

Intramural Cysts of the Uterus.

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THE study of cysts of the uterus is complicated on account of their great variety, and their etiology, which is often unknown, but perhaps chiefly, because they are not of frequent enough occurrence to allow any single individual to collect and study a sufficient number of cases to form a personal conclusion on the various points.

In this work I have intentionally restricted the field. I shall confine myself entirely to cysts formed in the muscular wall of the uterus, and lined by epithelium. I shall not discuss subperitoneal cysts, or cysts in the mucous membrane, or cystic fibromata or adenomyomata, subjects which have been widely studied, and on which much has been written. I have found a number of recorded cases which seemed at first sight to belong to my subject, but on closer study I found they were cases of cystic degeneration—such was the interpretation of the case reported by Loebl. Further, I shall not consider cases as interesting as “the ureter opening into a utero-vaginal cyst of the Wolffian canal” (Robert Meyer) as it is not, strictly speaking, a cyst of the uterus. In doing this work I think I am rendering some service as, to my knowledge, it has not yet been done. Authors have treated true cysts of the uterus with fibromyomata, adenomyomata or cases of simple aberrant epithelium. I have been fortunate enough personally to examine two cases, and to obtain notes of a third case.

Case I occurred under the care of Prof. Beuttner, and for Cases II and III I am indebted to Dr. Huguenin. I heartily thank Prof. Beuttner for the warm welcome which he gave me to his hospital and for all the facilities for study which he placed at my disposal, and Dr. Huguenin for his kindly counsel in the laboratory.

CASE I. (a) *Clinical History.*

Narcisse Gavairon, age 47. Cook. Admitted, August 25, 1909, to La Maternité, Geneva, under the care of Professor Oscar Beuttner. The family history revealed nothing of special interest.

Menstruation began at the age of 12 years, lasting 8—10 days, every 15 days, very abundant and with much pain in the lower

abdomen. The last period lasted from August 1 to 10, and again on August 20 continued to the time of admission on August 25. Leucorrhœa, abundant, yellowish-white. One confinement in 1883. Breech presentation; child still-born. No other pregnancy. No history or signs of gonorrhœa. The patient has suffered from pain in the lower abdomen since her confinement in 1883. Two years ago the patient was operated upon for pelvic abscess. Stools always offensive, and the patient had noticed pus in them.

The present illness began on July 28 with severe pains like those of labour. The patient was seen by two doctors who diagnosed pelvic abscess. There was no fever; the patient was treated by poultices and injections.

Gynæcological examination, August 25, 1909. The abdomen is distended; not painful on pressure. Palpation shews a tumour rising four finger-breadths above the pubes. P.V. The vulva and vagina are those of a multipara. The cervix is directed to the front and left, it is conical and has a transverse tear. The tumour is the size of a man's head, smooth and elastic, slightly painful on pressure, and somewhat pear-shaped. The fundus is round and has hard outgrowths which are prolonged to the pelvic walls.

Operation. Median incision from the symphysis to the umbilicus. On opening the abdomen the uterus was seen enlarged. Some small subserous fibroids were present in the wall. On the left side the appendages were adherent and formed a mass. The uterus was divided in the middle line and a little pus welled up from below. The two halves of the uterus were drawn upon by forceps. The left half was removed and in the process a cyst was perforated and its sanguineous contents escaped. The broad and round ligaments were divided between clamps. After hemisection the uterine artery was clamped with Faure's forceps. The right half of the uterus was removed without piercing the cyst. After suturing the stump of the uterus with three separate catgut sutures, it was covered by peritoneum. The uterine artery was ligatured. The appendix was seen short and thin. The abdomen was then closed.

(b) *Pathological Specimen.* (1) *General View.*

Hemisection and subtotal extirpation of the uterus. The section passes obliquely from above down and left to right, and does not reach the cervix. The cut surface of the *left* half measures 5 cm. from left to right, 8.3 cm. from above down and is 6.25 cm. thick. The knife passed through three fibromyomata in the uterine substance, and there is another subserous myoma on the posterior surface. The

left appendages are matted together and with the uterus. It is difficult to find the ovary.

The *right* half of the uterus measures from left to right 3·75 cm., from above down 5·8 cm., and is 6·25 cm. thick. On the cut surface are 8 fibromyomata varying in diameter from 1·25 mm. to 2·7 cm. They are spherical in form and easily shelled out. The right appendages are bound together by lamellæ of fibrous tissue which also unite them to the uterus. The right ovary measures 1·7 × 1·5 × 5 cm. The section shews numerous corpora albicantia and cysts with colourless contents. The right Fallopian tube is curved with the abdominal end firmly adherent to the uterine pole of the ovary. The tube is twisted on itself and has the form of a retort. The retort is the size of a fist and is filled with pus.

(2) *Macroscopical View of Section of the Cervix.* See Fig. I.

The section is taken from a piece excised 1 cm. below the surface cut in the operation, and is embedded in paraffin and coloured with hæmatoxylin eosin.

The preparation shews half a transverse section. The lumen of the cervical canal is a rent about 4 mm. long and 1 mm. broad at its widest part. The first point which strikes the naked eye is that the cervical canal is surrounded on all sides by cysts occupying about $\frac{1}{3}$ of the section, and on the left hand upper corner is a large cyst 10 × 6 mm. in diameter. The smaller cysts vary in diameter from less than 1 mm. to about 3·25 mm.

(3) *Microscopic View.*

The magnifying glass shews their shape to be spherical or slightly oval; irregular forms such as stellate or hour-glass are rare. This enlargement of 8 diameters also shews some cysts which escaped the naked eye. The contents of the cysts are also shewn as a more or less homogeneous mass with in some cases a concentric formation (see Fig. II). In some are apparently droplets of clear mucin. In some of the cysts the contents stain most readily with hæmatoxylin, in others with eosin. Even with this slight enlargement the greater number of the cysts are seen to be embedded in the muscular tissue. In places the latter seems prolonged into the mucous membrane so that the limit between them is not well defined; the depth of the mucous membrane is about 1·5 mm.

