

DR. JOHN A. SAMPSON, of Albany, New York, read a paper entitled, **Perforating Hemorrhagic (Chocolate) Cysts of the Ovary**,* calling attention to their importance and especially their relation to pelvic adenomata of endometrial type, (adenomyoma of the uterus, recto-vaginal septum, sigmoid, etc.) The following is the author's abstract:

Perforating hemorrhagic cysts of the ovary occur most frequently in women between thirty years of age and the menopause. In the twenty-three cases reported in this paper only two were under thirty and I have never found one in a woman after the menopause. It is quite a common condition, probably occurring in nearly 10 per cent of the women of the above age limits who require abdominal operations for the relief of pelvic disease. During the year May 1, 1920, to May 1, 1921, I found perforating hemorrhagic cysts of the ovary in fourteen of one hundred and seventy-eight patients between thirty and fifty years of age who had an abdominal operation for some disease of the pelvic organs.

The cysts are usually small, between two and four centimeters in diameter, occasionally less than two and also occasionally larger than four centimeters. They are quite frequently bilateral, as in eight of the twenty-three cases.

At operation the cyst or ovary is found to be adherent and in freeing it the "chocolate" contents escape because a previous perforation, which had been sealed by whatever structure the ovary had become adherent to, is reopened. Adhesions, due to the "irritating" action of the material which had previously escaped from the ovary, are always present and these vary greatly in location, density and extent. They may be found in any of the natural pockets and folds of the pelvis where such material would be apt to lodge and especially in the culdesac. When slight they simulate the adhesions resulting from pelvic peritonitis of tubal origin, on the other hand the adhesions in the culdesac may be accompanied by such a marked reaction as to resemble malignancy.

The histologic findings in these cysts vary in different specimens and in different portions of the same cyst. In discussing their life history I prefer to state "possibilities" at the present time, reserving a fuller presentation of the subject until I have had the opportunity to study more material. There may be several varieties of cysts but I am more inclined to believe that the apparently different kinds represent various stages in the development and retrogression of one type of cyst and

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also various phases of its menstrual cycle. The initial perforation may have been the rupture of an "endometrial" graafian follicle or atretic follicle, hematoma; or following ovulation an abnormal corpus luteum may have developed, due to the invasion of "endometrial tissue" present at the site of rupture. One group of these perforating hemorrhagic cysts shows the following conditions; a portion of the hematoma, usually the deeper, is lined by a "luteal" membrane the exact origin of which I have been unable to determine in every case. The rest of the cyst, usually towards the perforation, is apparently being relined by the invasion of epithelium, through the perforation, from epithelium situated in the periphery of the ovary at the site of rupture. This epithelial relining or regeneration is of endometrial type both in structure and in function. With the advance of the epithelial invasion the "luteal" membrane retrogresses and eventually the entire cyst may be relined by this epithelial tissue. This group represents either the development of an endometrial cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it represents the regeneration of an "endometrial" cyst after a hemorrhage (menstrual). Another group apparently represents either an earlier or a later stage of the former. The cysts in this group are entirely lined by epithelium, low, cuboidal or columnar; all three types of epithelium are often present in the same cyst. Usually there is a vascular cellular stroma not unlike that of the endometrium, between the epithelium and the ovarian tissue. This stroma varies greatly in thickness and in some instances may be very thin or even lacking in places; structures, like uterine glands, may be present in this stroma and these are usually most numerous near the site of the perforation. The entire cyst is like the epithelial portion of the cysts described in the first group and all gradations between the two groups may be found.

The exact counterpart of the epithelial lining of these ovarian hematomata may be found in the uterine hematomata often occurring in adenomyoma of the uterus and apparently due to the retention of menstrual blood. Tissue of "endometrial" type is also present in pockets in the periphery of the ovary about the perforation and the tissue in these pockets may resemble normal endometrium more closely than that lining the hematoma in the same ovary. The histologic study of these hematomata shows that periodic hemorrhage occurs similar to that of menstruation. I have come to the conclusion that these ovarian hematomata are of endometrial type just as are the uterine hematomata found in adenomyoma of the uterus.

I have never found these cysts in women after the menopause and some that I have found were small and apparently retrogressing rapidly. In two instances where I found adhesions with adenoma of endometrial type in the pelvis, but no gross evidence of these cysts in the ovaries, pockets were found in the periphery of the ovaries lined by columnar cells and a cellular stroma resembling endometrial tissue. I interpreted these pockets as the possible remains of a perforating hemorrhagic cyst in which nearly complete retrogression had occurred. For the above reasons I have concluded that their life cycle may sometimes be of "short" duration and the "characteristic" adhesions resulting from them may persist long after the cyst has disappeared.

