Facts and treatment options for patients with endometriosis

Adrienne Reaves
Facts and Treatment Options for Patients with Endometriosis

by

Adrienne D. Reaves
FADM
Approvals

Advisor: Glen Hintz
Date: 10/25/94

Associate Advisor: Robert Wabnitz
Date: 10/25/94

Associate Advisor: Nancy Ciolek
Date: 10/25/94

Department Chair: Luvon Sheppard
Date: 11/7/94

I, Adrienne Reaves, prefer to be contacted each time a request for production is made. I can be reached at the following address:

1406 Reaves Lane
Hopewell, VA 23860
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for Patients with Endometriosis

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Facts and Treatment Options for Patients with Endometriosis

1 INTRODUCTION

Endometriosis is one of the most frequently encountered gynecological disorders requiring either surgery or some other form of medical treatment. According to Endometriosis: The Disease and Its Treatment, a pamphlet published in 1991 by TAP Pharmaceuticals, it is estimated that one in every seven women of reproductive age suffers from this condition (3). "Endometriosis is a disease characterized by the presence of tissue histologically identical to endometrium [uterine lining] in ectopic locations outside the uterine cavity" (Wilson, 1). This ectopic endometrial tissue has the ability to respond to the hormonal changes of the menstrual cycle (Whitfield, 609) similar to normal endometrial tissue. It also has the ability to grow, spread, and infiltrate to cause many of the symptoms experienced by endometriosis sufferers (Merrill, 931).

Since endometriosis affects the female reproductive system, it is necessary to clearly understand how this system functions to best understand the disease and its effects. The female reproductive system is made of a single, muscular uterus, paired ovaries and fallopian tubes,
and various supporting structures such as ligaments (see Fig. A). The uterus houses the developing fetus as well as provides nourishment through the placenta. The ovaries produce the egg, or ovum, as well as the hormones, especially estrogen and progesterone, which cause the endometrium or uterine lining to thicken and become engorged with blood vessels in preparation for pregnancy. The fallopian tubes provide a canal through which the ovum can pass from the ovary to the uterus for possible fertilization and implantation into the endometrium. If the ovum is not fertilized by the sperm during sexual intercourse, then the endometrium is shed during menstruation, or a monthly period (Important Facts, "Female Reproductive Organs).

This endometriosis tissue responds to the female hormones estrogen and progesterone, which cause the endometrium to grow and proliferate. Estrogen is produced during ovulation, and progesterone is
produced by the follicle which remains after the ovum escapes from the ovary. This tissue thickens and grows during the monthly cycle and bleeds at the end of the cycle in the same manner as normal endometrial tissue. The major difference is when the endometriosis tissue bleeds, it has no means of escaping from the body unlike normal endometrium, which escapes through the vagina. Instead it remains within the pelvic cavity, surrounding the organs and other pelvic structures. The body responds to the blood by surrounding it with inflammation, and the tissue becomes red, painful and swollen (Important Facts, "The Menstrual Cycle"). When the bleeding ends, the inflamed tissue heals with scarring and adhesion formation around the affected structures (Important Facts, "What Is Endometriosis").

2. APPEARANCE OF ENDOMETRIOSIS

Stray endometrial tissue can be implanted on any surface within the pelvic cavity. The ovary is the most common site of implantation, followed by the peritoneum of the cul-de-sac of Douglas. Other common sites include the fallopian tubes, supporting ligaments, round ligament, surfaces of the uterus, bladder, appendix, rectum, cervix, ureter, and vagina (Merrill, 933) (See Fig. B).
In 1981 *The Handbook of Obstetrics and Gynecology* published laparoscopic findings resulting in a development of a staging of endometriosis. According to this information, endometriosis occurs in four distinct stages. Stage one, the mildest of the four, is identified by small blueish or black lesions along with non-attached avascular adhesions along the broad ligament. None of the lesions during stage one are any larger than five centimeters in diameter. Stage two is slightly more severe with an increase in diameter and number of lesions as well as the presence of small endometrial cysts on the ovaries. Also noted in the latter part of stage two are numerous adhesions fixed to the ovaries, fallopian tubes, and broad ligament. During this stage, adhesions can cause kinking of the fallopian tubes, resulting in infertility.
(see Fig. C). When the number of adhesions increases and attach more readily to the organs, the disease enters stage three. Stage four is the most severe and involves the bowel, appendix, and bladder (Benson, 618).

