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## Pregnancy and endometriosis with particular regard to ovarian endometriosis followed by pregnancy

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PREGNANCY AND ENDOMETRIOSIS WITH PARTICULAR  
REGARD TO OVARIAN ENDOMETRIOSIS  
FOLLOWED BY PREGNANCY

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The increasing frequency of the diagnosis of endometriosis has made a major problem of the high sterility rate found consistently in this disease. The dearth of pregnancies is a calamity in this group of women, the majority of whom are in the childbearing age, and whose disease may be a product of our society. Meigs (1) states the real reason for the frequency of endometriosis is that the endometrioma are not tumors, but represent abnormal physiology due to late marriage and delayed and infrequent childbearing.

Endometriosis may be defined as the occurrence and growth of endometrium in organs and tissues other than the uterus. This ectopic endometrial tissue undergoes the same cyclic histological change as the endometrium of the uterus, and shows decidual reaction with pregnancy. "Often endometriosis is first recognized when a search is being made for a woman's failure to conceive..." (2). Bland (3) reports sterility in 40-50% of all cases. In his review, Ranney (4) finds absolute sterility in 20-70% and relative sterility in 50-90% of cases. Table 1 is based on the reports of sterility by various authors and also indicates their percentage of conservative surgery and its result as to pregnancy. Truly conservative surgery necessarily indicates preservation of the reproductive capacity and will be used in that sense herein. Many authors use the term to indicate conservation of ovarian tissue, with or without hysterectomy. Their statistics have had to be deleted. Another factor which must be taken into consideration in

TABLE 1.

Author	Total Cases		Reported Sterility		Conservative Surgery		Pregnancy*	
	Cases	Relative	Cases	Absolute	No.	%	No.	%
Counsellor (29)	884	131	43.5%	32.1%	55	18.4%	7	10
Pemberton (30)	470				83	30%	16	17
Keene and Kimbrough (31)	118	118	59.1%	40.9%	14	25%	4	4
Dreyfus (32)	90	90	29.4%	21.3%				
Payne (33)	307	238		40%	73		13	?
Meigs (1)	144	144		34.3%	21	14.3%	3	3 or more
Haydon (34)	569	447	53%	38%	?	?	19	?
Turunen (35)	200				156	78%	50	?
Holmes (36)	80	63		46%	24	32.5%	3	?
Sanders (37)	120	104		23.1%	19	15.8%	0	0
Low (38)	249				73?	?	8	9
Counsellor and Sluder (10)	754	754	60%	45%		26%		
Cashman (39)	194	194		29.4%	19	16.8%	6	?
Beecham (40)	80				32	52.5%	4	?
Fallon, Brosnan and Moran (12)	200	190	34.5%	65.5%	100	50%	3	?
Schmitz and Towne (41)	51				47	82.4%	11	13

(2)

\*in married patients after conservative surgery with adequate follow-up reported.

the evaluation of pregnancy (or sterility) in endometriosis is that no one knows how many women with endometriosis have become pregnant because no one knows how many mild cases there are. Hence figures are only significant with relation to more severe cases which come to surgery and are proved pathologically (4).

It has been stated that conservative surgery is rewarded with pregnancy in 10% of these severe cases (5). This, considering the high sterility rate previous to operation, constitutes a strong plea for careful consideration of conservative surgery before applying the "adequate" treatment of castration.

#### ENDOMETRIOSIS OF THE OVARY

##### Incidence

Since 1905, when Pick (6) first found "cysts of the ovary containing syrupy, chocolate colored or reddish brown bloody contents, and made up of mucous membrane similiar to endometrium", there have been many reports of this entity which we now consider to be endometriosis of the ovary. Scott (7) states the second most frequent site for endometriosis is the ovary, adenomyosis being the most common site. He also remarks on the infrequency of pregnancy in association with ovarian endometriosis. Pregnancy is rare under such circumstances. Endometrial involvement of the ovaries alone is common, and in almost all cases of extensive pelvic involvement, the ovaries, too, are massively involved.

TABLE 2.

Author	Total Cases	Ovarian Involvement	
		Not Specified	Bilateral Unilateral
Counseller (29)	884	13.6%	
Pemberton (22)	129		10.9% 64.3%
Pemberton (30)	470		33.6% 47.2%
Keene and Kimbrough (31)	118	93.2%	
Dreyfus (32)	72	56.9%	
Payne (33)	307		28% 36%
Meigs (1)	144	57.1%	
Haydon (34)	569	60.6%	
Holmes (36)	80		35% 37.5%
Sanders (37)	120	69%	
Fallos and Rosenblum (24)	199		14.1% 28.1%
Dougal (42)	241	70%	

Table 2 presents a summary of reported ovarian involvement.