The adhesions form equally as interesting a pathologic study as the cysts themselves because adenoma of endometrial type is present in the tissues involved by the adhesions in a large percentage of the cases. I have studied histologically the tissues involved by the adhesions outside of the ovary in fourteen of the twenty-three specimens and adenoma of endometrial type was found in thirteen.

Sometime, or possibly many times, in the life cycle of these hematomata, material including epithelial tissue and blood ("menstrual") may escape into the peritoneal cavity from the hemorrhagic cyst or from the "endometrial" pockets in the ovary about the site of perforation and, lodging in the natural pockets and peritoneal

folds of the pelvis, causes adhesions. Adenoma of endometrial type often develops between the adherent folds of peritoneum thus resulting. These adenomata may be small, and quiescent or they may be invasive. *If invasive they may cause "adenomyoma" of the uterus by invasion of the uterine wall from "without" or "adenomyoma" of the utero sacral ligament, round ligament, recto vaginal septum, rectum, sigmoid, etc., namely, whatever structure or organ is invaded by the adenoma arising from the "infective" contents of the cyst or ovary lodging on its surface.* The question naturally arises, in what way does the content of the cyst or ovary cause the development of these adenomata? Is it due to some "specific" irritant present in the cyst contents which stimulates the peritoneal "endothelium;" thus causing a metaplasia and the development of endometrial tissue typical both in structure and in function? Some may claim that dormant "endometrial" epithelium may be present in the tissues soiled by the contents of the cyst and this is stimulated to further growth. *It seems to me that the condition found in many of these specimens is analogous to the implantation of ovarian papilloma or cancer on the peritoneal surface of the pelvis from the rupture of an ovarian tumor containing these growths.*

I offer the following as evidence that perforating hemorrhagic cysts of the ovary are hematmata of endometrial type:

1. These hematmata, as the uterine mucosa, manifest their "activity" during the menstrual life of the patient.
2. Histologically the epithelial lining of the ovarian hematmata is similar to that of the uterine hematmata, due to the retention of "menstrual" blood, often present in adenomyoma of the uterus.
3. Periodic hemorrhages occur in the ovarian hematmata which are similar in gross and histological appearance to that of menstruating endometrium.
4. The "chocolate" contents of the ovarian hematmata resemble old menstrual blood.
5. In two patients operated upon at the time of the menstrual period, one the day that menstruation was due and the other the last day of menstruation, the histological changes in the ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient.
6. The fact that material escaping from the ovarian hematmata may give rise to the development of adenoma of endometrial type in the tissues thus soiled is further proof that these hematmata contain endometrial tissue.

I cannot state that these ovarian hematmata of endometrial type are the only cause of ectopic pelvic adenomata.

These ovarian hematmata with their secondary peritoneal "implantations" are a pathologic entity as definite as that of ovarian papilloma and cancer. They are likewise a definite clinical entity which is capable of diagnosis before operation in a large percentage of the cases.

DISCUSSION

DR. RICHARD B. SMITH, GRAND RAPIDS, MICHIGAN.—I cannot discuss Dr. Sampson's paper from the standpoint of a pathologist, but must do so simply from that of a clinician.

I became interested in this class of cases about a year ago, at which time I made a study of hemorrhages occurring in the pelvic cavity exclusive of those resulting from ectopic pregnancy. Exclusive of tubes, the seat of pregnancy, the most constant source of hemorrhages in the pelvic cavity is the ovary, first, those occurring from normal graafian follicles, and second, those occurring in ovarian tumors the subject of traumatism or twisting, and third, an interesting group which has troubled us all as to etiology and has masqueraded under the head of hematoma ovarii. We have all met this condition frequently and have been puzzled by it.

It is commonly associated with some other pathologic condition of the pelvis, principally myomata.

Dr. Williams in discussing my paper last year before the Society stated that a special study should be made of these cases, since we have, as clinicians, recognized the fact that they form a definite clinical group. It has remained for Dr. Sampson to clear this matter up, and I am sure that gynecologists are grateful to him for having done so. We shall now recognize them as a definite, clinical, pathologic entity, and we shall approach the clinical side of the subject with new interest.

Just how we are to formulate our operative procedures, just what the indications are going to be in dealing with this condition, I think it is a little early to say, but we must bear in mind two things, one of which is, that we are dealing with a neoplastic disease, a disease which is capable of recurrence and further progress, and which may have within it serious future consequences to the patient. In the second place, we are dealing with a disease which apparently shows signs in its life history of retrogression; that is, the process may regress and disappear. Tentatively, I may suggest that we regard them as follows: we must consider those cases complicated by myomata as serious and deal with them radically. In others a more conservative course might well be followed.

DR. N. SPROAT HEANEY, CHICAGO.—I have wondered at the strength of the adhesions binding the ovary to the neighboring structures. Dr. Webster, in his study of ectopic pregnancy, advanced the theory that the pregnancy can only occur in tissue capable of undergoing decidual reaction. Therefore, for many years he doubted the occurrence of true ovarian pregnancy. Later he had two undoubted cases of ovarian pregnancy and then admitted their possibility, but could not correlate his decidual reaction theory with their occurrence. Dr. Sampson has found endometrial-like tissue in the ovary which after all proves Dr. Webster's decidual reaction true. Dr. Sampson has undoubtedly satisfied himself regarding one point concerning which I should like to inquire, namely, whether the endometrial tissue in the ovary is primary and the adenoma in the uterus is secondary to rupture of the cyst, or whether the ovary becomes infected by the endometrial tissue because it becomes adherent to the surface of the adenomyoma. I do not quite understand why the first possibility was accepted and why the second was ruled out of consideration.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I have seen a few of these cases myself, and certainly it is most satisfactory to have had this convincing proof brought forward as to the origin of these cases of adenoma of the rectovaginal septum and in other scattered tissues of the pelvis. It is remarkable and surprising to me to learn of the frequency of endometrial tissue in the ovary, and in view of this fact I must confess that I am puzzled to know how best to deal with this condition clinically, not only because it occurs apparently in the period of maximum fertility, but also from Dr. Sampson's contribution I got the impression that it very commonly is bilateral. All of us who have had to deal with adenomyoma of the rectovaginal septum know what a serious matter it is. If you have had the opportunity to observe any of these cases to the end, you know that this tumor is essentially a malignant one. It will invade the adjacent pelvic structures in very much the same way as carcinoma, and if you attempt, as I have done in one instance, to remove that tissue from the rectovaginal septum, either by the abdominal or vaginal route, you will find yourself face to face with a most serious and radical operation. I do believe in most instances it cannot be successfully removed unless you are willing to face a procedure of the first magnitude, and even then, in the light of this contribution, you would probably have a recurrence unless you also remove the ovaries. Since I have been reliably informed that radium

is ineffective in the treatment of adenomyoma, from our present viewpoint it looks as if one has to choose between hopelessly advancing growth and the removal of both ovaries during the child-bearing period in a condition which is by no means rare.

DR. RALPH H. POMEROY, BROOKLYN, NEW YORK.—As an incidental contribution to this discussion, I want to call attention to the history of a case that is now four years old. I had occasion to do a cesarean section on a young woman for a dermoid in the pelvis which was associated with a breech presentation. After the removal of the dermoid tumor, with a successful cesarean section, closing the incision in the ordinary way, a year following the patient came back complaining bitterly of pain in the abdominal wound, which was aggravated at the time of menstruation. I observed her through the menstrual periods and found a definite mass in the middle of the abdominal wound which between menstruation would subside, but it remained as a hard nodule. I insisted on operation, but she objected for six months. Finally I got her to consent to an operation. I told her I would not take out the uterus or sterilize her. I excised the abdominal scar, including the mass and a wedge from the top of the uterus, which was densely adherent to the abdominal wall. The tissue removed was submitted to a pathologist for examination, who reported adenomyoma. The woman has had no symptoms since and reports herself well. I thought I would add this case to the peculiar histories of hemorrhagic problems associated with adenomyoma in the menstruating woman.

DR. HUTCHINS.—I would like to ask whether these tumors can be diagnosed previous to operation fairly successfully by the character of the menstrual pain when it occurs and the time it occurs?

Dr. G. BROWN MILLER, WASHINGTON, D. C.—Since Dr. Cullen called attention to adenomyoma of the rectovaginal septum, I have had four cases. In two of these there were tumors in the sigmoid as large as those described by Dr. Sampson. One was operated on by Dr. Cullen, and I do not know whether he examined the tissue from the tumor surrounding the sigmoid or not. The case I operated on proved fatal. We could not get an autopsy, and the tissue surrounding the sigmoid was not removed, so that we do not know the nature of the growth.

I think Dr. Sampson's contribution is a most valuable one. The only difficult part to understand is in the cases where there was a tumor of the sigmoid, was that the tumor was not in contact with the adenomyoma of the rectovaginal septum or the ovaries. There were no adhesions of the bowel to the growth or to the ovary, and it would seem highly improbable that with the sigmoid separated so far from the chocolate cyst, it would lead by implantation to a well developed tumor of the bowel.