The *low power* seems to shew that the external surface of the section corresponds with that of the uterus. The cysts furthest from the cervical canal do not reach the parametrium, they are always

separated from it by a band of muscular tissue, sometimes only .2 mm. thick. The muscle bundles are arranged in various directions. The connective tissue is moderately developed. The blood-vessels are average in number and their walls are not thickened.

High Power. The surface epithelium of the mucous membrane is wanting in many places, but where it persists it consists of a single layer of cylindrical epithelium, non-ciliated. The glands are moderate in number and often ramified, and are lined by a single layer of cylindrical epithelium with secretory products accumulated at the end nearest the lumen; the majority of these cells have a darkly stained nucleus at their base; the nuclei are round or oval. There are some cells in which the nucleus is pale and situated in the middle of the cell. The lumen of the gland is either empty, or sometimes contains a substance homogeneously filamentous. The stroma is slightly sclerosed. Under the *oil immersion* the nuclei are seen to be generally irregular; some fragments of nuclei are also seen resembling grains stained deep blue like the entire nuclei. Very occasionally there are some polynuclear leucocytes. The cysts under the high power (Fig. III) are seen lined by a single layer of cylindrical epithelium with a deeply stained nucleus at the extreme base of the cell. The extremity of the cell nearest the lumen often containing hyaline droplets. The height of the cell is variable, that of the shortest is about $1\frac{1}{2}$ times their breadth. The longest cells are about three times as long as they are broad. The protoplasm is generally faintly coloured. In some places there are small diverticula, in which at first sight the epithelium appears to be of more than one layer, but that this is not the case is seen on using the micrometric rule which shews that they are in different planes, indicating that they are the nuclei of cells lining a curved cavity. The contents of the spaces often consist of a substance in concentric layers with almost always desquamated cells and sometimes mono- and polynuclear leucocytes. The abundance of cellular elements in the cysts varies, sometimes rich sometimes poor. The high power shews that it is not possible to distinguish the protoplasm and nuclei in these desquamated cells, and it is not easy in all cases to recognize their nature.

In the muscular tissue some spherical masses of epithelium are seen which are not dilated into cysts; these are formed in irregular shape, but always lined by a single layer of cylindrical epithelium. The connective and muscular tissue contain some polynuclear leucocytes.

Resumé of Case I:—Uterus removed from a patient aged 47 by hemisection on account of disease of the appendages and fibromyomata of the uterus. A section taken from a piece excised 1 cm. below the surface cut in the operation shewed a cyst 10 × 6 mm. near the left hand upper border of the cervix. Under the microscope the muscular tissue surrounding the cervical canal was seen to be occupied by cysts covering about $\frac{1}{3}$ of the section and varying from 1 mm. to 3·5 mm. in diameter.

CASE II. (a) *Clinical History.*

A woman, aged 45 years, suffering from frequent, profuse and painful hæmorrhage. The first examination shewed an enlarged uterus. The first curetting gave relief which only lasted a few weeks. A second and a third curetting had no more favourable result. As the patient became feeble and very thin, it was decided to remove the uterus.

Operation. Removal of uterus and appendages.

(b) *Pathological Specimen.* (1) *Macroscopical description.*

The ovaries shewed many cysts with serous and hæmorrhagic contents. The uterus was voluminous, its cavity narrow, the walls varied in thickness from 2½ to 3 cm. The fascicular structure was marked. Some vessels were visible to the naked eye. At about the level of the internal os uteri on the left side there was a small cavity. The centre of the cavity was about 3 mm. from the uterine mucous membrane. The cyst was only recognized after the specimen was fixed in formalin, and it is only possible to note that the contents appeared as a coagulum. Between the muscular tissue and the cavity there was a little white transparent tissue.

(2) *Microscopic Description.* Object: E. Zeiss. Oc. ii.

Section through the upper half of the cervix. Stained with hæmatoxylin eosin. A cyst about 4 mm. in diameter (see Fig. IV) is visible to the naked eye, situated near the mucous membrane. The microscope shews that between the cavity of the cyst and the muscular tissue there is an intermediate zone of a structure similar to that of the mucous membrane of the cervical canal in the same section. In fact there are glands here situated in a bed of cytogenous tissue (Recklinghausen), a tissue essentially constituted of cells whose nucleus, round or oval on section, is alone visible. Connective tissue fibres are excessively rare. The cavity of the cyst is lined by a single layer of non-ciliated cylindrical epithelium. This epithelial lining is not everywhere well preserved—in some places it is quite

CASE II.



FIG. 4.



FIG. 5.

destroyed, in others it is in process of necrosis. Surrounding the principal cavity there are some canaliculi also lined with cylindrical epithelium (see Fig. V). In the section the canaliculi appear as rents, of which the lumen is about the same size as the height of the cylindrical epithelium; other large canaliculi are more important and have a diameter about 5 times as large as the height of the epithelium. The shape of these canaliculi is simple, sometimes ramified, sometimes containing a papilla-like projection. The line of demarcation between the cytogenous tissue and the smooth muscular tissue is very irregular. Between the cyst and the mucous membrane of the cervical canal are some glandular canaliculi which approach very close to the cyst. The epithelium of these aberrant cysts is directly in contact with the smooth muscular tissue; I was not able to demonstrate their continuity with the wall of the cyst. The uterine muscular tissue shews nothing of special interest. The connective tissue does not as a rule occupy more space than is normal. There is no infiltration of leucocytes. The cervical mucous membrane shews traces of old hæmorrhage. The glands are tortuous, otherwise there is nothing particular to note.

