

Endometrial Tumours of Laparotomy Scars.*

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ENDOMETRIAL tumours, or "endometriomata" as they are generally named, are of the greatest interest for pathologists as well as gynæcologists. They have a wide distribution in the abdomen and its walls. They are restricted to adult females. They are not found in children. The rare cases recorded in old women are typical in structure and clinical features, and can be explained as atrophic remnants of these tumours which have undergone involution with the organs of generation after the menopause.

Our knowledge of the histogenesis and ætiology of endometrial tumours is in a very unsatisfactory state. To be honest, our ignorance is profound. As so often in pathology, we are confused and deceived by the theories propounded to explain them. We do not know, in the first place, if these anomalies are true tumours and blastomata, or instances of hyperplasia and attempts at compensatory regeneration. Again, we are ignorant of their tissue of origin, and do not even know if it be the same in all the situations in which they arise, or if it vary in different parts of the abdomen.

The endometrial tumours of laparotomy scars are of interest, and perhaps of importance in helping to throw light on this whole group of disorders, in that they, as their name implies, are always found in the newly formed or adventitious tissues of scars. They are rare, and I append abstracts of the chief cases recorded in the literature.

Meyer¹¹ describes the first case in a woman aged 35, who had been operated two years previously for ventri-fixation of the uterus and removal of the right adnexa. A painful nodule developed in the scar below the umbilicus. Excision of scar. Fundus uteri firmly attached to tumour and omentum adherent between uterus and abdominal wall. Removal of tumour together with attached part of fundus and omentum. Fundus found to be attached to abdominal wall by a "mesentery" about 5 mm. in length. *Histology*: Skin atrophic without cutaneous appendages.

* This paper is based upon the writer's "Studies on Tumour Formation, XI. *Guy's Hos, Rep.* LXXVI, p. 188, 1926.

Tumour consists of dense scar tissue with tubules and cysts and cellular stroma. Hæmorrhages and blood pigment. Only one cyst extends for short distance into "mesentery." Near here there is a "silkworm" thread, surrounded by cysts, tubules, and cellular stroma. No epithelial elements in excised part of uterus or omentum. Klages⁵ case concerns a middle aged woman who had been operated upon six years previously for ventri-fixation of the uterus and removal of the right adnexa and the vermiform appendix. A tumour made its appearance in the lower part of the scar four years later. It assumed a red colour and became very painful at the menstrual periods. Scar ascends in linea alba for 10 cm. above pubes. Its lower end contains a reddish, firm, tender nodule, of about the size of a walnut, and raised slightly above level of surrounding skin. Excision: Tumour produced into a stalk, which traverses peritoneal cavity and is attached to anterior wall of uterus and adherent to a tag of omentum. *Histology*: Radiating bands of dense fibrous tissue. Narrow bundles of plain muscle, most numerous at base of tumour. Large and small cysts and tubules, partly surrounded by inflammatory granulation tissue and partly by cellular stroma. Hæmorrhages.

v. Franque³ examined a V-para aged 39 upon whom a laparotomy had been performed four years previously for suture of a perforated uterus due to criminal abortion. A short time later a tumour was noticed in the lower part of the scar, which attained the size of a walnut during the last six months. Excision: Tumour only slightly movable, covered by pigmented skin. Enclosed in subcutaneous fat, but produced inwards for a distance of about 3 cm. as a wedge-shaped cicatricial mass, which contains punctate black and yellow areas. Not connected with peritoneum. *Histology*: Tubules and cysts. Cilia and goblet-cells. Cellular stroma. Hæmorrhages and pigment.—Fraas² saw a woman, aged 45, in whom ventri-fixation of the uterus had been performed twenty years previously. Scar on the left of middle line, 5 cm. in length, retracted. Its lower end very firm. Excision of scar, which is firmly adherent to the fundus of the greatly elongated uterus by means of dense scar tissue. Hysterectomy. *Histology*: Dense scar tissue containing cysts and "uterine" glands. These are present only in scar and adherent parts of surface of uterus, whereas they are absent in the myometrium and are therefore independent of the endometrium. No adeno-metritis of the uterus.