A case I have recently seen, answers Dr. Hutchins' question as to the symptoms in cases of adenomyoma of the rectovaginal septum. A woman complained of intense and persistent pain during the menstrual period, which would gradually subside and disappear ten days after the menstrual period had ceased. At the same time, she had definite symptoms of partial obstruction of the lower bowel. Evidently to my mind the tissue in the rectovaginal septum during menstruation caused pressure on the rectum to such an extent as to produce temporary partial obstruction of the bowel. As the menstrual period subsided, so the bowel symptoms subsided. It suggested a line of treatment that would give relief. The most difficult cases I have ever tried to operate on have been the two cases of this nature. The method of treatment which suggested itself was to sterilize the woman by the x-ray or radium. The last case I had had no pain except at the menstrual period, evidently due to the tissue which took part in menstruation, and if we prevent menstruation (in view of the great risk of removing the growth) I believe it would be the logical method of treating these cases. Dr. Cullen, however, to whom I wrote

concerning this case, said he had had two cases in which the ovaries had been removed along with the uterus, and in which the growth in the rectovaginal septum had subsequently progressed, causing another operation.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—Dr. Sampson showed us hemorrhagic cysts that are adjacent to tissue in which we are accustomed to find adenomyoma of the uterus or rectovaginal septum. I should be glad to know whether the doctor has met with cases in which perforating ovarian cysts are in contact with tissue remote from the uterus or rectovaginal septum, and whether he has found any such adenomyoma in such remote tissue.

DR. CAREY CULBERTSON, CHICAGO.—Dr. Sampson's demonstration would appear to clear up in a measure the difference of opinion found to exist in the literature relative to the origin of this type of tumor. Since Lockyer's first report of a tumor of this nature and that of Stevens' six cases in 1915, these tumors have been accepted as neoplasms, but in the German literature we find similar growths described as products of inflammatory reaction. Bartkiewitsch regarded them as muscle hyperplasias and used the term "adenomyometritis;" Amann used the term "retrocervical fibroadenomatous serositis," and Myer "adenomyositis uteri et recti." Stevens and Cullen have insisted that these tumors are true neoplasms, though usually bound up with extensive and dense adhesions, and it is this latter condition which is now explained so ably by Dr. Sampson, together with what would appear to be proof that these growths are true neoplasms. We now see that certain ovarian cysts may contain tissue identical in type with that of the mucosa of the uterine body, that such a cyst may spill its contents into the pouch of Douglas and give rise not only to proliferation of the adenomatous structure but to the formation of dense adhesions.

DR. WALTER WILLIAM CHIPMAN, MONTREAL, CANADA.—When Dr. Sampson refers to endometrial tissue in the ovary, he uses that merely as a descriptive term. He does not mean the endometrium is in the ovary because genetically the two tissues of the müllerian tract and ovary are different.

I would like to ask another question. Would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and the fibrous and muscle tissue by the reaction from this secretion?

DR. SAMPSON, (closing).—In answer to the questions which have been asked, I believe the growth is primary in the ovary, and not in the adenomyoma, and that the extension is from the ovary to the uterus and not from the uterus to the ovary. Cases have been reported in which adenomyoma was adherent to the ovary and the adenomyoma invaded the ovary. I think these cases might also admit of a reverse interpretation. In several of my cases the perforating hemorrhagic cyst of the ovary was not in contact with the growth in the culdesac, and I have some slides in which there were many adenomatous growths in the pelvis. The contents of the ovary had apparently escaped into the pelvis, and the adenomatous growth was found in the vesicouterine reflection of the peritoneum, around the round ligament, between the tubes and the ovarian ligament, and also in the culdesac, i.e., in any pocket in which such material would likely fall. Just exactly as in papilloma of the ovary these pockets may contain papillary implantations.

The question has also been asked, are all cases of adenomyoma of the rectovaginal septum and other ectopic adenomyomata, associated with perforating hemorrhagic cyst of the ovary? I cannot answer this question. The literature on the subject is not of very much value in determining this point, because the men who have reported ectopic adenomyomata were apparently more interested in the adenomatous growth than they were in the condition of the ovaries. In my own ex-

perience all the definite cases of ectopic adenomyomata were associated with these cysts. I have had two cases in which there were small nodules in the culdesac which I excised, and histologically it was difficult for me to determine definitely whether they were adenomyomata of endometrial type. I thought they might be. I examined the ovaries in these two cases, but could not find any gross evidence of these cysts. Hysterectomy was necessary in both cases, and the uterus was removed together with the ovaries. In each instance on examining the ovaries microscopically spaces were found lined by columnar epithelium and stroma resembling endometrium which might have been these cysts that had almost completely retrogressed. I believe these ovarian hematoma passed through a process of development, followed by one of retrogression, so that the smaller ones might almost entirely disappear. I do not wish to speak more about this phase of the subject because my views are not definitely formulated, and I am afraid I might say something which may not be true, even though I believe them at the present time; I wish to reserve such remarks until I know more about the subject.

I think it is possible that we may find ectopic adenomyoma without any gross evidence of these cysts, and yet they may come from these cysts primarily or from pockets in the ovary containing tissue of endometrial type. In other words, ectopic adenomyoma may persist long after the cysts or ovarian condition has disappeared.

Dr. Hutchins asked about making the diagnosis from the history and from the physical signs. Dr. Richardson and Dr. Miller have spoken about advanced cases. The latter are the exception. The less extensive cases are much more common. The history varies greatly. In the moderately advanced cases pain is often present, but there is nothing characteristic about the pain unless there is involvement of some such structure as the rectum, as brought out by Dr. Miller. I think, however, acquired dysmenorrhea of short duration and of the progressive type is a fairly common symptom.

In regard to the physical signs, the advanced cases resemble malignancy. In moderately advanced cases, it is possible to make a diagnosis. In the cases I reported tonight, 23 in number, I believe it was possible to have made a diagnosis before operation in one-half of them, but I did not do so. However, in the last year, I have made a diagnosis in about half of them before operation. We are able to make a diagnosis of a malignant ovarian cyst from the following physical signs; the ovarian cyst is adherent and we may also find involvement or implantations in the culdesac. If we find those two signs, I believe we are dealing with a malignant ovarian cyst. In the condition under discussion, we find an adherent ovary which feels like an adherent cystic ovary or a hydrosalpinx. In addition to that, we may feel a localized induration in the culdesac which is often nodular and does not resemble the conditions resulting from chronic pelvic inflammatory disease. When we find this combination of physical signs in a woman between thirty years of age and the menopause (often coupled with a retroflexion of the uterus) we can make a pretty reasonable diagnosis of this condition.

Its treatment is still in the experimental stage. I cannot help but think, from my own experience, that ovarian conservatism is a rather dangerous experiment. Of three cases, I operated on over a year ago in which I removed one ovary, I have operated on one since and two I have examined lately. In one of the latter I could feel an adherent enlarged ovary on one side and induration in the culdesac between the rectum and the uterus. I believe that the remaining ovary has caused a continuation of the growth already in the culdesac, or possibly in freeing the ovarian hematoma removed at the time of the operation I was responsible for causing the escape of the contents of the cyst and its subsequent growth in the culdesac. The other case showed a somewhat similar condition, but not so marked.

Dr. Culbertson brought out a very interesting point. There has been considerable written on the so-called inflammatory origin of adenomyoma in which is advocated a

belief that adenomyoma may arise from the irritation of the peritoneum so that the endothelium is converted into tissue which is histologically similar to endometrium, and not only that, but may function as such. These writers would consider the work which I have done as confirmatory of their views. It seems to me that it is more analogous to the implantation which occurs from a ruptured ovarian cyst containing papilloma or cancer than a metaplasia of the endothelium of the peritoneum arising from some specific irritant in the contents of this hematoma.

Dr. Chipman spoke about endometrial tissue in the ovary. I prefer to speak of it as tissue of endometrial type.

DR. CHIPMAN.—My question was, would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and fibrous and muscle tissues, by the reaction from this secretion?

DR. SAMPSON.—I believe it would. The spill of the cyst carries with it the epithelium which lines it or is situated in the periphery of the ovary at the site of perforation. This epithelium we find in many instances invades the surrounding tissue without reaction on the part of the tissue, and when a reaction takes place, it is not that of a true inflammation, but a hypertrophy of the muscle and of the connective tissue just as we find in an ordinary myoma. It is an extension of this epithelium from the peritoneal surface of the uterus into the uterine wall. I showed in one section in which the growth had invaded the uterine wall that there was no characteristic uterine stroma about it near the surface, but as it extended deeper the characteristic uterine stroma developed around the invading adenomyoma suggesting that the stroma in this instance was derived from the tissue which was invaded and not carried by the growth. I think in some instances pieces of tissue containing both glands and stroma may become deposited in the culdesac and there develop, as I expect to show in another communication.