Resumé of Case II:—Uterus removed from a patient aged 45 on account of hæmorrhage which was not relieved by three successive curettings. At about the level of the junction of the body and cervix there was a small cavity visible to the naked eye. The centre of the cavity was about 3 mm. from the cervical mucous membrane. The microscope shewed that the wall of the cyst was formed of a structure almost identical with that of the cervical mucous membrane. There were no signs of inflammatory changes or cicatrization.

CASE III.

A fibromatous uterus removed on account of hæmorrhage. Near the internal os uteri on the left side was a cyst about $1\frac{1}{2}$ cm. in diameter. It was spherical in shape and situated about equidistant from the mucous membrane and parametrium. The walls were smooth and traversed by numerous vessels. The contents were serous. Unfortunately the specimen was lost and no microscopic examination could be made. The size of the cyst seems a link between the very small cysts usually met with in pathological specimens, and those which by their volume attract clinical attention. The absence of any inflammatory changes visible to the naked eye is rather in favour of a congenital origin, as also its situation near the internal os uteri.

Cases Collected from Publications.

Salva Mercadé. Cysts near the Interstitial portion of the tube.

Observation 1. A. T., aged 40, admitted into La Pitié under the care of Professor Terrier, March 9, 1904, for menorrhagia and pain in the hypogastrium.

Menstruation began at 16, always normal, painless, lasting 4 days. Married at 17; first child at 18. Confinement and lying-in normal. At 30 years again a normal confinement, but the child died in 6 days. From this time the periods were normal but accompanied with slight pain and white discharge. No miscarriages. In May, 1902, A. T. began to feel pain in the right iliac fossa radiating down the thigh, especially after a long walk. The menses began 4 or 5 days earlier; they were preceded by a sensation of weight and dragging in the lower abdomen, especially on the right side. These pains persisted during the first days of menstruation. About the same time micturition became scanty, painful and frequent. This condition continued for about 6 weeks, when suddenly the pains became more intense. Fever began accompanied by obstinate constipation and complete retention of urine. Dr. B., who was now consulted, diagnosed pelvic peritonitis. The symptoms continued serious for about 8 days, when they began gradually to mend. Seven weeks later the patient got up. Menstruation became normal again, but the patient always suffered during this time from slight pain in the lower abdomen, especially on the right side, with radiation into the groin, down the thigh and sometimes into the lumbar region. Between the periods the above symptoms, with the exception of fatigue and troubles of micturition, disappeared. Four months ago, December, 1903, after fatigue, the pains appeared afresh, very intense and without respite. Their localisation was always the same. They were dull, continuous, with frequent paroxysms, especially at the time of menstruation, which was accompanied by blackish clots. There was no white discharge. From time to time the habitual troubles of micturition gave place to complete retention of urine.

Condition on Admission. Abdominal palpation gave rise to slight pain in the iliac fossa, especially the left, but nothing was felt. Vaginal examination shewed the uterus normal. In the left cul-de-sac a mass was felt the size of a mandarin, very mobile, slightly painful, separated by a distinct groove from the uterus. In the right cul-de-sac a diffuse mass was felt, probably the appendages with chronic inflammatory changes.

Diagnosis. Double hydrosalpinx.

Operation. March 12, 1904, by Prof. Terrier, assisted by M. Gosset. Supra-vaginal hysterectomy, without drainage. Recovery; discharged 21 days later.

Examination of Parts Removed. Right ovary healthy. The right tube was distended in its outer $\frac{1}{3}$, forming a cyst the size of an orange, with thin walls shewing liquid translucent contents. Left ovary healthy. Left tube formed a large serous cyst in its outer extremity about double the size of the one on the right side. The uterus was of normal size and shewed at the level of the junction of the left tube with the fundus a cyst the size of a large pea projecting under the peritoneal covering. The cyst appeared to be directly under the peritoneum or at least covered only by a very thin membrane. Half the circumference of the cyst projected, the other half was entirely in the parenchyma of the uterus. The walls could be slightly depressed on pressure. The contents were a yellow liquid, like that contained in the cystic tubes. The histological examination of the

specimen by Lecène shewed: (1) Below at A the lumen of the tube divided in its interstitial portion and surrounded by muscular fibres. (2) All round the tube, scattered in the thickness of the uterine muscle are canaliculi formed by tiny tubes paved with ciliated cylindrical epithelium. (3) Above at K the lumen of the cyst is lined by a cylindrical epithelium, ciliated in some parts. A papilla projects from the interior of the cyst covered by the same epithelium. This portion is represented separately on Fig. 8. It appears that the cyst is formed by the cystic dilatation of one of these adjacent tubal cysts.

Observation II. Marie C., aged 42, admitted April 20, 1904, into La Pitié under the care of Prof. Terrier for pain in the abdomen for two months.

Personal history reveals nothing particular. Menstruation always normal, slight, not painful, lasting 5 to 6 days. At 18 years a normal confinement. General health always good. No miscarriages. No white discharge. Nothing abnormal on the part of the bladder, rectum or digestive tract. For last two months patient has felt pain in the lower abdomen without precise localisation radiating particularly down the right thigh. About the same time patient noticed that her abdomen increased in size and she felt a tumour. Inspection shewed a large abdomen, but the walls were fat. No collateral circulation.

Vaginal Examination. Cervix atrophied, inclined to the left. The fundus is deviated to the right of the median line, three fingers above the pubes and moveable. On the left of the uterus, distinctly separated from it, is a globular, mobile mass, its upper limit reaching the umbilicus. On the right is a small tumour, not painful, moveable.

Diagnosis. Double cysts of the broad ligament.