—Cullen¹ describes adeno-myoma of the rectus muscle. A laparotomy had been performed on the patient, a woman aged 34, nine years previously for rupture of the uterus following an abortion. A year later she gave birth to a full-time child. Menstruation normal. A few days before admission she noticed a

small tender nodule in the rectus abdominis muscle, on the left of the middle line, under the lower end of the scar, but not attached to it. Operation: Tumour, 3 cm. in length, excised. Firm and fibrous, mottled, unencapsulated. *Histology*: Unstriated muscle with areas of typical uterine mucous membrane. Blood and pigment.—Mahle and McCarty¹⁰ describe three cases. (1) Woman aged 30, with a small tumour of the lower end of a laparotomy scar of two years duration. Painful at periods. Operation: Tumour attached to the left Fallopian tube about four cm. from uterine horn. *Histology*: Adeno-myoma. (2) IX-para aged 46. Last pregnancy ten years ago. Ventri-fixation of the uterus several years ago. Tumour present in scar for about a year. Painful at periods. Operation: Tumour situated in abdominal wall above symphysis pubis, 8 cm. in diameter, firmly attached to right side of uterus. Since it infiltrated the retro-peritoneal tissues and was apparently inoperable, only a piece was excised for histological examination. Tumour firm, with pigmented glandular and cystic areas. *Histology*: Adeno-myoma. (3) This specimen is described by these authors as a tumour of the groin together with their tumour of the round ligament. It clearly belongs to the group now under discussion. An unmarried woman, aged 50, in whom an appendicular abscess had been drained twenty-five years previously. Two small nodules appeared in the scar four years before admission. They were painful at the periods. Excision: The tumour occupied the scar and extended downwards to the femoral ring. An inguinal hernia and fibroids of the uterus were present. *Histology*: Adeno-myoma. Lauche⁸ collected four cases. (1) Unipara, aged 30. Laparotomy for double pyosalpinx and ventri-fixation of uterus of four years standing. Soon after she noticed a thickening of the lower end of the scar. Vesicles appeared here at the menstrual periods. Latterly they have discharged blood-stained fluid at these times. Operation: Tumour, which contains many isolated cysts, extends as far as peritoneum, but not beyond it. No direct connection with uterus. *Histology*: Dense bundles of scar tissue. Branched tubules and cysts with cellular stroma. Blood and pigment. Areas of round-celled infiltration. Bundles of twisted and knotted fibres of unstriated muscle. Peritoneum not present in sections. (2) Age 35. Only pregnancy eleven years previously. Ventri-fixation of uterus two years before admission. Right adnexa found to be adherent to uterus. Cystic left ovary removed. Periods painful since then. A tumour made its appearance in the scar. It increased in size at the periods. Excised together with piece of peritoneum. Structure of abdominal wall obliterated, replaced with scar tissue with brownish cysts. Tumour connected with fundus uteri, a part of the surface of which

was excised. *Histology*: Same as that of first case, except for absence of unstripped muscle. (3) Age 37. Several abortions. Operation on ovaries thirteen years previously. Since then three normal pregnancies, the last four years ago. For past six years pain in scar and dysmenorrhœa. Operation: Excision of thickened lower end of laparotomy scar, which contains blood-stained cysts. Peritoneum opened. Dense adhesions between stump of left adnexa, removed at first operation, and scar. *Histology*: See first case. No unstripped muscle present. (4) Unmarried woman aged 26. Periods always irregular. Laparotomy for tumour of ovary and ventri-fixation of the uterus four years ago. Tumour of lower end of scar for six months. Painful and enlarged at periods. Operation. Tumour under abdominal fascia. Not connected with peritoneum, which was not opened. Uterus adherent to abdominal wall. *Histology*: Similar to that of first case. Small round isolated areas of unstripped muscle.—Tobler¹⁹ records five cases. Four of them concern women aged 22, 25, 41, and 32 respectively, two of whom had undergone tubal sterilization two years previously, and a third a laparotomy for a tubal pregnancy twelve years ago. A small hernia was present in the scar in the last case. A tumour of the cicatrix was present for a year and a half, two years, and eighteen months respectively. It had given rise to pain at the periods. Tobler's last case concerns a woman aged 30, who had a tumour, 1 cm. in diameter, in the scar of a suppurated appendicectomy wound made six years previously. It contained minute brownish cysts. *Histology*: Dense scar tissue. Islands of endometrial tissue with cysts and tubules. Blood and pigment. No plain muscle present. In the case associated with a hernia the tumour was attached to the apex of its sac. The tubules are continuous at several spots with the peritoneal epithelium.—Lochrane⁹ operated upon a II-para aged 38, whose younger child was twelve years of age. Four years previously a laparotomy was performed for "displacement of the womb," and a tumour was noticed three years later in the scar. "It swells and gets very sore and tender at about the time of the periods." Menorrhagia and severe dysmenorrhœa since the last confinement. Operation: A diffuse, fibrous-looking mass, with ill-defined margins, under fascia of right rectus muscle in laparotomy scar. Shut off from abdominal cavity by the peritoneum only. Honeycombed with small cysts with thick dark menstrual-like fluid. The remains of two or three old catgut sutures are present in it. Anterior wall of the uterus, near fundus, attached to the site of the tumour by a narrow band consisting apparently only of peritoneum. Right ovary adherent to uterus, enlarged, and contains a hæmorrhagic cyst. *Histology*: Islands of endometrium imbedded in fibrous