Peritoneal implants can occur as small, "red velvety lesions...on the peritoneal surface" (Penroll, 743). These lesions are presumably the earliest implants to appear. After some time, with further menstrual accumulation on the lesions, the small implants can grow into larger dark blue, brown, or black cyst-like implants (743). The peritoneum surrounding the lesions begins then to thicken, scar, and often pucker, resulting in the "kissing lesions" (Hulka, A-7). These lesions often occur singularly, but "multiple implantations are the rule" (Penroll, 743).

When endometriosis effects the ovary, small lesions may grow and proliferate into much larger cysts. These endometrial cysts, or endometriomas as shown in Fig. C are often as large as ten centimeters in diameter and are filled with a thick, dark "material that looks like chocolate syrup but is composed of blood and blood pigment" (Merrill, 934), thus the name "chocolate cysts" (Penroll, 743). Other types of implants also are found on the surfaces of the ovary. These include
puckered or kissing lesions, small red implants, as well as small
cystic lesions surrounded by dense adhesions. When the adhesions
present themselves and surround the ovary, passage of the ovum from
the ovary to the fallopian tube might become obstructed and infertility
can result.

Often lesions can effect the large bowel. In these instances, the
implants rarely penetrate beneath the surface of the organ (Merrill, 935).
Bowel obstruction may occur due to the effect of endometriosis
adhesions on the mesentary surrounding the intestine (Schenken, 312).
Adhesions can pull and tug on the mesentary, twisting and distorting the
bowel. Rectal endometriosis is more often than not associated with the
presence of endometriosis elsewhere in the pelvic cavity (Schwartz,

3. SYMPTOMS OF ENDOMETRIOSIS

The symptoms of endometriosis normally include one or more of
the following: "1) progressive acquired pelvic pain associated with or
occurring just prior to menstruation, 2) dyspareunia [painful
intercourse], 3) painful defecation, 4) premenstrual staining and
abnormal bleeding, ...and [5]) infertility" (Wilson, 58) (see Fig. D). These
symptoms are highly variable and do not indicate the severity of the
disease. A study of 206 patients with varying degrees of endometriosis was conducted (Schenkken, 85). This study was conducted to show the relationship between the degree of endometriosis and the severity of symptoms experienced. The two symptoms studied are dysmenhorrea (painful menstruation) (see Fig. D) and dyspareunia (painful intercourse) (see Fig E). It was once hypothesized that the higher the degree of the disease, the more severe the symptoms experienced. According to the graphs, women with mild, moderate, and severe endometriosis complained of painful menstruation and intercourse in approximately the same frequencies. The study concluded that there was no relationship between degree of disease and severity of symptoms (85). A patient who has been diagnosed with an extensive degree of endometriosis may suffer from minor symptoms
or be asymptomatic, while a patient who has been diagnosed with a mild case of the disease may suffer greatly from extreme symptoms (58).

Pelvic pain, especially that associated with menstruation, is the most common complaint of patients with endometriosis (Wilson, 59). "As the disease progresses, pain may be present throughout the month, not just at the time of menses [menstruation]" (59). "...About one-third of patients who suffer chronic pelvic pain, particularly in association with
infertility, have endometriosis" (Schenken, 133). The pain has been described as "...a dull aching, or cramping, lower abdominal or back pain, ...or bearing down sensation in the pelvis..." (Merrill, 938). There have been no conclusive studies as to the exact cause of the pain. It seems logical that pain could be directly or indirectly related to the bleeding of the implants in response to normal hormonal changes. According to Wilson, "...[c]yclic swelling and bleeding within the implants may stretch surrounding tissues" (59) resulting in pain. Endometriosis tissue produces prostaglandins, which "...are important mediators of inflammation" (60). These prostaglandins may effect nerves in surrounding tissues and stimulate pain sensations.