Operation. April 27, 1904, by Prof. Terrier, aided by M. Gosset. Median laparotomy. On the left a cyst of the broad ligament, size of two fists, pushing the uterus to the right. Uterus slightly enlarged. Section of broad ligament close to the uterus. Section of round ligament. Attempt made to enucleate the cyst, but owing to its size and adhesions it was punctured; 400 grms. of sero-sanguineous liquid withdrawn. The utero-ovarian ligament was sought for and found in the iliac meso-colon. Supra-vaginal amputation of the uterus from left to right (American method). Enucleation from below upwards of the right appendages. Stump cauterized and rendered extra-peritoneal. Ligature of the vascular pedicles with silk. Appendicectomy, the appendix appearing large, long and inflamed. Peritoneum and aponeurosis sutured with catgut. Horse-hair for the skin. Drainage; healed in 21 days.

Examination of Specimen. On the left an intra-ligamentary cyst the size of two fists. On the right a smaller cyst. The contents of the cysts were sero-sanguineous. The uterus was slightly enlarged, shewing at the level of the left cornu a small cyst about the size of a pea projecting under the peritoneum. The appearance of this cyst was similar to the intra-ligamentous cyst and its contents were also sero-sanguineous. The structure was in all points similar to that of the preceding case. The section shews: (1) The tube in its interstitial portion. (2) Epithelial débris scattered in large quantities in the uterine muscle and lined on the inner surface with ciliated cylindrical epithelium. At K these débris already form true cysts. (3) The cyst which projected under the peritoneum was also clothed with cylindrical epithelium, ciliated at some points and shewing slight projec-

tions of the wall, better shewn under a high power. To sum up, the same process seems to be present here, viz., cystic dilatation of one of the adjacent tubal groups of epithelial débris of which the cysts K' seem to be an intermediate stage.

Huguier. Serous Interstitial Cyst developed in the thickness of the posterior wall of the body of the Uterus.

Woman, aged 66. Died from cancer of the left breast. Married at 26. 9 months later two still-born children. 5 years later a child thriving.

Post Mortem. In the thickness of the posterior wall of the uterus a tumour the size of a large orange is found. Commencing below in the posterior part of the cervix and ascending the whole length of the posterior surface of the body and 6 cm. above it. It is 10 cm. high, 9 cm. broad, and 7 cm. thick. It is pinkish-white and opaque in all its extent except at its upper extremity where its thin walls are transparent. The thickness of the wall varies very much according to the parts examined. It is composed of 4 layers from without in (1) the peritoneum, (2) the proper tissue of the uterus, (3) a cellular fibrous membrane adhering feebly to the proper structure of the uterus, but which is united very intimately to (4) the true or internal tunic of the cyst. The latter is smooth, shining and has not the slightest inequality on its inner surface. It contained a mobile fluid like water, very clear, citron coloured, non-viscous to the touch. The cyst formed so much a part of the uterus that it was thought to be a case of hydrometra. The cavity of the uterus was found at the lower and anterior surface.

Stufler. Rare Cyst of the Uterus extirpated by Laparotomy.

Patient aged 43 years. Married. No profession; entered *June 1, 1903*, the Gynecological Institute, Modena. No hereditary or personal antecedents.

First menstruated at 13 years; always normal; lasted 7-8 days; never leucorrhœa. Married at 25 years, 9 pregnancies, 7 normal, but the 3rd and the 7th interrupted at the 3rd month with abundant loss. Last confinement July 23, 1901. In the beginning of 1903 the patient had some metrorrhagia which ceased under appropriate treatment. *Since April, 1903*, she had recognized the presence in the right iliac fossa of a round tumour, mobile, sensitive to pressure, as large as a fist, and which has increased in size since the patient entered the hospital. At present the abdomen bulges in the region of the right iliac fossa. On palpation the tumour is not very resistant and formed of bosses which are as irregular in their consistence as in their volume, some elastic and more or less resistant and some of a fibrous consistence. The tumour reaches the iliac spine on the right side, and as far as two finger-breadths from the left iliac spine. Above it reaches as high as the umbilicus. Per vaginam, uterus retro- and left sinistro-version. Sensitive to the touch at the level of the front part of the uterus. The internal examination combined with palpation shews that the tumour is inserted at the right corner of the uterus, to which it is attached by a hard cord.

Diagnosis. Cystic tumour of the right appendages, perhaps cyst of the ovary. Patient left the hospital June 10, but returned the 18 of January, 1904. General condition unaltered. Periods normal, a few days too soon. Some vague pains in the hypogastrium. The tumour has increased in size

and there is some ascites. In addition a new tumour is noticed on the left side of the uterus, smooth, elastic, almost fluctuating, which seems to be an enlarged "bosselure" of the primitive cyst or a new tumour developed on the left of the uterus.

Operation. March 9, 1904. On opening the abdominal cavity, a large multilocular cystic tumour is found, without adhesions and attached to the anterior surface of the uterus by a short thick cord which is inserted directly into the anterior surface of the uterus at a short distance from the fundus and $1\frac{1}{2}$ cm. from the left border through a distance of $3\frac{1}{2}$ cm. in the longitudinal direction and $1\frac{1}{2}$ cm. in the transverse. Section of the pedicle. A continuation as a cul-de-sac into the myometrium, to which it is very adherent, is then noticed. It is resected, and the uterine wound is closed as after a myomectomy. The left ovary, which is sown with small cysts, is removed. The right ovary is sclerosed. Closure of the peritoneum and of the muscular aponeurotic layer by catgut. Suture of the wound by separate stitches. The patient is discharged healed April 4, 1904. Weight of the tumour 2770 grms. It is formed of several cystic bosses, of which the largest measures 12 cm. in diameter. Around this last 15 tumours are counted, the diameter varying from 3—10 cm. Further, arising here and there from the external surface of the large cyst, or from spaces which separate the different cysts, or from secondary bosses, small cysts the size of a grain of millet are observed. The external wall of these cysts is smooth, elastic, very transparent, with a very fine vascular network. The interstices between the different bosses are formed of loose cellular tissue threaded by dilated vessels; they are very deep. No trace of a moveable layer of peritoneum is found on the surface of the tumour. On opening, the interior surface of these cysts appeared smooth. The liquid is a very transparent, colourless fluid, sp.gr. 1004. Reaction alkaline. Slight precipitate on heating. Does not contain sugar.