#### Etiology

It is not the purpose of this paper to present the interesting argument as to the etiology of endometriosis, other than to state that no conclusive evidence has been brought forward to substantiate any one and that there are points of dissention well taken in response to each. For a comprehensive review of the various theories, the reader is referred to Ranney (4). An interesting sidelight is the statement of Goodall (8), "I am more convinced than ever that endometriosis is an expression of hyperestrinism", and the corroborative findings of Pratt (9) indicating the relief of pain as being due to the decreased function of the ovaries following surgery. He finds it "helpful to reduce ovarian function by removing one ovary and 1/2 to 1/3 of the other, further treatment seldom being necessary."

#### Pathology

External endometriosis is a growth of endometrium anywhere except where it belongs, in the uterine cavity. It resembles cancer--speedy growth, spread, invasion, metastasis--but cytologically the cells are well differentiated and hence benign. The lesion is composed of glandular tubules identical with the epithelial diverticuli of the uterine mucosa. There is simple columnar epithelium, with or without cilia, and around this, connective tissue with nuclei resembling those of the subendometrial tissue of the

uterus. There may also be smooth muscle between the epithelial islands. In other words the lesion resembles a miniature uterus, and follows the cyclic hormonal changes in the blood as does the uterus. Normal, cystic, hyperplastic, or polypoid endometrium may be encountered in cysts from various patients. The lesion has one major difference; the menstruation occurs in a closed cavity. With approaching menstruation, some of the epithelium is cast off with the menstrual blood. The gland, therefore, becomes dilated with this blood and debris, and a small hematoma is formed. With repeated menstruation, the cyst enlarges and the intracystic pressure increases rapidly. The cyst wall invades the host, opposed by fibrous tissue, varying in degree with the host. In the ovary there is the least fibrous counterattack, and the cyst size increases rapidly, invading the ovary and producing a bulge on the ovarian surface much like the mature Graafian follicle. The cyclic hemorrhage and increasing intracystic pressure would seem to favor sudden rupture, but this is not the usual occurrence. A slow, occasional leak (usually with periods) with rapid walling off of the chemically irritating material by inflammatory tissue, is the most common occurrence and leads to the formation of the very dense adhesions so characteristic of the disease. Sudden massive rupture of the cysts, as occurs occasionally with pregnancy, is due to the breaking of adhesions which bind the cyst to the uterus by the enlarging uterus. This gives symptoms varying from



those of mild appendicitis to ruptured tubal pregnancy.

At any menstrual period all the endometrium may be cast off. If this occurs, the activity of the cyst is at an end. If only a small portion of the endometrial lining is left, it may take several months for the lining to regenerate, thus giving temporary relief from symptoms. Following the rupture or leakage of the cyst, the dense adhesions wall off the area, and the next time leakage occurs the pressure has to be higher to overcome the effect of the adhesions. Hence the intracystic pressure gradually builds up and may eventually suppress or destroy the endometrial lining, and stop the activity of the cyst.

Rupture of the cysts also releases bits of endometrial tissue into the peritoneal cavity, which may, if the implantation theory is correct, start new endometrial implants with the same potential results as the original.

Endometriosis not only grows on the surface, but invades the host tissue in a manner resembling that of a malignancy. An ovary that shows only a characteristic bluish-black puckered area on the surface may, on section, be found to be almost completely destroyed like an apple rotten from the core. (10, 11, 7, 12.)

#### Clinical Picture

The complaints which bring any woman to a doctor's office are pelvic pain, bleeding dysfunction, dysmenorrhea and sterility. Endometriosis must be seriously considered in each of these

complaints. (10) The most frequent symptom is that of acquired dysmenorrhea, which is usually accompanied by a change of the menstrual flow, usually an increase in amount. (1) This pelvic pain has certain characteristic features. The pain first appears about five days before the menses, during the stage of premenstrual engorgement. It becomes much more acute as the menses begin, and continues in severity throughout the entire period. Pelvic comfort is gradually re-established over the next three to five days, and the patient enjoys relative comfort until the cycle starts again.

Certain accidents may occur in the course of pelvic endometriosis to precipitate an acute pelvic episode. Chief among these is the rupture, or leakage of a large, tarry cyst, usually at the menstrual period. The signs and symptoms are those of acute or subacute pelvic peritonitis. These cysts may, though infrequently as noted above, become twisted or infarcted to precipitate an acute episode. "The most severe and typical pain may be caused by a very active peanut-sized nodule on the uterosacral ligaments while a patient who has large, bilateral, tarry cysts and a pelvis full of inactive, old endometriosis may have no symptoms at all."