Pain experienced during sexual intercourse, or dyspareunia, is about as common a symptom as the pain associated with menses. This is especially true for the dyspareunia felt during deep penetration. Some findings conclude that painful intercourse is "...usually due to involvement of the rectovaginal septum by endometriosis and is often associated with a fixed retroverted uterus, fixed ovaries, and endometriotic nodules on the uterosacral ligaments or in the cul-de-sac of Douglas" (Schenken, 134)

Painful defecation is experienced in patients who have endometriosis associated with or in the general area of the rectum,
sigmoid colon, or other areas of the lower gastrointestinal tract. Painful defecation, along with painful intercourse, is "...clearly related to pressure upon distended lesions or the stretching of adhesions" (Merrill, 939).

Abnormal bleeding is the next most common symptom of endometriosis after some form of pelvic pain (Schenken, 134). These patients often complain of premenstrual staining, intermenstrual spotting, and abnormally heavy menstrual flows (Wilson, 63). When abnormal bleeding patterns are caused by endometriosis, "...it may be due to involvement of the ovaries by the endometriotic lesions..." (Merrill, 939). This might cause the ovary, which produces the cyclic hormones which causes the onset of menstruation, to alter hormone production.

Although several other symptoms might be experienced, the symptom which is most likely to bring a patient to a physician is infertility. Kinking of the fallopian tubes by dense, fibrous adhesions could be one cause of infertility among endometriosis sufferers. "Fixation of the uterus [by adhesions] in a retroverted position may interfere with adequate placement of semen [into the uterus]" (Merrill, 939) resulting in decreased fertility.
4. THEORIES OF HISTOGENESIS

The first reference to what was later termed endometriosis was made by C. von Rokitansky in 1860. The condition was not given any serious consideration until the 1920's when John Albertson Sampson published his classic reports of the disease he named (Schenken, 3). In these reports, Sampson theorized that "...viable endometrial tissue is transported retrograde through the fallopian tubes and implants upon peritoneal surface[s] of abdomminopelvic organs" (see Fig. F) (4).

This explanation, known as Sampson's Theory is the basis for various other later described theories for the development of endometriosis. Those who challenged Sampson's Theory argued that "...retrograde menstruation rarely occurred and, even if blood were regrugitated into the pelvis, endometrial cells were too large to [travel through] the tubal
lumen" (5). Later studies disproved this belief (5), and retrograde menstruation remains a viable working theory for the occurrence of endometriosis. Other theories involve mechanical transplantation, lymphatic and vascular metastasis (cell differentiation), combination theories, etc. There are over a dozen working theories, most of which are based on Sampson's Theory, but none of which have been proven.

5. DIAGNOSIS OF ENDOMETRIOSIS

If a woman experiences any of the symptoms associated with endometriosis, she should consult her physician. Most often women do not report their symptoms, resulting in insufficient data regarding disease frequency. During a normal pelvic examination, nodules or lumps might be discovered, indicating the possible presence of fibrous masses in the pelvic cavity. This finding could signal a physician to look toward endometriosis as a possible explanation. According to Penroll, "[t]he varied presentations of endometriosis mandate that it be considered in the differential diagnosis of virtually all pelvic disease" (747).

Although pelvic examination and palpation of fibroid masses can clue a physician to the possible presence of endometriosis, a positive diagnosis of endometriosis can only be made through actual visualization
of the implants (Merrill, 940). The most common means of positive
diagnosis is through laparoscopy. Laparoscopy is performed under
either local or general anesthesia. A slender light-transmitting
endoscope is inserted into a tiny incision made in the folds of the
umbilicus (see Fig. G). Other instruments used to lift and move
structures within the pelvic cavity are
inserted into incisions made along
the hairline at the base of the belly
(Diagnostic Laparoscopy, "The Laparoscopic Procedure). The laparoscope
allows the physician to look inside the pelvis at the organs and
surrounding structures. The image seen through the laparoscope is
projected onto a monitor so that all the medical personnel present for the
procedure are allowed to view and identify a possible problem for
diagnosis. This procedure also allows a physician to rule out the
possibility of other conditions with similar symptoms, such as pelvic
inflammatory disease, ovarian cancer, or a host of other similar
conditions (Wilson, 66).