scar tissue. Epithelium apparently ciliated in places. No mention of plain muscle.—Lemon and Mahle⁸ record nine cases of “post-operative invasion of the abdominal wall.” (1) Aged 46. Ventri-suspension. Tumour of laparotomy scar, midway between umbilicus and symphysis pubis, connected with fundus uteri and extending down into the right side of abdomen. Noticed for one year. (2) Aged 35. Ventri-fixation of the uterus four years previously. Hard irregular mass attached to fundus uteri below laparotomy scar. (3) Aged 38. Suspension of uterus. Mass in scar, adherent to fundus, painful at periods. (4) Aged 43. Ventri-fixation of the uterus twelve years previously. Hard irregular mass under scar. Fundus densely adherent to abdominal wall below it. (5) Aged 30. Shortening of uterine ligaments for prolapse five years ago. Mass in lower part of scar, attached to left Fallopian tube $3\frac{1}{2}$ cm. from uterine horn. (6) Aged 27. Salpingectomy four years previously. Operation for adhesions two years later. Mass in scar, adherent to fundus uteri. (7) Aged 36. Ventri-fixation three years ago. Tumour of lower end of scar, noticed soon after. Intermittently discharged bloody fluid. Not connected with uterus. (8) Aged 40. Hysterectomy and oöphorectomy six years previously. Mass in scar. (9) Aged 35. Double salpingectomy, right oöphorectomy, and appendicectomy nine years previously. Tumour of scar noticed six years later. Painful and enlarged at periods. Extended to peritoneum with omentum adherent to its inner surface. Not connected with uterus. *Histology*: Adeno-myomata. Fibrous tissue. Islands of endometrium. Epithelium occasionally ciliated. Hæmorrhages, blood pigment. Signs of inflammation. Smooth muscle present. First case contains miliary tubercles. Sections through fibrous bridge between tumour and fundus uteri when it was present, contain no glandular tissue.—Vassmer²⁰ saw an unmarried woman, aged 24. Ventri-fixation of the uterus four years previously. Two catgut sutures were passed through fundus, but its cavity had almost certainly not been entered. Since then periods painful, with a bloody discharge from a small nodule in the scar. Excision followed by recurrence of tumour. Second excision Fundus attached to scar by a band. *Histology*: Scar tissue. Islands of uterine mucosa, the tubules of which extend to skin and communicate with the surface. Separated from peritoneum by a layer of skeletal muscle. The band is built of plain muscle, etc., typical of the round ligament and uterus, and contains no epithelial structures.—Rosenstein¹⁶ saw an immovable firm tumour of a laparotomy scar, at about its middle between umbilicus and pubes, in a woman aged 23, who had undergone an operation for resection of both Fallopian tubes and ventri-fixation of the uterus five years previously. *Histology*: Scar tissue containing several “silk-

worm" threads. Tubules and cysts. Cellular stroma relatively scanty. Blood and pigment. No plain muscle.