(10)

The pelvic pain has certain characteristics. It is not relieved by antispasmodics, as is true dysmenorrhea. Most pelvic pains are relieved by heat to the abdomen, but, since this causes

increased engorgement, the pain from endometriosis is made worse by heat (10). Any activity which increases the engorgement, or irritates the pelvic regions, will further increase the discomfort of these patients. Typical of this are the common complaints, often volunteered by the patient, that auto or train trips, intercourse, pelvic examinations, or long hours on their feet add to their discomfort.

The complaints are those of many gynecologic problems, but the association of these complaints with the menstrual period, as to timing, makes up the clinical entity of endometriosis. "When the endometriosis comes to involve extensive regions of the pelvis, the associated adhesions and chronic inflammation may so alter the pelvic physiologic processes that the patient is never comfortable. If the endometriosis is not inactivated by pressure and loss of its endometrial glands, there may still be a periodic increase of the discomfort with some menstrual periods. If the endometriosis itself is inactive, or if because of age or destruction of ovarian tissue by endometriosis, the menopause is at hand, then the patient has the same symptoms as chronic pelvic inflammatory disease with no periodicity" (10).

Sutton (13) states that the two procedures of diagnostic importance are the pelvic examination and laparotomy. To this should be added the valuable aid of the cul-de-scope.

On physical examination the most diagnostic findings are the

puckered, shotty, indurated nodules in the cul-de-sac and over the posterior surface of the uterus. These are best felt rectally or by rectovaginal examination. Often the most striking thing is pain on examination, out of all proportion to the physical findings, for many of the regions are too soft to palpate. Endometrial cysts of the ovary differ from other ovarian cysts in that their contour is rough and irregular and they are bound down to the adnexa or cul-de-sac. (10)

"Pelvic pain that has a definite relationship to the approaching menses, and a typical dysmenorrhea are the cardinal points in the diagnosis of endometriosis." (10)

#### Pregnancy and Ovarian Endometriosis

Sampson (14) reported the first case in 1922, in a 37 year old primipara who had a laparotomy for myomatous uterus. A 2 cm. chocolate cyst of the left ovary was found, and also a 14 mm. fetus.

Winestine (15) reports an oophorectomy early in pregnancy for LLQ pain, chills and fever. An endometrial cyst of the left ovary was found.

Smith (16) remarks of a patient who had a unilateral oophorectomy, for endometriosis, and who was delivered 22 months later.

Aschheim (17) found right ovarian endometriosis in a patient with a ruptured uterus due to adenomyosis during pregnancy.

Schaanning (18) records removing one ovary which had adherent endometrial cysts from a patient 16-18 weeks pregnant.

Wharton (19) reports three cases of pregnancy following conservative surgery for ovarian endometriosis:

Case 1: Right ovarian chocolate cyst (8 cm.) resected, with myomectomy and suspension; delivered 30 months later.

Case 2: Bilateral adherent chocolate cysts, myomectomy, left salpingo-oophorectomy, right cyst resected; delivered 24 months later.

Case 3: Chocolate cysts of both ovaries removed, uterine suspension; delivered  $8\frac{1}{2}$  months later.

Cattell and Swinton (20) report pregnancies in three of their patients following the removal of one ovary for endometriosis.

Von Franque (21) reports removing a fist-sized ovarian endometrial cyst from a patient 5-6 weeks pregnant. She aborted.

Pemberton (22) states that 15 of his patients with ovarian endometriosis had conservative surgery, and later became pregnant.

Ramos (23) found an egg-sized endometrial cyst of the right ovary, and also left ovarian cysts, in a patient at laparotomy, following her second criminal abortion.

Fallos and Rosenblum (24) report a patient who had a partial bilateral oophorectomy for multiple chocolate cysts. She became pregnant 27 months later. Previously sterile for seven years.

McKenzie (25) reported finding endometriosis and ruptured ectopic pregnancy in the same ovary.

Scott (7) found a ruptured, right endometrial cyst and also left endometrial cysts in a previously sterile (6 years) patient who was 36 weeks pregnant. He also removed a grapefruit-sized

cyst from the right ovary, and a small cyst from the left ovary in a patient in the 10th to 12th week of pregnancy. Both women were delivered of viable children.

Eking (26) reports removing one ovary and leaving "only a very small portion" of the other ovary, followed by 300 mgm. hours of radium. Two years later the patient was delivered of a live child, with no difficulty.

Lock and Meyers (27) report a white female who had had one pregnancy, with spontaneous abortion. The left tube and ovary were a fused cystic mass. There were also chocolate cysts of the right ovary. A left salpingo-oophorectomy and fundectomy were done, and the right ovarian cyst evacuated. Two thirds of the corpus uteri was removed for adenomyosis. Two years later the patient was delivered of a normal child.

Levi (28) reported two cases, both with endometrial implants and involvement of both ovaries. In each, one ovary was removed and the remaining ovary partially resected. Both patients were subsequently delivered of normal healthy babies. The patients had been sterile  $1\frac{1}{2}$ , and 5 years previous to the surgery.

#### Case Reports\*

Case 1: Mrs. R.J.S., a white female, age 26, para 0, gravida 0, was first seen 9-23-46, having used contraceptives to date.

\* The author wishes to express his gratitude for the use of these case reports from the files of Dr. Leon S. McGoogan, and to state his appreciation of that opportunity.

Menstrual history 12, 26/6, regular and with occasional pain.

Physical examination revealed second degree retroversion and retroflexion of the uterus. In the cul-de-sac, a semicystic, shot-like, irregularly fixed mass, on the left. Surgery was recommended.

On 11-21-46 an Olshausen suspension and partial resection of the left ovary was done. Gross and microscopic diagnosis was ovarian endometriosis.

The patient was next seen on 5-10-47. LMP was 4-20-47, profuse, with clots but no cramps, and lasted five days. No contraceptives were being used. She returned 6-20-47, LMP 5-17-47, and a diagnosis of pregnancy was made. On 2-2-48 the patient was delivered of a normal male child, with low forceps. There were no complications.

Case 2: Mrs. G.H.R., a white female, age 26, p.0, g.0, married 12-20-46, was first seen 1-29-47. Menstrual history 13, 28/5 with no pain until 18 years of age. Since that time there had been increasing severity of pain beginning with the onset of flow and lasting for 24 hours. Physical examination revealed a retroverted, retroflexed uterus, and nodular masses in the cul-de-sac, with typical visible endometrial implants.

She was operated on 9-16-47, the vaginal implants were opened and carbolized, the right ovary showed a 6 cm. adherent cyst and was 75% resected, the left ovary had a 5 cm. adherent cyst and was 50% resected.

On 11-17-47 she was found to have a 22 day cycle, no pain, and no pregnancy. She was placed on thyroid. She was last seen the first of November, 1948, and was three months pregnant.

Case 3: Mrs. E.Z.H., a white female, age 23, p.O, g.O, was first seen 11-19-45. Menstrual history 13, 25/7, regular with increasing backache and cramps for the first 48 hours. She complained of headache, fatigue, and sterility. Stated "she had been treated with many drugs, including pituitary." The uterus was found to be retroverted and retroflexed, 2nd to 3rd degree. Treatment was instruction in knee chest position, and the insertion of a pessary.

On 6-14-46 the findings were the same plus a prolapsed left ovary of suspicious size, and an indefinite right ovarian mass. She was operated on 6-19-46, a left salpingo-oophorectomy for extensive endometriosis, and resection of implants on the right ovary, also an appendectomy was done.

She was last seen on 8-5-46 with a BMR of minus 11. Treatment with thyroid was begun. A later report by letter stated that she had become pregnant and delivered in September, 1947.

Case 4: Mrs. G.L.H., a white female, age 28, p.O, g.O, was first seen 2-10-38. Menstrual history 12, 35/4, pain on the first day. She gave a history of scarlet fever, tonsilectomy, appendectomy, and a fractured pelvis. Pregnancy was diagnosed and she was delivered 9-30-38. She complained of some bleeding on



defecation, but no fissures were found.

On 4-22-40 she had a spontaneous miscarriage and a D&C was done.

She was next seen on 4-25-42 complaining of right sided cramps in the lower abdomen for the past ten days, profuse bleeding for one day, and spotting previous to that. The last menstrual period was 3-19-42. Tenderness was found in the RLQ, a brownish discharge, and the uterus twice normal size. A tentative diagnosis of ectopic pregnancy was made. At operation there were adhesions between the posterior wall of the uterus, descending colon, omentum, and right tube and ovary. In the right adnexa there were chocolate cysts enlarged to 5-6 cm. in size. The right mass was freed and removed (ovary and tube). The left ovary showed implants, and the left tube was short and thick.

On 2-18-43 she was again seen, the periods had been regular, every 30 days, lasting 4-5 days. LMP 1-3-43.

She was next seen 4-1-43 and a diagnosis of pregnancy was made. There was some bleeding and she was treated for threatened abortion, successfully. Delivery was on 10-8-43 and there were no complications.

On 6-29-45 pregnancy was again diagnosed, the patient stating that for three months previous to her last period she had had LLQ pain, increasing with the menses. She was delivered 1-31-46, the only complication being a prolapsed arm necessitating manual

dilatation, replacement and mid-forceps delivery.

She was last seen on 2-9-48 at which time she had a spontaneous abortion. There were no complications except a slight anemia.

Case 5: Mrs. R.M. B., a white female, age 25, p.0, g.0, was first seen 11-18-37. She complained of attacks of RLQ pain which was not referred, and not associated with nausea or vomiting. In the past few months the pain had become left sided as well. It was not related to the menses by the patient. Menstrual history 10, 28/7, regular with a few cramps, not the same as above. Examination revealed a tender area over the appendix, and a small, tender mass on the posterior wall of the uterus near the peritoneal reflection. There was acute anteversion of the uterus and associated anteflexion. A diagnosis of endometriosis and/or chronic appendicitis was made. She was operated 11-27-37, and a ruptured endometrial ovarian cyst, with hemorrhage, was found. A right salpingo-oophorectomy, suspension, and appendectomy was done and there were no complications.

She was next seen complaining of sterility on 9-24-38. Her periods were regular, and there was no pain or discomfort.

On 8-21-46 a diagnosis of pregnancy was made, and she was delivered on 3-26-47 by low forceps. There were no complications.

Case 6: Mrs. C.O., a white female, age 28, p.1 (five years), g.1, was first seen 3-10-48, complaining of sterility. No contraceptives had been used in the past four years. Menstrual history

12, 28/7, with depression, weakness, and abdominal discomfort for the first two days, in bed the first day. She also complained of a sense of pressure in the rectum when she sat down too rapidly. The patient had a hemorrhoidectomy in 1944.

Physical examination revealed a uterus in 2nd degree retroversion and retroflexion, and nodules in the rectovaginal septum. Operation was deferred until 5-10-48. Gross endometriosis of the uterosacral ligaments and of the left ovary was found. The uterosacral ligaments were resected, a partial resection of the left ovary, modified Coffey suspension, and appendectomy were done.

The wound healed well. There was no decrease in discomfort or apprehension with the periods. She was last seen in November, 1948, stating her last menstrual period was in July, and a diagnosis of pregnancy was made.

Case 7: Mrs. F.P., a white female, age 25, p.O, g.O, was first seen 9-16-46 complaining of sterility. For the past 18 months no contraceptives had been used. Menstrual history 13, 21/4, regular with no pain. Physical examination revealed a retroverted, retroflexed uterus, and a nodular mass in the cul-de-sac. A diagnosis of endometriosis was made. Air passed in the Rubin test at 170, and a second attempt at 80. The sperm of the husband were checked and found to be adequate.

On 10-10-46 at operation, a 6x6 cm. chocolate cyst of the left ovary, and a 3x3 cm. cyst of the right ovary, plus implants

of endometriosis in the cul-de-sac were found. A left salpingo-oophorectomy, a partial resection of the right ovary, and an appendectomy were done. Examination on 11-5-46 found the uterus still first degree retroverted and retroflexed, and a small nodule in the cul-de-sac.

The patient had severe nausea and vomiting on 11-17-46, and was hospitalized for one week. Diagnosis was anxiety neurosis.

She was seen on 6-2-47 and a diagnosis of pregnancy was confirmed. She was delivered with no complications on 12-30-47.

On 2-11-48 at the six weeks check-up, she was advised to wait two or three months and then try for another pregnancy. She was seen in December, 1948, and found to be three months pregnant.

#### Summary

The diagnosis of endometriosis is being made more frequently now, due to a better understanding of the disease, and the fact that more operators are watching for its typical findings. The problem is not one that involves only the obstetrician and the gynecologist, but the general practitioner as well, for when recognized early, the disease is amenable to conservative surgery with approximately a ten per cent chance of subsequent pregnancy.

Since the disease occurs in women of the childbearing age, and the rate of previous sterility is approximately forty-five per cent absolute, and seventy per cent relative, the problem of treatment assumes greater importance. The mental health of these

women may depend on their chances of producing children, and to castrate all cases must be considered extremely radical. It has been the purpose of this paper to review the literature as to coexistent pregnancy and endometriosis, and pregnancy following conservative surgery of the ovaries. Though the percentage of pregnancy in such conditions is small, it is felt that the woman suffering from this disease should be given the opportunity for childbearing in all cases where children are desired and the severity of the lesions does not preclude conservative surgery.

Seven new cases in which rather radical surgery was performed are reported. In each the reproductive function was preserved with the result of one or more pregnancies in each case.

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