Laparotomy (incision into the abdominal wall) done for some other
condition is another method of positive diagnosis of endometriosis.
Laparotomy is not performed solely as a means of diagnosis of
endometrosis; some other ailment requiring the procedure must present itself. For example, if a young woman is diagnosed with appendicitis and must have the organ removed through laparotomy, while her abdominal wall is opened, the surgeon should examine the portion of peritoneum which is in view during the operation for endometriotic lesions.

6. TREATMENT OPTIONS

Treatment for endometriosis will depend on three major considerations: "the manifestations of the disease, the desires of the patient, and the method of diagnosis" (Merrill, 940). The disease in its more severe states may warrant a more strict treatment option. Numerous adhesions obstructing organ function, a great deal of scarring, large endometrial cysts, or obliteration or destruction of pelvic tissue will require surgical correction along with drug therapy. Treatment options include first a regimen of drug and/or hormone therapy and surgery.

Since endometrial tissue is responsive to circulating female steroidal hormones, a regimen of hormone therapy is often used to treat cases. "...Hormonal therapy for endometriosis should never be instituted until the diagnosis of endometriosis is confirmed by laparoscopy or laparotomy" (Wilson, 114). Danazol is the most commonly used drug in
the management of endometriosis (Schenken, 191). Most other hormones used "mimic those naturally occurring states that appear to improve or delay onset of the disease process by altering cyclic ovulation" (191). Estrogen and progestogens are used to create a state of psuedopregnancy and GnRH analogs or progestogens alone create a pseudomenopause in patients (191).

When a patient complains to her physician about pelvic pain and other symptoms associated with endometriosis, the physician may first prescribe an antibiotic to treat any possible infection. At the same time the physician might put the patient on a cycle of oral contraceptives. If the contraceptives and antibiotic together alleviate the symptoms, no further treatment will be necessary at that time. However, if the symptoms do not subside, further considerations must be made. Oral contraceptives contain doses of estrogen and progestogenes in varying degrees. They are so effective on mild cases of endometriosis because they halt ovulation. The hormones which cause endometriosis tissue to rupture and bleed are produced during ovulation. Oral contraceptives do not, however, eliminate existing endometriosis. They can only prevent future tissue implantations and can "help halt the spread and pain caused by [existing] endometriosis" (Endometriosis: The Disease and Its Treatment, 14). When used at dosages high enough to treat
endometriosis, oral contraceptives may pose a few unwanted side-effects. These include nausea, water retention, and irregular menstrual bleeding (TAP Pharmaceuticals, 14). Doses of progestosterone alone can reduce the effect of estrogen on existing endometrial implants. They, too, are most effective on cases of mild or minimal endometriosis. At high doses, progestosterone can interrupt normal ovarian function, and might result in a period of infertility after treatment ceases (14). The side effects from progesterone include in-between period spotting, water retention, breast tenderness, depression, and elevated lipid levels (14).

Male hormones, testosterone and methyltestosterone, are used in some cases and are believed to be effective in relieving endometriosis symptoms (Merrill, 943). When used for up to 6 months, methyltestosterone relieved pain in the majority of patients studied (Schenken, 196). The side effects associated with male hormone therapy are more severe and more numerous than with female hormones. They include "...hot flashes/sweating, vaginal dryness, weight gain, decreased breast size, acne/oily skin, a slight increase in body or facial hair, deepening of the voice, and decreased libido..." (TAP Pharmaceuticals, 16). Many of these masculinizing side-effects can be reversed after treatment is stopped. Danazol, the most widely used medication for the treatment of endometriosis, is a derivative of testosterone and has a similar effect on
endometriosis tissue as other male hormone derivatives (Porth, 645). It 
"...directly suppress[es] the growth of endometrial and endometriotic 
tissues..." (Wilson, 119). Breakthrough bleeding is one of the most 
uncommon side-effects, along with similar masculinizing effects of other 
male hormone derivatives (124).