I have described¹⁴ a case of an unmarried woman, 36 years of age, who had a colotomy and laparotomy performed two years previously for what she believes to be a suppuration in the pelvis. Both openings have since closed. Lately she has noticed a tumour, 2 cm. in its greatest diameter, in the lower end of the laparotomy scar. It is painful and increases in size at the menstrual periods, at which times she also complains of hæmorrhage from the bowel. The tumour was excised. It lay under the rectus sheath; its edges were ill defined. It did not extend as far as the peritoneum. It was firm and consisted of strands of fibrous tissue, in which a few brownish cysts were scattered. The uterus was not attached to the anterior abdominal wall. *Histology*: The tumour consists of very dense and non-cellular fibrous tissue, which is often wrapped about groups of thick-walled blood vessels, held together by hyaline envelopes of their own. The general fibrous tissue has undergone hyaline degeneration in many places. Plain muscle is entirely absent, but a good many fibres of skeletal muscle are visible, especially near the periphery of the tumour. The islands of endometrium are large and irregular. The tubules are large but few in number. Many are cystic. The stroma is generally non-cellular and fibrillar. It contains many thick-walled arterioles and dilated veins. The looser parts of the fibrous tissue and, to a lesser extent, the endometrial stroma are infiltrated with leucocytes. There are no fresh hæmorrhages and only a few small deposits of hæmosiderin in the stroma. The tubules are empty. The edges of the tumour are ill defined. Its fibrous strands are lost in the surrounding areolar tissue.

These tumours of laparotomy scars can be summarized thus: They are always found in adult women, between the ages of 22 and 50, with an average age of 36. They are usually associated with disturbances of menstruation, at any rate since the tumour was first noticed. The laparotomy in the scar of which the tumour developed had been performed as long as twenty-five years, or as recently as two years previously. The tumour was noticed after an interval of from a few weeks to twenty-one years. Increase in size of the tumour and pain at the periods are mentioned often, and were accompanied by a discharge of bloody fluid from its surface in three cases, described by Lauche,⁶ Lemon and Mahle⁸ and Vassmer.²⁰

It is a remarkable, but unexplained, fact that endometrial tumours of laparotomy scars are restricted to the lower half of the abdominal wall. Their highest point is the umbilicus.

These tumours can be grouped in accordance with the nature and purpose of the original operation.

Group 1: Ventri-fixation of the uterus. Fifteen cases, namely those of Meyer,¹¹ Klages,⁵ Mahle,² and McCarty¹⁰ (Case 2), Lauche⁶ (Cases 1, 2, and 4, Lochrane,⁹ Lemon and Mahle⁸ (Cases 1, 2, 3, 4, 7), Vassmer,²⁰ and Rosenstein.¹⁹ In all these, with the exception of Lauche's⁶ first case and of Lemon and Mahle's⁸ seventh case, the uterus was found to be adherent to the anterior abdominal wall. The peritoneum or omentum is stated to have been involved in the cases of Meyer,¹¹ Klages,⁵ Lauche⁶ (Case 2), and of Lemon and Mahle.⁸ In those of Lauche⁶ (Cases 1 and 4), Lochrane,⁹ Vassmer,²⁰ and Rosenstein¹⁶ it was not implicated.

Group 2: Operation for perforation or rupture of pregnant uterus. Two cases, those of Franqué³ and Cullen.¹

Group 3: Hysterectomy. One case, the eighth of Lemon and Mahle.⁸ Nevertheless this case is included by these writers in those due to "post-operative invasion of the abdominal wall" by endometrium.

Group 4: Operations on the Fallopian tubes or ovaries without hysterectomy. Six cases. Sterilization had been performed in two of Tobler's¹⁹ cases, and an operation for a tubal pregnancy in a third. In Lauche's⁸ third case the left adnexa were amputated. Its stump was found to be firmly adherent to the laparotomy scar. Salpingectomy had been performed in two of Lemon and Mahle⁸ cases. In the first of these the cicatricial tumour was adherent to the fundus uteri, and in the other to the omentum.

Group 5: Operations upon the uterine ligaments. One case, the fifth of those of Lemon and Mahle,⁸ in which the ligaments had been shortened for a prolapse of the uterus. The tumour of the scar was found to be adherent to the left Fallopian tube.

Group 6: Appendicectomy. Two cases, the third of Mahle and McCarty¹⁰ and the fourth of Tobler.¹⁹

Group 7: Uncertain. The case recorded above¹⁴ in which laparotomy and colotomy had been performed for "suppuration of the pelvis."