Microscopic Examination. The point of implantation of the pedicle is shewn as a connective tissue, fairly dense and fairly rich in nuclear elements, in direct continuation with muscular layer of the uterus. The wall of the cyst is formed of two layers quite distinct from one another. The external is formed of an undulated connective tissue poor in cellular elements. The internal is formed of loose connective tissue rich in connective tissue cells and in muscular tissue. The *epithelial layer*, which is wanting in places, is formed of *cylindrical cells* arranged in one or more layers with a tendency in places to proliferation. This epithelium, examined in situ, is shewn deprived of cilia.

Candelet. Interstitial Cyst of the Uterus resembling an Ovarian Cyst, and removed as such.

M. Candelet communicated the following observation. The woman, aged 43 years, was admitted under the care of M. Demarquay for an abdominal tumour, first observed two years previously. Until that date the general health had been good and the periods regular, when she noticed a tumour developing in the left iliac fossa. The tumour grew and reached beyond the median line and 8 cm. above the umbilicus. It was smooth, had no bosses and no adhesions. M. Demarquay diagnosed an ovarian cyst and made an exploratory puncture which gave 5 litres of a lemon-yellow liquid, perfectly limpid. This confirmed the diagnosis, and as the general condition of the woman was excellent it was decided to perform ovariectomy. The operation was painful and laborious and lasted $2\frac{1}{2}$ hours.

The surgeon recognized after opening the abdomen that the tumour sprang from the uterus and not from the ovary. Nevertheless the cyst was emptied and drawn outside. The ecraseur was applied to the pedicle at the fundus of the uterus and after section the peritoneum was sutured. Patient died 36 hours later. Examination of the specimen after the operation, and of the uterus at the autopsy, shewed that it was a cystic pouch developed in the thickness of the uterine wall, in the middle of the muscular fibres. The walls of the cyst were formed by the muscular fibres of the "Vie organique," of which some shewed the modification caused by pregnancy. Nowhere was mucous tissue found. The uterus, which was relatively slightly developed, was only 15 cm. long, and shewed on its surface *other little cysts of the same nature and in process of formation*. They were small and filled with blood. They could be seen shining through like bluish spots.

**Rosenthal. Cystis intramuralis uteri e canali
Gärtneri. Endometritis polyposa.**

B. P., aged 20 years. Married 4 years. Menstruated first time at 13 years of age, every 4 weeks, lasting 5 to 6 days. First year of marriage 1 child. Two years ago one miscarriage.

One year ago the patient felt a tumour in the lower part of the abdomen which grew slowly. Five months ago she consulted a doctor who diagnosed pregnancy at 8 months. As the confinement did not take place, she entered hospital October 9, 1899. The patient is well developed, not stout. Constipated. Heart and lungs sound. Abdomen has all the dimensions of a nine months' pregnancy. An elastic tumour reaching two fingers breadth below the sternum.

Diagnosis. Cyst of right ovary; intraligamentous.

Operation. November 13, 1899. Laparotomy. The right wall of the cyst loses itself in the pelvis and is intimately adherent to the posterior surface and the right wall of the uterus. The tumour was only partially extirpated, on account of the adhesions. The patient died 34 hours after the operation.

Post Mortem. The wall of the cyst was thick. The *internal surface* was smooth, covered with *cylindrical epithelium*, non-ciliated. The wall is entirely formed of connective tissue. On the left side the tube is normal, the ovary is cystic, the size of a prune. The left half of the uterus is of normal size. The transverse diameter of the uterus is enlarged and adherent to the wall of the cyst, of which a part still remained attached after the operation. The wall of the cyst is much spread out. The cyst seems formed at the expense of the canal of Gärtner. The uterine mucous membrane showed polypoid endometritis.

Anatomical Diagnosis. Intramural cyst of the uterus arising from the canal of Gärtner.

Peán. Interstitial Cyst of the wall of the Uterus.

Woman, age 27. Menstruated at 15 years. Always very irregular.
Married at 18 years. No children.

History 3 years. Volume of tumour very variable, seems influenced by the monthly periods. No puncture. The abdomen is about the size it would have been at full term of a normal pregnancy. The tumour is globular, not nodulated, smooth, distinctly fluctuating, and forming part

of the uterus. The cervix is found high. Short incision. A tumour of reddish-brown colour appeared. No anterior adhesions. No ascites. Puncture. 13 litres of serous liquid. The sac being emptied, the walls retracted more markedly than is the case with ovarian cysts. Its origin is seen to be direct from the uterus and that it is an interstitial cyst developed in the posterior wall. The wall was ligatured below the cavity and on tying the ligatures tightly a sort of pedicle was formed. This was brought between the lips of the wound at the inferior angle where it was fixed with the corresponding portion of the uterus. The rest of the abdomen was closed.

Kessler. A Cyst of the Uterus.