To date, GnRH analogs are the most recent advancement in 
endometriosis therapy (Schenken, 199). GnRH (gonadotropin-releasing 
hormone) analogs inhibit the action of pituitary gonadotropins and halts 
ovulation, thus relieving symptoms associated with endometriosis (Porth, 
645). Of all the medications used, GnRH analogs and danazol "...have 
produced the most rapid and predictable relief of pain short-term (six 
months or less) ...[O]ral contraceptives are less expensive and are 
generally used more long term (more than six months)" (Martin vol 1, 36). 
Young women with pelvic pain are best treated with hormone therapy 
(Wilson, 115).

Often times hormonal treatments alone do not give significant 
results and surgery might be required. Although all of the hormone 
therapies have thier benefits, none will cure the disease. They can only 
provide temporary relief of symptoms, but never a cure. Actual removal 
of endometriosis tissue will give best results. There are two classifica-
tions of surgical treatment: conservative and non-conservative.
Conservative surgery involves removal of endometriosis lesions, adhesions, and other types of endometriosis implants, and can correct blocked or kinked fallopian tubes, thus correcting infertility. It can be performed through laparoscopy (see Fig. H), laparotomy, lasers, or cautilization. It is often used in cases of infertility resulting from extreme endometriosis.

Non-conservative surgery is normally performed only on women who are over forty years of age and who have no desire to further bear children (Wilson, 115). This type of surgical procedure involves removal of the reproductive organs. The only known cure for endometriosis is removal of the ovaries and uterus, or total hysterectomy. Other effective forms of non-conservative surgery are removal of ovaries alone (oophorectomy) and removal of ovaries and fallopian tubes (bilateral salpingo-oophorectomy). These procedures, always done through laparotomy, are most extreme and are considered for treatment only as a last resort.
II. UNIT TWO: ARTISTIC COMPONENT

7. INITIAL INTENT

With this thesis project I intend to use my knowledge of medical subjects, background in Women's Studies, and skills and talents as an artist to inform and educate the millions of women who suffer from endometriosis, or who are suspected of having the disease, but do not know exactly what it is. It is vital that women learn about the special conditions which effect our bodies and take an active role in any medical treatment we might undergo.

I chose endometriosis as the topic of my Master's thesis because it is a particularly misunderstood disorder, misunderstood by both physicians and patients alike. I also, being a woman suspected of having the disease, wanted to help educate the women who are as confused as I was and those who do not have access to sufficient resources to educate themselves. I had been given several pamphlets addressing the disease during visits with physicians, but none seemed to fully satisfy my need to know. This thesis project is for myself as much as it is for the countless numbers of women who suffer from endometriosis.
8. ILLUSTRATIONS

The first illustration which appears in the brochure is titled "Female Reproductive System". The linear portions of the illustration were constructed in Adobe Illustrator 3.0 and photocopied onto a light orange sheet of Canson ® Mi-tientes light weight artist paper. The remainder of the illustration was done in colored pencil on the Mi-tientes. Shown in the illustration are the uterus, fallopian tubes, and ovaries with relation to the umbilicus and pelvic girdle. The illustration was later scanned and saved as a TIFF file in Adobe Photoshop using Silverscan. It was then placed into the brochure which was constructed in Aldus Student PageMaker 4.0.

The next illustration was produced by hand using watercolor paints. This illustration gives a close-up view of the ovary, fallopian tube and broad ligament. The focus of the illustration is the avascular adhesions joining the fallopian tube to the ovary. The adhesions pull at the tube and cause it to kink in certain spots. The kink in the tube is exaggerated in the illustration for effect. There are also small puckered lesions on both the fallopian tube and the ovary, as well as a large endometrioma on the ovary. The broad ligament and the surface of the uterus are not affected. Even though the broad ligament and uterine surfaces would in reality be affected if endometrial implants covered the
ovaries and tube to such an extent, I chose not the illustrate implants along these structures to avoid distracting the eye from the ovary and tube. The appearance of the disease is important information for the patient and illustrations are the least offensive way to communicate this.

I titled the next piece "Retrograde Menstruation" as it illustrates Samson's Theory, described earlier in this work. This illustration was created in Adobe Photoshop. I used arrows to direct the eye to the upward flow of menstrual tissue from the uterine cavity, through the fallopian tube, onto the ovary, and out into the pelvic cavity. A clear transparency with labels was created and placed over the illustration. The labels further note the directional flow of the endometrial tissue.

