldstein's case, in 1903, was a twin pregnancy in a VI-para. The placenta was laterally implanted. Post-partum bleeding suggested a torn cervix, and when retractors were applied numerous plaques appeared to view, suggesting a carcinomatous change. Sections taken for diagnosis from the vascular cervix gave a picture of a healed erosion, with large and small nests of decidual cells in the neighborhood of the external os, on the cervical flaps, and also under the eroded flap of the portio vaginalis.

Hohmeier in 1905 investigated the cervical mucosa in 7 cases in various stages of pregnancy or immediately after birth. Decidua in the lower two thirds of the cervix was seen in 4 cases; twice with placenta prævia and twice with normally situated placentæ. The reaction varied in extent, sometimes being broad and extensive while in other specimens it was limited, as in the case of Volk.

Blumberg in 1905 reports a V-para who had been bleeding off and on until her fifth month of pregnancy, when examination disclosed several gray polyps the size of a bean in a large, soft, and somewhat dilated cervix. Three of the polyps were removed for examination and the labor terminated. There was placenta prævia. The polyps were found to be the seat of decidual change. His second case is that of a case which entered the Landau clinic with bleeding from retained secondary post-abortum. The day following their removal severe hæmorrhage indicated inspection of the os. Several granular areas were seen on the cervical lips, some of which were removed and found to be the seat of decidual formation.

Taussig, in his paper before our Society, reported a case of great interest on account of the multiple locations presenting decidual formation. The case was a primipara of 35 years in which a tubal pregnancy was associated with multiple uterine myomata, a cystic adenomyoma, and a parovarian cyst. The pregnancy occurred in the fimbrica ovarica, and by the spread of the placenta upon the posterior peritoneum became a case of secondary abdominal pregnancy. Decidua formation was found in the uterus, on the posterior uterine peritoneum, in the non-pregnant tube, in the parovarian cyst, in peritoneal adhesions, and in the cervix. The decidua noted in the cervix presented in the region of the internal os and for 1 cm. below, but could not be demonstrated in the lower cervical canal.

It is more than possible that the case of Seitz does not belong in this list, yet it deserves consideration on account of its many peculiar features. A woman 41 years of age, who had had nine children and two abortions, was

operated in the Munich clinic for carcinoma. Her periods had been irregular for the past two years and there had been bleeding at irregular intervals. On this account the missing of two months' menstruation had not aroused the suspicion of pregnancy, and the enlargement of the uterus had been attributed to metritis. The organ, when removed by vaginal hysterectomy, suggested pregnancy, and was preserved in toto in formalin, after some of the preservative had been injected into the specimen. Before the operation the cervix had been seen to be gaping, yet no membrane was visible in the canal. The lower cervix was considerably torn by bullet forceps. On opening the uterus several weeks later a seven weeks' pregnancy was seen, with the chorion embedded on the upper lateral wall. The sac of the fœtus contained clear fluid. Between the decidua vera and reflexa was a fresh, unorganized blood clot extending down to the internal os. The cervix presents an early carcinoma. The internal os is nearly as wide as the dilated external orifice, and projecting down throughout the length of the entire cervical canal is a fold of decidua continuous with that of the uterine body, thus extending the circumference of the decidua vera to the external os. Histologically the membrane is identical with that of the uterine body, although it is attached to the cervical tissue more loosely than that in the cavity of the corpus. The membrane is also thinner. The microscopical picture of the underlying tissue is confused, because of poor fixing of tissues and changes incidental to the developing carcinoma. Yet the author concludes that the cervix proper shows no decidual change and that the decidual membrane was forced through the somewhat dilated os by a combination of trauma during the operation and the injection of fixing fluid into the uterine cavity in the preservation of the specimen.

Kermauner in the same year (1906) mentions the presence of cervical decidua in the upper cervix of his specimen of a post-partum uterus which had presented a placenta prævia. Bondi in 1907 describes the uterus of a 37-year-old multipara which was removed in the second month of pregnancy for a carcinomatous polyp. Larger and smaller areas of decidual reaction were found in the region of the external os, some of which were covered with stratified epithelium. Decidual changes could not be demonstrated in the upper cervix.

Stroganoff (1908) records a case of polypoid proliferation on the anterior cervical lip of a three months' pregnancy. This bled freely on contact and was removed for microscopic examination. It proved to be well-developed decidua. The upper layer was here and there covered with stratified epithelium. The patient remained under observation for several months without a return of the growth and without bleeding.

Gaifami (1909) and Ballerini (1910) also describe cases in which they have demonstrated cervical tissue. Excluding the case of Seitz as not proven, and the observations of Gaifami and Ballerini, which are recorded in the Italian journals, and of which I have seen only reviews, we find in the literature 22 reports of decidual change in the cervix in our search. Thirteen of these were observed in connection with placenta prævia, 8 with normally situated placentæ, and one in tubal pregnancies. Yet the more recent articles indicate the feeling that the condition is more common than hitherto believed. Indeed Ballerini's article is quoted in review as stating that such reaction occurs in 25 per cent of cases. It is of interest to recall that, of the 8 cases reported in normally implanted placenta, the decidual areas were noted on the lower cervix in 7 instances. On the contrary, in connection with placenta prævia the findings are reversed, since the upper cervix is the usual site. That this portion of the uterus is the site of decidual changes more commonly than hitherto supposed may be inferred from Hohmeier's observations (not mentioned above) that decidua was present in the upper third of the cervix in all of his 7 cases. All cases thus far reported show that the decidual formation occurs only in localized areas without the production of a continuous membrane.

My interest in this subject was recently revived by the observation of an unusual case of pregnancy in which bleeding from the cervix followed trauma and in which a watery, bran-colored leucorrhœal discharge was a

marked symptom. At operation we found numerous small polyps surmounting bleeding areas of the thickened mucosa of a long narrow cervix with everted lips. Although the possibility of decidual growth was discussed, we then feared the tissue would prove to be malignant. The case is as follows:

Mrs. X. X., aged 22 years. The family history is negative for tuberculosis and cancer. She has never had scarlet fever, inflammatory rheumatism, nor diphtheria. Had typhoid when 13 years old, and was confined to bed by it for eight weeks. A succession of attacks of "sore throat" was relieved by the removal of the tonsils with the guillotine. At 17 she gradually ran down in health while in boarding school. Lost in weight from 105 to 96 pounds. Had a succession of colds in the head, with little or no cough but with fever. The glands near the angle of the right jaw now enlarged to the size of a hen's egg and remained swollen for 5 or 6 months, until removed by operation. The diagnosis of this condition is uncertain, although the surgeon stated that there was no evidence of tuberculosis. Two years later there was a slight recurrence and a few discrete glands were removed. Since then (2 years) has been in excellent health until present complaint.

Menstruation began at 15 years. Was regular from the first, of the thirty-day type. Never but the slightest pain. Flow lasts 5 days. No leucorrhœa.

Married in June, 1912. Last period July 5, 1912. Nausea began early in August. When 3 months pregnant, in this her first pregnancy, a blood-stained discharge resulted a few hours after coitus, and was shortly followed by painful uterine contractions. The uterine discharge upon her napkin presented a salmon pink stain of 10 or 12 cm. in diameter. It was so watery that it strongly suggested leakage from the sac of the ovum, which suspicion was intensified by the strong odor as of vernix caseosa. The discharge gradually decreased with the subsidence of the pains, although it was still present after 5 days. The pains lasted off and on for 36 hours and disappeared after the use of morphin. The patient remained in bed for 10 days. A few days later, vaginal examination disclosed a 2½ to 3 months pregnant uterus, sharply anteflexed and with a long narrow cervix as if of an infantile type. The external os pouted slightly but did not admit the finger-tip. No evidence of placenta prævia. No blood followed the examination. A speculum was not used.