The uterus and vagina of a widow over 50 years of age were removed in one piece (Olshausen's method) on account of cancer of the portio and several carcinomatous patches in the vagina. The cyst, *the size of a walnut*, lies in the anterior wall of the uterus. Macroscopically the cavity seems fairly smooth. Here and there are coagulum and débris. Up to the present *no lining epithelium has been found*—rather the inner surface seems formed of the muscular structure in process of complete disintegration. The muscle bundles and threads which lie nearest the lumen seem broken off and loosened from the more normal or less concentrically arranged layer which border it. In some cases entirely loose they are lying free and without order in a bed of celloidin. Towards the uterine cavity, the cyst is hidden by the atrophied mucous membrane and a muscular layer 4 mm. thick, whereas towards the perimetrium the wall in its thinnest part is only 1–2 mm. thick. It is not impossible therefore that by continual destruction of the wall at this spot eventually an opening into the peritoneal cavity might have followed. I regret I can give no information as to the contents of the cyst. Before the operation it was taken to be a soft interstitial myoma explaining the cause of the thickening of the uterus. An assistant later made an incision into the supposed tumour and allowed the contents to escape without noticing their character.

Pénard. Interstitial Cyst.

Patient age 36. Died of phthisis. Had never menstruated. Slight migraine only each month.

Uterus. A fibrous tumour .01 cm. diameter on the upper and middle part of the uterus. The anterior surface of the uterus appears swollen and a little injected. On the left are a large number of small yellowish cysts, hydatiform, independent of each other, and fixed to the tissue of the uterus itself. *On the right only one is seen, which seems completely lodged in the thickness of the organ.*

Recklinghausen (Case XVI. P 61). Atheromatous Cyst in Cervix.

“. . . No myoma or cysts are found in the substance of the corpus uteri. But in the *cervix* are *tiny mucous membrane cysts*, and in the *left wall* a *round atheromatous cyst 5 mm. diameter filled with desquamated squamous cells*, and situated *1 mm. outside the mucous membrane*. Further off on both sides is a longitudinal fibrous strand, scythe shaped on section, but with no trace of a Gärtner's canal.”

Gustav Klein. Cyst of the right Wolffian Canal.

At the autopsy of a full term still-born foetus apparently well developed, a considerable thickening of the whole of the right side of the uterus was found in the form of a tumour. The swelling was not definable from the body of the uterus but was situated in the substance of the uterus itself and covered like the latter with peritoneum. The fundus was saddle shaped. The ovaries and tubes appeared normal. Hardened in alcohol the specimen shewed that there were two uteri and two vaginæ, separated by a fine, complete septum. In the right wall of the uterus, by the side of the two completely separate uterine cavities, was a third canal commencing $\cdot 5$ cm. below the fundus and extending $1\cdot 3$ cm. below the external uterine orifice. The cavity of the right uterus was $3\cdot 9$ cm. long (measured in a straight line) and the third canal $4\cdot 7$ cm. long. The transverse diameter of the lumen of the left uterus measured $\cdot 6$ cm., of the right $\cdot 7$ cm., and of the third canal $\cdot 5$ cm., in only one part $\cdot 75$ cm.

The two uterine cavities, with the exception of the non-union, had the same appearance as that in the new-born. The portio was apparent and the cul-de-sac formed. The position of the internal orifice was noted by the termination of the cervical folds which were relatively more numerous than those of the mucous membrane of the body of the uterus. The latter only possessed a few. The vagina was largely deprived of them and showed a deep depression between its folds. The folds of the uterine mucosa were directed from above down, and it was the same with the cervix. The appearance of the third canal was completely different. Numerous ridges so projected into the lumen that they gave the appearance of little cavities communicating with each other, and on section appeared as partitions.

By comparison with the corresponding parts of the other half it was seen that they were only ridges and not partitions. The aspect of this sinuous cavity recalled that of the large intestine. The surface of the folds was perfectly smooth. There were no contents. This picture describes a sinuous canal situated in the lateral wall of the uterus, and according to the macroscopical description can only be explained as the canal of Wolff which has undergone a cystic dilatation through a great part of its extent. As it was situated in the muscular structure of the uterus it cannot belong to the ovary or to the parovarium. All idea of a vaginal origin must be laid aside. Vaginal cysts may occupy a considerable extent and may even reach as high as the cervix, but they cannot reach $\frac{1}{2}$ cm. below the fundus of the uterus in the muscular tissue. On the other hand, topographically one can only attribute similar vaginal cysts to the canal of Wolff, for the vaginal glands are normally wanting and cannot be held responsible for cystic formations. On macroscopical examination not the least trace of the canal of Wolff was found either in the uterus or in the vagina. The sinuosities agree absolutely with those which Dohrn, Beigel, Rieder, etc., report on the natural form of the canals. In one case the upper part only for a length of 2 cm. was not sinuous but curved.

A section made in the region of the anterior half and 1 cm. below the fundus of the uterus, thus including the anterior half of the three cavities (two uteri and one cyst), offered the following study for the microscope. In the muscular tissue, where the differentiation between longitudinal and circular fibres was not well marked, there were three cavities, and in this region the cystic cavity is a little larger than the uterine cavities. The cyst is lined internally by a thin layer of connective tissue poor in nuclei.

This tissue is not well defined towards the lumen but is slightly frayed. It seems there has been a desquamation of tissue. There is no trace of epithelium. On the contrary, in certain parts of the connective tissue, there is a small quantity of detritus furnished with fine nuclei, in which one cannot demonstrate the presence of any element. Perhaps there had been an epithelium which was destroyed after death by maceration, as also a part of the sub-epithelial connective tissue (the autopsy only took place 12 hours after the birth of the foetus, which died during the confinement). On the external surface next to the connective tissue is a layer of circular muscle fibres.

The uterine cavities are lined by a mucous membrane, furnished in parts only by a cylindrical epithelium of average height and still deprived of cilia. In several places this epithelium is wanting. The epithelium dips down more or less and forms little invaginations and thus shews the commencement of glandular formation. In places superficial glands with a dilated cul-de-sac are found. Invaginations of solid epithelium, as are found for example in the sudoriparous and mammary glands, are wanting. Only a few invaginations in the form of fossettes and tubes are found. In one case even the epithelial glands are deprived of cilia. The interglandular layer of round cells is not well developed.