We see that of twenty-eight cases for which *data* are available, only fifteen had undergone ventral fixation of the uterus. In two of the remainder the operation had to do with the vermiform appendix and not the internal organs of generation.

The naked-eye and histological structure of these tumours of scars is identical with that of those of the groin and umbilicus, and need not be summarized. It corresponds with the uterine

mucosa, and there is plenty of evidence of participation in the menstrual function.

We have seen that the peritoneum was implicated by the tumour in several instances. Tobler,¹⁹ indeed, demonstrates histological continuity between the peritoneal epithelium of the hernial sac, to which the tumour was attached, and its tubules.

Unstriped muscle was present in the cases of Klages,⁵ Cullen,¹ Mahle and McCarty,¹⁰ Lauche⁶ (Cases 1 and 4), and Lemon and Mahle.⁸ In Cullen's specimen it formed the bulk of the connective tissue, and in those of Lauche it was present as isolated whorls and knots.

Meyer,¹¹ Lemon and Mahle⁸ (five cases), and Vassmer²⁰ state that, upon histological examination, no epithelium was found to be present in the band connecting the uterus with the abdominal scar after ventri-fixation. Fraas² on the other hand, found tubules and cysts in the adhesions, but emphasized that they barely extended below the surface of the uterus and were not present in the myometrium. He performed a thorough examination of the amputated uterus. In Lauche's⁶ second case the tumour was adherent to the surface of the fundus, but the area was not indentified with the microscope. Anatomical continuity between the epithelium of the uterine mucous membrane and that of the tumour has therefore not been established in one single case.

Endometrial tumours are explained with the help of one of three theories. It is assumed that the tumour arises either in a "cell-rest" which was displaced in development, or in a fragment of endometrium displaced in adult life, or by proliferation and change of type of epithelial cells of the peritoneum.

Embryonic theory.—The principal foetal structures that are invoked to explain endometrial tumours of the abdominal wall are the remains of the vitelline duct and urachus at the umbilicus, and those of the Wolffian body in other situations, especially the groin. We can dismiss the first two of these at once, since they are endodermal structures. The uterine mucosa is a product of the mesoderm. It is no more than a wild speculation to assume, upon no evidence whatever, that the endoderm gives rise to a typical mesodermal tissue.

With regard to the Wolffian body, it may be said that bits of it have been described in the embryo at or near the spot at which the inguinal canal is to be developed. There is not the slightest evidence that its tubules are present in other parts of the anterior abdominal wall. It is conceivable that endometrial tumours of the groin originate in Wolffian remnants, as well as those within and close to the broad ligaments, in which Wolffian tubules normally persist. But to assume that other intra- and extra-peritoneal

endometrial tumours are Wolffian in origin is contrary to the known facts of embryology. It is impossible for these tubules to stray to the umbilicus or to the intestines, except possibly in the very grossest and most monstrous malformations. And to believe that these "rests" happen to be present at the spot at which the laparotomy scar is subsequently formed and that they are included in it, is childish credulity.

There is no evidence that tumours which we can demonstrate to have arisen in foetal rudiments are more common than those in the genesis of which no such anomaly need or can be assumed. Again, all the evidence we possess points at the conclusion that remnants of foetal organs, where and when present, undergo differentiation and are therefore not disposed for tumour formation to a greater extent than other tissues. To assume, as is generally done, that *displaced* tissues are predisposed for tumour formation is simply the result of entire ignorance of embryology, since most of the assumed displacements are not only non-proven, but, as shown by R. Meyer^{12,13} long ago, actual physical impossibilities.

Nor is there a real proof that the epithelium of persistent remnants of the Wolffian body is ever differentiated into uterine epithelium. Even when endometrial tumours are found at the exact spots where its remnants normally persist, no proof has been brought forward that the one originates in the other. The whole of v. Recklinghausen's¹⁵ hypothesis of the origin of "adenomyomata" is based on inference unsupported by definite evidence. Again, endometrial tumours are unknown in the kidneys which, when everything is said and done, are developed from the same blastema as the Wolffian body.