Shortly after getting out of bed the patient began to complain of leucorrhœa, seemingly aggravated by exercise. Four weeks after the onset of the first attack she was seized with a similar one, save that the discharge was not so profuse and was marked with small fresh blood clots. Uterine contractions continued at frequent intervals and with increasing pain for several hours, and, feeling that she was about to abort, I sent her to the hospital. Much to our surprise the uterine pains stopped during the night after a dose of morphin, in spite of the fact that she was driven in an automobile some five miles to the hospital. The blood-stained discharge lasted 3 days and was again followed by profuse leucorrhœa. Vaginal examination was at this time similar to that of two weeks before, save that the external os felt more gaping. Later, when she was up and about or when riding in her automobile, she became conscious of bloody fluid on several occasions. No pain followed these discharges. The leucorrhœa was profuse and was found to be of a bran color and distinctly watery consistence.

Bleeding again followed coitus on November 22, without subsequent uterine contractions. Feeling that the pregnancy should not be allowed to run without a definite diagnosis of the condition, I suggested dilating the cervix enough to permit the passage of one finger to explore the neighborhood of the internal os. Upon examination in consultation, to justify the risk of abortion during this procedure, there was an immediate and profuse bloody discharge, staining the sheets for a foot in circumference with bright red blood. The immediate hæmorrhage was comparative in amount to that seen a few hours after delivery. At least four pads, folded into 4-inch width from a yard of sterile gauze, were completely saturated before the patient could be moved to the Presbyterian hospital for immediate delivery.

A few hours later, November 26, 1912, the patient was prepared for operation under ether. On exposing the cervix a most unusual condition presented to view. Projecting through the gaping os, and surmounting ridges of a bright red lining membrane, were 12 or 15 worm-like polyps moving in the oozing blood which seemed to arise from around their bases. These polyps, of varying length (4 mm. to 1 cm., and 2 to 3 mm. in diameter), appeared to crown longitudinal foldings of membrane, just as the comb of a rooster is decorated with excrescenes. The whole lining membrane of the cervical canal was arranged in longitudinal foldings about 1 cm. apart, separated from each other by furrows. The greatest thickness of the folds of the membrane proper was at the margin of the bluish vaginal where it measured 4 or 5 mm. Of the color of angleworms, the papillæ were seen, of irregular contour distended at the end in an œdematous swelling. Blood-vessels could be seen in the depths of their substance. In texture the polyps resembled brain substance, breaking off when picked up with forceps. They appeared to cover with their bases at least one fourth of the lining of the canal. The whole picture exclusive of the polyps suggested an extremely injected decidual membrane, with the difference that the furrows here ran parallel and vertical, as if they had arisen from the persistence of fœtal plica palmatæ.

As the diagnosis was by no means certain, and

fearing the possibility of sarcoma, the operative plan was changed from anterior hysterotomy to dilation of the canal and morcellation and removal of the ovum.

The internal os easily admitted the passage of a No. 8 Hegar dilator, and the vascular cervix was stretched to permit the passage of No. 26, which facilitated examination with the eye and finger. The polyps were most abundant as a ring in the lower canal, yet were present for 3 cm. above the os. They appeared to decrease in size in the higher levels. The membrane, however, presented folds to the internal os, 4½ cm. above its lower fellow. Indeed the feel above was as of numerous projections extending as papillæ down from the maternal side of the fœtal sac, which but loosely covered the internal os. The lower uterine segment appeared more funnel-shaped than usual, as if there had been no widening of the lower pole of an infantile type of uterus. The upper edge of the cervix formed a very obtuse angle with the uterine body.

The placenta was found in the right upper lateral pole of the uterus, and the 4½-month fœtus with the membranes was crushed and removed with ovum forceps. No pack was applied, but scrapings were taken from the posterior wall of the lower half of the canal for microscopic examination as a guide for subsequent treatment. Twenty-four hours later these were found to present no evidence of malignancy.

The sections showed masses of irregular polyps together with considerable free blood. The margins of the polyps were covered with high columnar epithelium, the protoplasm of which contained many granules. There were glands with crenated edges, some being full of mucus. There was marked œdema of the stroma and the cells were widely separated, showing stellate branches with vesicular oval and round shaped nuclei. There were many dilated blood-vessels, for the most part with thin wall vessels. Many lymphocytes and a few leucocytes were seen scattered through the section. In contrast with the areas just described, the tissue presenting decidual change showed an even and rounded edge. The surface epithelium was lower than in the other areas, and in certain sections presented the typical flattened surface epithelium of uterine decidua. The cell margins were distinct and the nuclei round. There were comparatively few granules noted in the protoplasm. The stroma was also very œdematous, and its cells bore no resemblance to the areas first described save that they were also of irregular and stellate shape. The cells presented the typical decidual type (Figs. 1 and 2). The nuclei were rounded. Many cells contained two nuclei. There were areas of vesiculation scattered through the sections, as if some cells had fallen from the reticulum. There were many lymphocytes in the tissues and the blood-vessels were markedly dilated. In favorable sections it will be seen that the large decidual cells

Fig. 1. The tissue on the bottom of the illustration has not undergone the decidual process.

are grouped about the blood-vessels as if beginning in the perithelial coat (Fig. 3).

Five days later, under gas, the cervix was again inspected, when the site of the former excrescences was found to be occupied by an irregular and sloughing base with no evidence of the former picture. The examination of scrapings taken from the lower and upper halves of the cervical canal merely confirmed the clinical picture.

Cervical polyps have long been recognized as a source of bleeding during pregnancy, yet I can find no case on record presenting the picture given in our case. As a rule the polyps are single and of fairly large size.

Three of the cases noted in this review show that bleeding may result from trauma of the decidual patches. Volk's case bled from contact of the numerous plaques, while Stroganoff clearly shows that the bleeding in his case came from the decidual proliferations. Blum-

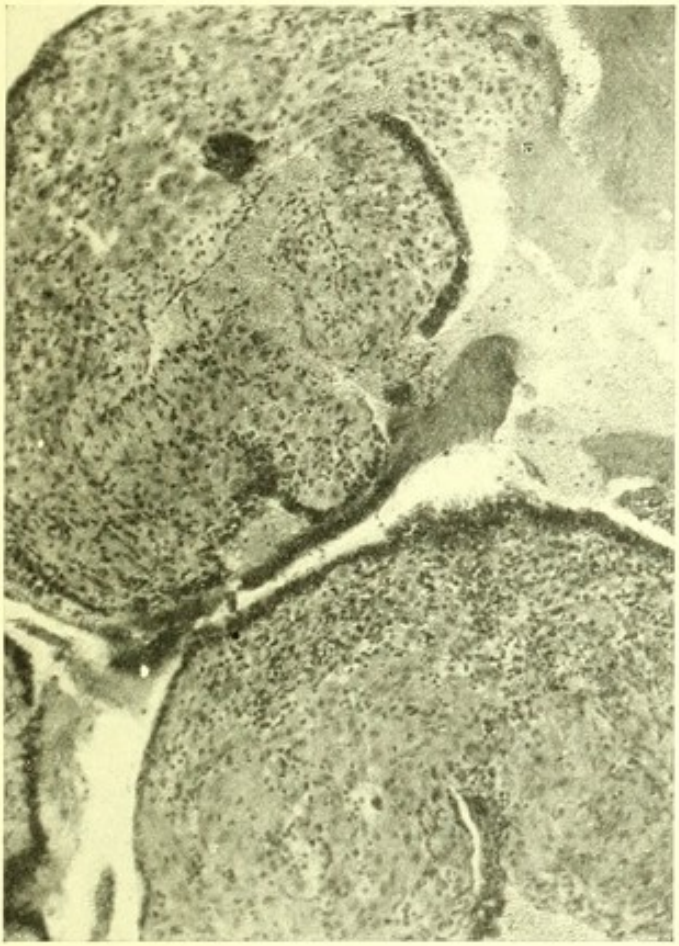

Fig. 2. Observe the flattening of the epithelium, which is well shown on one margin. The presence of the lymphocytes in the tissue obscures many of the decidual cells.

berg's first case is of interest in that there were several polyps the size of a bean in the lower cervix, yet the marked hæmorrhage may well have come from the placenta prævia. Yet it would appear that the hæmorrhage in his second case (post-abortum) arose from abrasions in the decidual area.

The treatment adopted by Stroganoff could not well have been attempted in my case, even had I been aware of his happy result. The denudation of the entire cervical cavity would present too many risks, even though it were proven that the growth was benign.

Thus far no one theory has sufficed to explain the presence of decidual tissue in all its various sites. It is doubtless true that a distinct and continuous membrane is limited to the uterus, yet the ectopic decidua which arises in connection with pregnancy cannot well be distinguished from similar areas of the compact zone of the decidua vera. And until a better test arises to determine what is and what is not decidua, we must continue to take the cell as our guide, bad guide though it be, provided the diagnosis is controlled by the study of wide enough areas and sufficient sections.

Cervical decidua associated with placenta prævia may be extension from above downward, if the histological os grows in size during the formation of the lower uterine segment, as suggested by Bayer; yet a vascular cervix is described in the cases of the literature as a common feature to all. It may be that cervical tissue does not always arise from the stimulus of pregnancy alone, and the irritant of inflammation may commonly be necessary. Certain it is, however, that malignant tumors, circumscribed inflammations, erosions, polyps, etc., are reported most frequently with decidua in this unusual site.

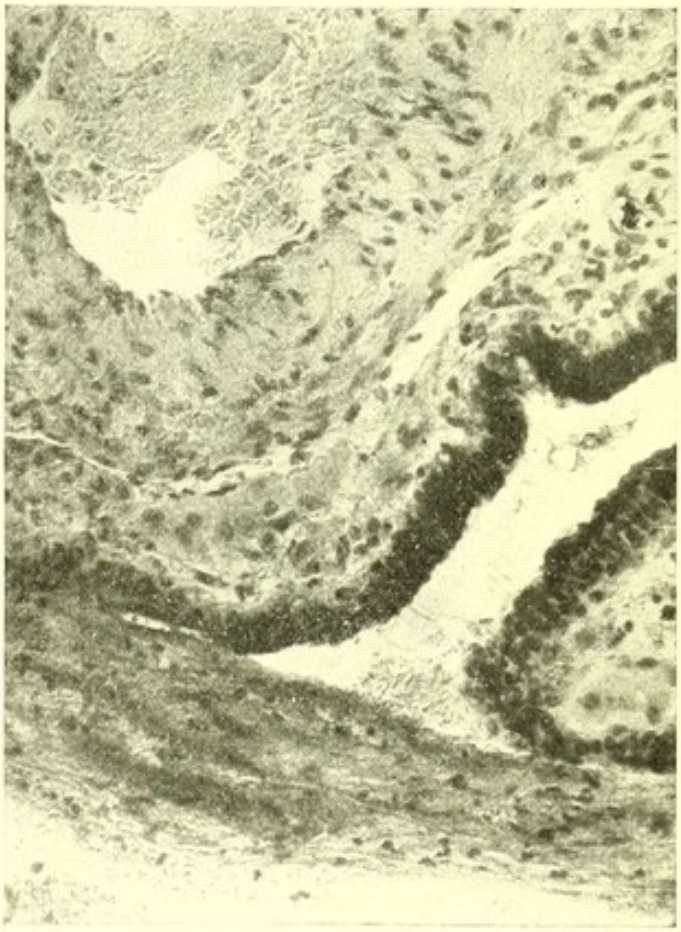

Fig. 3. Decidual cells may be seen on the side of the small blood-vessel, apparently arising from the perithelial layer.

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