To sum up, the microscopic examination has not the value of the macroscopic, in support of the view of a cyst developed from the canal of Wolff. Especially the demonstration of cylindrical epithelium is wanting. We have not been able to explain the cause of the persistence and cystic dilatation of the canal of Wolff. If there had been only one uterine cavity then this one might have corresponded to one of the canals of Müller, and the cyst to the other—this latter being developed only in a rudimentary form.

Heterotopia, or the presence of a structure in a situation where it is not normally present, is particularly common in the form of epithelial heterotopia in the female genital organs.

In the uterus epithelial heterotopia occurs in the form of: (1) Malignant growth, by metastasis or direct extension. (2) Benign tumours (Adenomyomata). (3) Canals. (4) Diverticula. (5) Cysts.

It may originate from: (1) The Wolffian body (Recklinghausen). (2) The canals of Gärtner (Rieder). (3) The remains of the union of the canals of Müller (Kossmann). (4) The epithelium of the normal mucous membrane (Chiari). (5) The endothelium of the peritoneum (R. Meyer). (6) From lymphatic canaliculi (Blount).

The origin may be congenital or acquired. The acquired cases may be the result of inflammation (R. Meyer), or accidental implantation, *e.g.*, traumatism (Risch), or the process of regeneration, *e.g.*, of the mucous membrane after pregnancy (Recklinghausen, in Supplement, p. 234).

These origins are all accepted, and each theory has its more or less exclusive partisans. Recklinghausen traces the greater number of his cases of adenomyomata to congenital origin. Robert Meyer,

on the other hand, is inclined to consider these cases of epithelial heterotopia as the result of inflammatory changes.

Chiari was among the first to recognize inflammatory changes as a cause of epithelial heterotopia. Since then many authors have studied the subject, and this form of origin of acquired heterotopia is now universally admitted, whereas it was only a few years ago that all cases of heterotopia were considered as congenital, unless they were the result of changes due to malignant new growth.

The accidental implantation of epithelial tissue in the uterus does not appear to have been observed. It has often been observed in the skin and in the vagina (Risch), and there is no reason why it should not be associated with the uterus. An active process, such as that of regeneration of the mucous membrane of the uterus after confinement, might also give rise to the presence of epithelial elements in the muscular tissue—a suggestion made by Recklinghausen in the supplement to his great study (p. 234).

There are many interesting points connected with the study of these cysts. To understand their pathological formation, it is essential to study the *wall*: its origin, its structure, the origin of the epithelial elements, the character of the contents, and what factors could give rise to the epithelial formation in the middle of the muscular tissue of the uterus. This point brings us naturally to the consideration of cysts in general. Aschoff has carefully studied this subject.

This author considers that cysts may originate from: (1) Absorption of tissue which has undergone necrosis. (2) From dilatation of pre-existing cavities. (3) From a neoplastic process in which the elements have the tendency to form closed cavities or spheres.

As stated before, cases cited in the literature as cysts of the uterine wall comprise a large number which are simply the result of liquid necrosis of an intra-mural myoma. This is an explanation obviously excluded in Cases I and II as the muscular elements have remained absolutely passive in the process.

The persistence of the canal of Gärtner has often been demonstrated. The important work of Recklinghausen contains several observations of this fact, as well as the special study of Rieder. But among the cases recorded, there are relatively few observations of cysts developed from the persistent canal, for it is uncertain whether those which I have gathered from the works of Recklinghausen and Rieder can be ranged in this category. The cases reported by Rosenthal and Klein are probably of this origin. The persistence of

the Wolffian body in the uterus is doubtful, and Robert Meyer, who is certainly the most reliable author on this subject, is inclined to admit that the Wolffian body leaves no trace in the muscular wall of the uterus. Whether the little cysts which I have examined can become large enough to attract clinical attention is very difficult to determine. The cases of Candelet and Pénard shew small cysts in process of formation. Case III seems a link between the smallest pathological cysts and large cysts like those of Rosenthal, Candelet and Péan. It is true that the histological examination of cases already published is often not complete enough to enable any definite statement to be made with regard to their probable origin. In some cases the epithelium may have been destroyed during the growth of the cyst, in others after death before examination of the specimen (Klein, Kessler), and again in other cases not expressly sought for—but in all probability these voluminous cysts were not due to simple softening of myomata, because the muscular tissue in their wall shewed no defined demarcation from the muscular structure of the uterus as is the case with a myoma.

In Case I, multiple cysts in the muscular tissue of the cervix, I am inclined to think that, as a result of the process of chronic inflammation, to which all the internal organs were subject, a proliferation of the glands of the mucous membrane took place into the muscular tissue, and that the glands became distended by the accumulation of the ordinary products of secretion. Indeed one cyst is situated close to the cervical canal and contains mucoid secretion. We know from the study of general pathology of inflammatory processes connected with glands (*e.g.*, in the breast, etc.), that the excretory products are often obstructed either by an accumulation of cellular elements in the lumen of the duct, or by stricture through the periglandular tissue. Unfortunately I was unable in this case to decide positively whether such a process had taken place as the sections were exceedingly difficult to obtain, and all attempts to construct a series of sections failed. But on macroscopic and microscopic examination I was able to be sure that the contents of a certain number of the cavities had undergone a colloid change, and were of a consistence which would certainly retard or even prevent the evacuation of the products of secretion. On comparing this specimen with one of retention cysts or "Ovula Nabothi" a distinct analogy in the pathological phenomena is seen, yet the quantitative difference is so great that it does not seem advisable to range the two processes under the same heading,

though some authors (*e.g.*, Kaufmann) do not differentiate between simple retention cysts known as "Ovula Nabothi" and a cavernous transformation of the portio by cysts.

In some of the cysts the wall shews a slight projection similar to that interpreted by Mercadé and Amann as "papilliform," but which is most probably caused by the section passing through a fold or curve of the entire cyst, a phenomenon familiar in curettings of the uterine mucosa.