To ascribe the presence of an endometrial tumour at a given spot to an undefined and undefinable "abnormal predisposition" of this spot is futile, and no more than an attempt to explain one unknown factor in terms of another equally unknown.

Displacement theory.—We owe this theory, which is too well known to need description here, to the ingenuity of Sampson^{17,18}. But what evidence is there, except that inferred from the presence of the tumour, that viable fragments of endometrium desquamated at a menstrual period reach the peritoneum and settle on its surface? Again, are Sampson's arguments supported by biological *data*? Is not *contra rerum naturam* for the currents within the Fallopian tubes to be so easily reversed? Is it not inconceivable, especially when we bear in mind the ultimate fate of transplanted tissues in general, that semi-necrotic desquamated cells, the physiological fate of which is to die, should not only settle and grow in a foreign situation with great regularity and ease, but proliferate with a vigour vastly in excess of that of the endometrium? In

spite of Sampson's assumed "intermediary host, hotbed, or incubator," I submit that this is inconceivable. Whatever the cells in which these tumours originate, they must be viable, active, vigorous cells.

Lauche⁷ justly remarks that the ultimate proof of the correctness or otherwise of Sampson's theory will be given by experiments with apes. We still await these, since those of Jacobson⁴ were performed with curettings and not with fragments desquamated naturally at a menstrual period, and therefore teach us nothing we wish to know.

Even the most whole-hearted supporters of Sampson's theory cannot very well apply it in its original form to the tumours of laparotomy scars, since they have no evidence that the operation was performed at a menstrual period. And once the wound is covered with granulations, these would most certainly destroy a fragment of endometrium implanted on them at the next period. The theory has thus been modified by the assumption that the needle used in placing the deep sutures at the operation had perforated the uterine cavity and torn away a fragment of endometrium and implanted it in the laparotomy wound. But what evidence is there of this want of skill or care on the part of the operator? I notice, indeed, that several of the writers who advocate this theory—and it is pretty generally held by British and American gynaecologists—are careful to make it perfectly evident that the original operation was not performed by themselves. It is obvious, of course, that accidents will happen, and that even the best surgeon might wound the endometrium, but I submit that reasonable evidence must be produced that it actually did happen. Unsupported assumptions are not working hypotheses, although the two are often confounded.

Is it probable that a needle, however large it be, provided it have a point, even a very blunt one, would tear fragments of tissue away from their surroundings and push them for considerable distances? This is as improbable as with the smallest needles. The case is entirely altered should the point be broken off, for then a rough surface would result, which would be an admirable agent for laceration and transport. Although I cannot speak from personal experience, I am unable to conceive of even the most careless and inefficient surgeon stitching the uterus to the abdominal wall with a broken needle.

And should a fragment of endometrium be torn away and adhere to the needle or ligature, would it not be arrested almost at once—in the deeper layers of the myometrium—by the resistance and friction offered by this tissue to its progress? Surely the opposite should happen from what we know actually takes place,

The most frequent site of these implants should be in the uterine wall, the next under the peritoneum, and the least in the laparotomy scar. We cannot even presume a "predisposition" to account for this anomalous behaviour, since endometrial tumours are infinitely commoner in and on the uterus than in laparotomy scars. And that displacement alone predisposes for tumour formation and the further the tissue be removed from home the more likely it is to flourish is an exploded notion, as I have indicated above.

Peritoneal theory.—This assumes that the epithelial cells of the peritoneum, when they proliferate in response to an irritation, the nature of which is unknown, undergo differentiation *in situ* into uterine epithelium. Although there is not very much nor very conclusive evidence in its favour, it is applicable to certain cases at least and, which is of great importance, compatible with biological facts. It is the best theory hitherto devised to account for endometrial tumours of the intestines and peritoneal surface of the uterus and its adnexa, and applies to those of the umbilicus, the groin, and laparotomy scars. It will be well to review the evidence in its favour.

(a) *Direct evidence.*—It has been shown in a good many intra-abdominal tumours that they permeate the wall of the gut, uterus, etc., from without, and in several cases direct histological continuity has been established between the peritoneal epithelium and that of the tumour. This applies, as we see, to Tobler's¹⁹ tumour of a laparotomy scar.

(b) *Biological evidence.*—We must—at least those of us who are pathologists—take an epigenetic view of development and differentiation, and assume that an organ is produced in its normal situation, and nowhere else, because its cells are subjected to a long sequence of appropriate stimuli only at this spot, the cumulative effect of which is the assumption of the corresponding physiological structure. Thus, endometrium is produced only at one spot, not because the epithelium or other parts of the cœlom of the embryo is incapable of undergoing differentiation in this direction, but because the environment, to which it is the response, directed this change here, and nowhere else, throughout embryonic life. Although it is inconceivable that endometrium could be produced in other parts of the peritoneum in development, it is a matter of experience that it never is, since accessory ducts of Müller are not found except in the immediate vicinity of the principal ducts, and endometrial tumours are unknown in embryos and children. Until these things have been demonstrated in them, it is contrary to experience to assume that the tumours in

women originate in congenital accessory uteri or congenitally pre-disposed cells. To the best of our knowledge *the tumour is always acquired*. It is something new. It follows from this that there is not the slightest evidence that its cells of origin were not, at one time, perfectly healthy, normal cells.

(c) *Pathological evidence.*—Since, as I have attempted to show, the structure ultimately assumed by the cells depends largely upon the influence of their environment, it follows that, should the latter change, the former may undergo a corresponding change. Evidence is steadily accumulating that this actually happens in many pathological states. Examples are heterotopic bone formation and metaplasia of epithelium. There is no *a priori* reasons why every differentiation undergone in development by the tissues of the embryo should not be repeated during the whole life of the individual in pathological states. Since the endometrium arises in the cells of the cœlom, the peritoneal cells of the adult may well produce endometrial epithelium again if they be subjected to a suitable abnormal environment. I believe this conclusion to be sound and unassailable, since it is backed by good evidence. Our great and, at present, insurmountable difficulty, when we apply it to endometrial tumours, is that we have no idea of the nature of the environment changes. We know that the alteration of type or metaplasia depends upon an influence exerted by the functioning ovaries, since endometrial tumours are absent in males and sexually immature females. Again, we know that the alteration is associated with proliferation of the peritoneal epithelium and a mild degree of inflammatory reaction. But we do not know if the proliferation be a response to an inflammation or of the nature of a compensatory regeneration, a possible attempt at balancing a defective uterine secretion.

This state of uncertainty is mainly responsible for the differences of opinion as to the status of these anomalies, whether they are to be regarded as regenerations or true tumours. For it must be admitted that, in our ignorance of tumour formation, we are inclined to call every nodule of new tissue a tumour when we cannot find a cause for its presence, and a regenerative hyperplasia when we can associate it with a causative agent. Without entering into this question in detail, I personally regard endometrial tumours—together with many, if not all neoplasms—as partaking of the nature of both. They are clearly hyperplasias or accessory uteri in the perfection of their histological structure and the performance of the physiological functions of the endometrium, *e.g.*, menstruation and decidua formation. They are tumours in their often isolated and independent mode of growth

and the assumption of irregular shapes. For me they are important links between the physiological tissues and the tumours. I have named them "endometrial" in this paper because they are structurally and functionally identical with the endometrium, and "tumour" simply in the original connotation of the word, which means no more than a swelling or lump.

I have not discussed the typical "endometrial" stroma of these tumours nor the plain muscle in them, since the presence of these structures is readily explained when we admit that the epithelium has become truly "endometrial." It is a well known fact that the epithelia in normal development and pathological growth exert an influence on the cells of the mesenchyme with which they happen to be in contact, and make these assume a corresponding structure. I therefore regard the stroma and muscle of these tumours simply as local mesenchyme cells or connective tissue corpuscles, altered and metamorphosed by the "endometrial" epithelium into "uterine" mesenchymal tissues.

Conclusions:— 1. Endometrial tumours are acquired accessory uteri.

2. Of the theories which attempt to explain them the "peritoneal" is the most generally applicable, and its acceptance offers the fewest difficulties. It alone agrees with biological facts.

It has been suggested that desmoid tumours of the abdominal wall are in reality endometriomata. I regard these tumours as fibro-sacromata that have the peculiarity of at first appearing as fibromata and recurring time after time as more malignant sacromata. They are equally common in both sexes, have no connection with a scar and have nothing to do with endometrial tumours.

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