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2nd Edition

Current Practice in Obstetrics & Gynecology-3

Endometriosis

Pankaj Desai
Purvi Patel

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9 CHAPTER

Approach to Recurrent Endometriosis

Abha Singh

INTRODUCTION

The ability of endometriosis to recur even after apparently complete surgery has been known.[1,2] The frequency of recurrence seems to be rising as more conservative approach is being widely used. Prevention of its recurrence is one of the most important goals of management.

PREVALENCE

Endometriosis is a difficult disease to treat completely. Most of the time it can be suppressed rather than treated. Recurrence is well-known and a challenge. Different investigators quote different rates. Dr Robert Shaw, Past President of the World Society of Endometriosis, has reported the overall recurrence rate of 60%.[3]

Vercellini et al., have reported a 20–40% recurrence of pain in their study.[4] Guo reviewed all the publications pertaining to endometriosis recurrence and found it to be 21.5% at 2 years and 40–50% at 5 years.[5] Others have reported a comparison of recurrence pattern with laparoscopy and laparotomy.[6] They found no significant difference of recurrence after both modalities of treatment. Amongst the infertile women it is highly prevalent, to the extent of 30–50%.[7]

RISK FACTORS FOR RECURRENCE

A very commonly observed finding in clinical practice is recurrence of endometriosis after treatment. Many studies have been done to analyze the risk factors involved:

- Young age of women at time of first operation predisposes to recurrence. Pregnancy after laparoscopic surgery was found to decrease the risk.[8]
- Presence of eutopic endometrium plays a role in recurrence. It is resistant to apoptosis. Bulletti et al. did endometrial ablation in laparoscopically treated women and checked them for recurrence at end of 2 years and

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found good results.[9] The study suggested role of eutopic endometrium in the recurrence of endometriosis through tubal dissemination.

- *Recurrence after hysterectomy:* Hysterectomized women with ovarian conservation may have 6.1 times greater risk of developing pain and 8.1 times greater risk for reoperation.[10]
- Endometriosis is known to affect families. It is six to seven times more common in first-degree relatives.[11,12] Endometrium in these women may be inherently different, favoring endometriosis. An increased level of enzymes known as matrix metalloproteinases promotes growth of endometriotic tissue. They are also found to be resistant to progestins.[13]
- Endometriosis is estrogen-dependent. An increased aromatase level is found in women with severe endometriosis. It converts androgens to estrogens. It is further activated by local prostaglandin E2 (PGE2) production, and this vicious cycle may be responsible for recurrence.[13]
- Recurrence is higher in cases of deep endometriosis. Radical surgery is associated with a lower incidence of recurrence.[14]
- Genetic polymorphism in estrogen receptors (ERs), namely, ERalpha (Pvu II and Xba I) and ERbeta (Alu I) has been found in women suffering from endometriosis.[15]
- *Extent of previous surgery:* Fedele et al. in his long-term follow-up study on women with bladder endometriosis concluded that completeness of surgery is important.[16]
- In a meta-analysis and systematic review, the risk factors described were age at surgery (earlier the surgery, more the recurrence), CA-125 levels, size of endometriotic cysts, and preoperative medical treatment. The preoperative medication may mask the lesions or may alter the genomic response.[17]

BIOMARKERS FOR RECURRENT ENDOMETRIOSIS

Endometriosis is a menace for being recurrent. Thus, every step should be taken to prevent it. One of the ways to do so is to develop biomarkers for recurrence that would allow identification of high-risk women followed by appropriate treatment. In future, we may have multiple biomarkers for recurrence, but at present only those are discussed which have been published in distinguished journals.

- *CA-125:* This is the most studied marker so far. It remains elevated in gynecologic conditions such as endometriosis or epithelial ovarian cancer as well as in nongynecologic conditions such as pancreatic, breast, colon, and lung cancers. Solitary levels of CA-125 are poor markers for endometriosis. Its measurement along with CA 19-9, CA 72–4, and human epididymis protein 4 has been tried but was not found to be sensitive enough.[18,19]

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- Though >2,000 papers have been published on CA-125, but its best application remains not in diagnosing, but monitoring the treatment.[20]
- *Natural killer (NK) cell excess:* One of the reasons attributable to development of endometriosis is dysfunction of NK cells. Peripheral blood NK cells were sampled before and after treatment.

Presence of NK cells even after treatment suggests risk of recurrence.[21]

- *Urocortin (UCN):* It is expressed by eutopic and ectopic human endometrium. Recently Pergialiotis et al. published in their systematic review that the specificity of UCN even reach 90% with the cutoff value >33 pg/mL. More and larger studies are required.[22] UCN has proved a good approach for diagnosing ovarian endometrioma, but not for any other manifestation of endometriosis.
- *MicroRNA (miRNA):* Role of miRNA in ectopic endometrium has been studied by many authors but has not been found to be of any definite value at present.[23] The collection and processing of miRNA samples needs an expertise and which otherwise becomes difficult to follow.
- Later studies demonstrated that cognate chemokine receptor 1 (CCR_1) mRNA measurement in peripheral blood helps in early diagnosis, reduced recurrence, and better management outcome.[24]
- *kappa-B:* The immunoreactivity between the nuclear factor kappa-B and progesterone receptor (PR) isoform-B has been evaluated. In ovarian endometriomas, an increased activation of kappa-B and decreased PR isoform-B has been confirmed and has been found to be a good biomarker for recurrence.[25]
- *Cyclooxygenase-2 (COX-2):* In endometriosis there is an increased expression of inflammatory factors. An overexpression of COX-2 along with adhesions and previous medical treatment has been found to be predictive of recurrence of ovarian endometrioma with a sensitivity of 72.5%.[26] Higher levels of COX-2 are associated with high cell proliferation, low apoptosis, increased invasiveness, angiogenesis, and impaired NK cell differentiation. Thus, COX-2 inhibitors may play an important role in relieving the symptoms of endometriosis.

High-throughput Molecular Markers

- *Proteome:* Studies on proteomes in detecting endometriosis have shown it to be a good tool, but it is very expensive and time-consuming to be universally used.[27]
- *Metabolome:* The ectopic endometrium in different individuals may have different metabolic pathways. Plasma levels of fucose, proline, lysine/arginine, choline-containing metabolites, and lipoproteins may be elevated and related to the spread and severity of the disease.[28]

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Urine Biomarkers

Four urinary markers have been studied: Enolase, vitamin D-binding protein, peptide-profiling, and cytokeratin 19. They require further evaluation before use.[29]

Endometrial Biomarkers

Endometriosis can be diagnosed by endometrial biopsy or intrauterine fluid component estimation.[30] However, more studies are needed to find the accuracy of these markers.

Angiogenic Factors

Since angiogenesis has an important role in endometriosis, the angiogenetic factors such as vascular endothelial growth factor A (VEGF A), VEGF 121, and VEGF 189 have been extensively studied and found to be increased.[31]

Oxidative Stress Markers

Superoxide dismutase and glutathione peroxidase were measured but their sensitivity did not prove to be very accurate, therefore larger data is required.

Inflammatory Proteins and Cytokines

Several inflammatory factors were investigated, but they can be found increased in other inflammatory conditions too, hence not very specific.

DNA Markers

Familial clustering of endometriosis suggests the importance of hereditary factors, but evidence indicates that genetic predisposition is multifactorial and not linked to a single mutation.

Mitochondrial DNA deletions are associated with endometriosis and are being studied as biomarker for endometriosis.[32]

MEDICAL TREATMENT

The medical management depends on the stage of disease, severity of symptoms, age, and future childbearing requirements.

The medical treatment of endometriosis is based on creating a hypoestrogenic environment, which causes atrophy of ectopic endometrium. It is unfortunate that most of the drugs used for this purpose lead to untoward adverse effects. Recurrent endometriosis remains a challenge to treat because the treatment only suppresses the condition and the women who are keen to conceive remain amenorrheic and the medication acts just like a contraceptive.

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Progestins are now the first line of treatment which include:

- *Dienogest:* It is a 19-nortestosterone derivative, a fourth generation orally active progestogen with a high specificity for the PR. The dosage is 2 mg per day. It is cost-effective with minimal side effects. It shows good tolerability, pain relief, and effective in disease progression when compared to gonadotropin-releasing hormone (GnRH) analogs.
- *Medroxyprogesterone acetate (MPA):* It is another well-tolerated, economical progestin which causes less bone loss.

Combined oral contraceptive (COC) pills are very commonly used for dysmenorrhea in young and adolescent girls. However, Cochrane review showed limited evidence from two trials. The low cost in comparison to other medical treatments is the reason for its rampant use in our country.

Levonorgestrel-intrauterine system (LNG-IUS): This is a good alternative for long-term management. LNG does not suppress ovulation or create hypoestrogenism. It acts by depleting estrogen and PRs through inhibition of synthesis of estrogen receptors that results in an antiproliferative effect, endometrial glandular atrophy, transformation of the stroma, and the increased apoptosis.[31] It has been found very useful in maintenance of postoperative therapy. Insertion of LNG-IUS at the time of primary laparoscopy is associated with improvement in pain scores. Its use can reduce the rate of the repeated surgeries.[33]

GnRH agonists: These are usually used as second line of therapy when symptoms are not controlled by progestins. Their use becomes limited due to high cost and severe vasomotor symptoms and accelerated bone loss. These can be used only for a maximum of 6 months. The side effects may require an add-back therapy with progestins and low-dose estrogens. GnRH agonist nafarelin has been found a safe alternative to danazol with almost similar efficacy. Most common side effect is hot flushes. It has an additional advantage of not requiring intramuscular route (used intranasally).

Selective estrogen receptor modulators (SERM): Raloxifene and bazedoxifene are under trial as they antagonize estrogen-induced uterine endometrial stimulation. There is not enough evidence for pain relief.

Selective progesterone receptor modulator (SPRM): This can be either pure agonist or antagonist or both and can be used as a second-line drug. Mifepristone is the most studied drug. It causes amenorrhea without causing hypoestrogenism.

Ulipristal acetate is another SPRM used for treatment of fibroid and in some countries as emergency contraception. It reduces cellular proliferation and causes endometrial atrophy.

Asoprisnil, another SPRM, was shown to reduce pelvic pain statistically significantly. Current studies do not provide enough evidence for its use.

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GnRH antagonists: These are recommended by European Society of Human Reproduction and Embryology (ESHRE) and found to reduce pain very effectively. *Elagolix* and *cetrorelix* have been found to have acceptable efficacy. Long-term outcomes are not yet known.[34]

Aromatase inhibitors: These form an appealing group as they selectively inhibit estrogen production in endometriotic lesions, without causing anovulation. Aromatase inhibitors act by inhibiting aromatase enzyme, thus reducing estrogen. ESHRE recommends their use in combination with COCs, progestins, or GnRH analogs to avoid the ovarian stimulation. They reduce the pain and intestinal and urinary symptoms effectively, but long-term uses must be avoided due to hypoestrogenic adverse effects.

Management needs to be tailored according to the individual's desired outcome. For alleviation of pain, medical therapy is better, though no drug is efficacious than the other despite significant differences in their side effect profile. For infertility associated with endometriosis, medical treatment may not be good as it suppresses ovulation. In such women, surgical correction followed by controlled ovarian stimulation and intrauterine insemination followed by in vitro fertilization (IVF) is recommended.

Unfortunately, high recurrences occur after discontinuation of medical therapy. GnRH analogs with add-back therapy are favored for long-term management. *Mifepristone*, an antiprogesterone, is showing encouraging results so far which need to be confirmed.

SURGICAL MANAGEMENT OF RECURRENT ENDOMETRIOSIS

Endometriosis is a disease with the stigma of recurrence. With the present trend of conservative approach, the incidence of recurrent endometriosis is on the rise.

Logically the best choice for recurrent endometriosis would be definitive surgery. However, in most women it cannot be opted for, as they are infertile and desire children and thereby require a conservative approach. Operative laparoscopy is found to be as effective as laparotomy. Laparoscopy allows a detailed visualization of pelvic anatomy and appropriate dissection of the tissues.[35] It is the most preferred route. Cystectomy is always preferred in comparison to fulguration, though it is associated with reduced ovarian reserve. Laparotomy should be done where planes of cleavage are not identified on laparoscopy.[36] In women where conception is not desired, hysterectomy gives satisfactory results in most of them. However, 15% may still have persistent symptoms and 3–5% may experience worsening of symptoms. Bilateral oophorectomy along with hysterectomy is found to reduce the risk of recurrence by six times.[37]

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HORMONAL REPLACEMENT THERAPY

The presently available medical treatment for endometriosis has one of the most dreadful side effects of causing menopausal symptoms. The use of hormonal replacement therapy (HRT) raises concerns about disease reactivation and recurrence of pain and need for surgical treatment, and even malignant transformation of residual endometriosis. The risk of recurrence with HRT is linked to residual disease after surgery. "De novo" endometriosis appears especially after unopposed estrogen therapy or obesity, which has an additional effect for increasing the risk of endometriosis development. Administration of HRT is often required in women with severe disease and in women with radical surgery. Theoretically HRT has few risks, but it may be required in these women especially for bone protection, improvement in libido, and prevention of urogenital atrophy. Postmenopausal women with symptomatic endometriosis should be managed surgically with removal of all visible endometriotic tissue because of the higher risk of recurrence and the risk of malignancy.[38]

Unopposed estrogen stimulation may lead to malignant transformation of the residual foci of endometriosis; hence, progestins should be preferably added. No recurrence has been reported with the combination therapy.[39]

Aromatase inhibitors have been used successfully by some authors but their long-term use is associated with loss of bone mineral density.[40]

Matorras' study[41] in this context revealed that there was no recurrence in women who did not receive HRT, but 3.5% recurrence was reported in those who had received HRT. Two risk factors were observed:

1. Peritoneal involvement of 3 cm or more (2.4% recurrence vs. 0.3% per year).
2. Incomplete surgery (22.2% vs. 1.9% per patient).

He concluded that risk of recurrence is low with HRT where total hysterectomy has been performed with bilateral salpingo-oophorectomy. In women with peritoneal involvement of >2 cm, the recurrence makes HRT controversial option, as the beneficial effects of HRT cannot compensate for the recurrence. Thus the individual must be carefully evaluated for administering HRT as it may lead to malignant transformation or recurrence. This risk has not been quantified so far in any of the studies.

FUTURE RESEARCH

Efforts to study an ideal biomarker from different fields such as mitochondrial DNA, UCN, inflammatory, and oxidative markers are being made, but none has been able to compete the gold standard of diagnosis by *laparoscopy*. A variety of theories put forward for understanding the pathogenesis fail to explain different sites of endometriosis. Available treatment presents a dilemma to the clinician especially if associated with infertility. Surgical

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removal of ovarian endometrioma may reduce the ovarian reserve which may be a disaster for those who are trying to conceive. Recurrence which is well-known may again start the ball rolling for the women to go for the treatment. Thus in long-term, larger studies are needed to diagnose and treat the menace of endometriosis.

The future is focused on anti-inflammatory drugs and modulators of the immune system. The drugs such as tumor necrosis factor binding protein, pentoxifylline TNF-alpha 2b. The ideal drug for treatment of endometriosis is the one which will completely eradicate endometriosis and reverse infertility, but is not currently available. The future research on immune modulators and aromatase inhibitors may result hopefully in successful management of endometriosis.

CONCLUSION

Endometriosis is a disease often affecting the quality of life, which is not even proportional to the severity of the disease. It is often difficult for the gynecologist to completely treat the condition due to high incidence of recurrence.

Currently, surgery is the management of choice for recurrent endometriosis. The recurrent rate can be reduced and using short-term medical therapy can prolong the interval of recurrence.

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Current Practice in Obstetrics & Gynecology-3
Endometriosis

This series *Current Practice in Obstetrics and Gynecology* is a very popular on-going series in India. In your hand now, is the new edition of its third volume. Specifically centering on endometriosis, this edition has retained the basics and gone further by thoroughly reviewing and re-writing all chapters of the previous edition. It has the up-to-date information on infertility in endometriosis, clinical management of pain, conservative management and diagnostic intricacies of endometriosis. It has also updated academic chapters on etiopathology and epidemiology. Clinically rare but challenging situations like recurrent endometriosis, endometriosis at extremes of age and early pregnancy loss in endometriosis have been packed with latest understanding and developments. Surgical management of the condition is a new addition in this edition. All contributors are renowned in the subject and very well informed. It is envisaged to be a worthy reference book for students, teachers and practitioners of the subject.

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