Non-carcinomatous proliferation of epithelial elements of the uterine mucous membrane have been often described. Robert Meyer records a case which reached the broad ligament. In the collection of cysts there is no particular one which could suggest the canal of Gärtner. The concentric arrangement of muscular fibres round some of the cysts as shewn in Fig. III is a purely mechanical one.

In Case II the structure of the tissue immediately surrounding the cyst cannot be distinguished from the mucous membrane of the cervical canal in the same section. There is no trace of any inflammatory process past or present. The cyst is therefore probably of congenital origin; but to determine the nature of the congenital malformation is difficult.

The striking resemblance of the wall of the cyst to the cervical mucous membrane in its immediate neighbourhood suggests at once the probability of the inclusion of a portion of the mucous membrane in the muscular tissue during development. The glands of the uterine mucosa are very rudimentary during fœtal life, and do not develop until the age of 8—10 years; but there is no reason why they should not develop simultaneously in the portion of mucous membrane accidentally included in the muscular tissue, which possesses the same potential power of forming glands as the mucous membrane from which it originated. Probably the portion included in the muscular tissue was originally in direct connection with the cervical mucous membrane, as the glands of the two structures can now be traced to a very close proximity to each other, though it is not easy to explain how the communication was obliterated. There is no trace of any inflammatory process as before stated. The suggestion of the presence of a congenital diverticulum of the uterine mucosa is not without foundation. Bernstein describes a diverticulum in a case of uterus bicornis septus in *Macacus Rhesus*. Recklinghausen in Fig. I (c) of Case VI, p. 32, shews an adenomyoma the size of a walnut in the ventral wall of the uterus, the cavity of which communicates freely with the cavity of the uterus. The size of this diverticulum is in favour of a congenital rather than an

acquired origin. (In the same diagram (Cc) a small cyst is shewn in the posterior wall of the cervix. Its size (2 mm.?), situation in the muscular tissue, and the absence of any inflammatory changes described by the author, suggest also a congenital origin, other than Gärtner's canal, which is represented on either side of the cervix as a solid fibrous strand.)

On the other hand the position of the cyst in Case II near the internal os uteri, where the persistence of diverticula of Gärtner's canal is most often recognized (Maudach, Rieder), is in favour of an origin from that canal. Recklinghausen in Cases XI, p. 51, and XIX, p. 70, is uncertain whether to consider certain structures in the cervix as derivatives of Gärtner's canal, or the cervical mucous membrane. Yet I must emphasize the fact that neither above or below the cyst was any trace of epithelium or fibrous strand or differentiated muscle, which might suggest a canal of Gärtner.

In conclusion we may say:—

1. Intra-muscular cysts of the uterus do exist. That these cysts are found in all parts of the uterus—near the cornua, near the fundus, in the body, at the junction of the body and cervix, and in the cervix, or the left or right, in front or behind.

2. The volume of these cysts is usually so small that they are only found as objects of pathological interest at a post mortem, or in specimens removed by operation, but apparently they may reach a considerable size and attract clinical attention (*e.g.*, size of a nine months' pregnancy, Rosenthal).

3. The epithelium may be well defined, ciliated or non-ciliated columnar cells, or represented merely by a smooth internal lining, or not demonstrable at all (*e.g.*, Kessler, Klein). They may contain pavement epithelium (Recklinghausen).

4. These cysts may have a congenital origin. A sufficient number of cases with full examination have not yet been reported to confirm the many theories of possible origin under this heading. The origin from Gärtner's canal appears to have at present the most cases in support of it. An origin from a congenital inclusion of mucous membrane is strongly supported by Case II.

5. They may be acquired. Case I appears to be inflammatory in origin.

6. The frequent occurrence of abundant hæmorrhage noticed in some cases is probably to be attributed as suggested by Robert Meyer to concomitant vascular lesions (arterio-sclerosis, fatty degeneration, and increased blood pressure).

7. The cysts do not appear to be in any case the only pathological condition present, though in some cases the condition of the appendages is not mentioned. In only one case (Klein) is a concomitant congenital malformation mentioned.

8. In no case was the character of the cyst diagnosed before operation or death.

9. In two cases the patient's life might have been spared, had the condition been recognized directly the abdomen was opened.

CASE I.

FIGURE I. Drawing natural size of section of Case I taken about the middle of the cervix. The cervical canal is represented by the dark star-like centre. Immediately around the canal and reaching almost to the parametrium are numerous small cysts visible to the naked eye, and on the left hand upper corner is a larger cyst about 10×6 mm. in diameter.

FIGURE II (12 diameters). One of the cysts in Case I shewing the colloid, somewhat concentric contents with some droplets of clear secretion. In the left hand lower corner is a small cyst communicating with the main one; the contents of the smaller cyst are shewn as a dark flap folded over into the larger cyst.

FIGURE III (140 diameters). Shewing a portion of the wall of a cyst in Case I and surrounding muscular structure. Above is the colloid contents, bordered below by the cylindrical cells with large droplets of clear secretion in their free extremity, and darkly stained nuclei at the base (the latter form a distinct dark band). The base of the cells is in direct contact with the muscular fibres of the uterus, which in the figure tend to be arranged concentrically round the cyst for a depth of about 1 cm.

CASE II.

FIGURE IV (15 diameters). Shews the single cyst and its thick wall resembling mucous membrane with cytogenous tissue and gland like epithelial tubes.

FIGURE V (50 diameters). Shewing the structure of the gland-like formation in the bed of cytogenous tissue surrounding the cyst in Case II. They are almost identical in appearance with those seen in the mucous membrane of the cervical canal of the same case. They are irregular in shape and lined by cylindrical cells. Some of them contain desquamated epithelial cells.

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