The sagittal section of the female reproductive system showing sites of endometrial implantation was produced using dry carbon dust. Also scanned into Adobe Photoshop and imported into the final booklet, this illustration was completed using cadaver sketches produced in a Gross Anatomy course at the University of Rochester in the spring semester of 1991. A sheet of clear Mylar® was placed over the illustration and small red dots were placed on the Mylar in locations of endometrial implantation.

The two graphs done for the brochure were created in Adobe Illustrator 3.0 and saved as EPS (encapsulated postscript) files to be
imported into Aldus PageMaker. These graphs show the relationship between the degree of endometriosis and the severity of two types of pelvic pain: painful menstruation and the pain associated with sexual intercourse. There were problems encountered in the production of the graphs. They basically concerned the software and an understanding of graph data manipulation. I attempted to create three subgraphs into each complete graph. I was able to successfully enter the data into the graph template in the proper sequences. This allowed me to create the graph I planned.

The piece used to illustrate the major symptoms of endometriosis was redone approximately five times until I was satisfied enough to include it with the body of artwork. The initial illustration was a close-up of the female pelvis, similar in view to that in "Female Reproductive System". There were arrows directing the eye the areas within the pelvis which experience the three major symptoms: pelvic pain, abnormal utering bleeding, and infertility. As the illustration evolved to its present appearance, I grew more satisfied with the information given. In the final piece, a full-length female figure was used. This figure was drawn in Adobe Illustrator and imported as an EPS into Adobe Photoshop where color and words were added. This illustration is simple. It is not too involved and distracting. The pelvis of the female
figure in the illustration is highlighted to draw attention to the area affected by endometriosis. In a previous version, the background was painted with a solid warm red fill. It was later changed to white to calm the illustration.

The final two illustrations in the brochure were done together to show a process, although they were presented in different sections of the brochure. They both relate to the laparoscopic procedure. The first is the actual procedure, showing the laparoscope as it is inserted into the pelvis. The second shows two views through the laparoscope at the inside of the pelvis during adhesion removal. The two illustrations were enclosed in circles to give the feel of the actual view through the laparoscope. The background outside the circles was intended to be a flat black plain, which later proved to distract the eye when studying the illustrations. The black background was later deleted. Both of these illustrations were produced using the exact same method used to create the first illustration, "Female Reproductive System".
9. FINAL THESIS PROJECT

In choosing illustrations and the layout for the brochure, my audience was my primary concern. Some initial illustrations were found to be either too technical or too offensive for individuals who were not accustomed to observing medical subject matter. The complete brochure was carefully planned to be as visually pleasing as possible without compromising any of the vital information included. The cover was created using two different shades of orange Canson® Mi-Tienns heavy weight paper. The darker shade was 9.5 " x 12". The lighter sheet was one half inch shorter on each side so that it would fit directly in the center of the larger sheet. One the shorter sheet of paper was embossed the symbol for female "♀". Embossing was suggested by Professor Hintz and Professor Bernadette Merkel taught me the technique so that I may complete my cover design. I had initially chosen to have the symbol printed in ink, but found it to be much to harsh for the cover of the brochure. I wanted the cover to be sympathetic yet pleasing. I anticipate that the women who will read the brochure will have just recently been diagnosed with endometriosis and will be nervous and afraid. I want the cover of the brochure to ease their minds and invite them to read on.

The pages of the brochure were designed with a unifying orange
bar at the top of each page. Each illustration, with the exception of the two graphs, was created with drop shadows of 40% grey behind them to add a graphic element to the pages. The caption boxes were produced using the same color as the bars on the top of every page and were created using drop shadows.

10. CONCLUSION

Endometriosis is a difficult disease to understand. The symptoms are so widely varied from patient to patient that physicians often find it difficult to diagnose. Because of this many patients go undiagnosed or never completely understand the disorder. This thesis report and brochure will hopefully make endometriosis a little easier to understand for the millions of women who are effected.
WORKS CITED


Computer Software:


