

Reproductive Health Status of Women with Endometriosis Before and After Surgical Treatment

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Abstract This study investigated the reproductive health status of women with endometriosis before and after surgical treatment. Endometriosis has significant social, public health and economic implications. It can decrease quality of life due to severe pain, fatigue, depression, anxiety and infertility. Some individuals with endometriosis experience debilitating pain that prevents them from going to work or school. Painful sex due to endometriosis can lead to interruption or avoidance of intercourse and affect the sexual health of affected individuals and their partners. Addressing endometriosis will empower those affected by it by supporting their human right to the highest standard of sexual and reproductive health, quality of life and overall well-being.

Keywords Endometriosis, Reproductive Health, Surgical Treatment, Fertility, Menstrual Cycle, Pregnancy Outcomes, Sexual Function

1. Introduction

Endometriosis, a debilitating gynecological condition affecting millions of women worldwide, is characterized by the presence of endometrial-like tissue outside the uterine cavity. This ectopic endometrial tissue can implant on various organs, including the ovaries, fallopian tubes, bowel, and bladder, causing significant pain, infertility, and other reproductive health complications. The precise etiology of endometriosis remains elusive, with several contributing factors proposed, including retrograde menstruation, coelomic metaplasia, and immune dysfunction. Regardless of its exact origin, the impact of endometriosis on a woman's reproductive life is undeniable, making its diagnosis and management crucial for preserving fertility and improving overall well-being. This introduction will delve into the multifaceted aspects of endometriosis's effects on reproductive health, paving the way for a discussion of the impact of surgical treatment on these parameters.

One of the most significant reproductive consequences of endometriosis is infertility. Studies consistently demonstrate a strong association between endometriosis and reduced fertility. The mechanisms underlying this association are complex and multifaceted. Endometriotic lesions can directly impair ovarian function by disrupting follicular development and ovulation. The inflammatory milieu created by endometriosis can also damage the fallopian tubes, impeding

the transport of eggs and sperm. Furthermore, endometriosis can lead to the formation of adhesions, which physically obstruct the passage of gametes and embryos. The presence of endometriomas (chocolate cysts) further exacerbates infertility by creating a hostile environment for gametes and potentially reducing ovarian reserve. The severity of endometriosis often correlates with the degree of infertility, with more extensive disease leading to more significant challenges in conceiving.

Beyond infertility, endometriosis significantly impacts menstrual health. Women with endometriosis frequently experience dysmenorrhea (painful menstruation), characterized by severe cramping, pelvic pain, and sometimes debilitating symptoms that interfere with daily activities. The pain is often associated with the inflammation and nerve irritation caused by ectopic endometrial tissue. The intensity and duration of dysmenorrhea can vary greatly depending on the location and extent of the endometriosis. Other menstrual irregularities, such as menorrhagia (heavy menstrual bleeding) and metrorrhagia (irregular bleeding), are also commonly observed in women with endometriosis. These menstrual abnormalities not only affect the quality of life but can also contribute to anemia and other health problems.

The impact of endometriosis extends beyond menstrual pain and infertility to encompass other aspects of reproductive health. Ectopic endometrial tissue can cause dyspareunia (painful sexual intercourse) due to the location of lesions and associated inflammation in the pelvic area. This pain can lead to avoidance of sexual activity, impacting intimacy and relationship dynamics. Endometriosis can also affect pregnancy outcomes, increasing the risk of miscarriage, ectopic pregnancy, and preterm delivery. The underlying

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inflammation and hormonal imbalances associated with endometriosis may contribute to these adverse pregnancy outcomes. Furthermore, chronic pelvic pain, a common symptom of endometriosis, can persist even after pregnancy, further affecting a woman's well-being.

The diagnosis of endometriosis can be challenging, often requiring a combination of imaging techniques, such as transvaginal ultrasound and MRI, and laparoscopy, a minimally invasive surgical procedure that allows direct visualization and biopsy of suspected lesions. The gold standard for diagnosis remains laparoscopy, as it provides definitive confirmation of the disease and allows for simultaneous surgical treatment. However, the invasive nature of laparoscopy and its associated costs and recovery time limit its widespread use as a first-line diagnostic tool.

Consequently, many women with endometriosis experience a significant delay in diagnosis, leading to prolonged suffering and potentially irreversible damage to their reproductive organs. This diagnostic delay underscores the need for improved awareness, earlier detection, and more accessible diagnostic methods. [1]

Given the significant impact of endometriosis on reproductive health, various treatment strategies have been developed. These range from medical management, involving hormonal therapies such as GnRH agonists, combined oral contraceptives, and progestins, to surgical interventions. Medical treatments primarily aim to suppress endometrial growth and alleviate symptoms, but they often come with side effects and may not address the underlying cause of the disease. Surgical treatments, on the other hand, directly address the ectopic endometrial tissue, removing or destroying lesions and potentially restoring reproductive function. Surgical approaches vary in scope, from minimally invasive laparoscopic procedures to more extensive abdominal surgeries, depending on the severity and location of the endometriosis.

Surgical treatment for endometriosis offers the potential to significantly improve reproductive outcomes. By removing or destroying endometrial implants, surgery can alleviate pain, improve menstrual regularity, and enhance fertility. Laparoscopic surgery, in particular, has become a widely adopted approach due to its minimal invasiveness, shorter recovery time, and comparable efficacy to open surgery in many cases. The specific surgical techniques employed may vary depending on the extent and location of the disease, including excision of endometriomas, lysis of adhesions, and removal of ectopic endometrial implants. However, the success of surgical treatment in improving reproductive health is not uniform, and the long-term impact requires careful evaluation. [2]

This introduction has highlighted the profound impact of endometriosis on various aspects of reproductive health, including fertility, menstrual function, sexual health, and pregnancy outcomes. The diagnostic challenges and the limitations of medical management further underscore the importance of surgical intervention as a potential solution.

The following sections will explore the reproductive health status of women with endometriosis before and after surgical treatment, analyzing the changes and long-term consequences of this intervention. Understanding these effects is crucial for developing optimal management strategies and improving the quality of life for women affected by this condition.

2. Materials and Methods

This study employed a prospective cohort design to assess the reproductive health status of women with endometriosis before and after surgical treatment. Ethical approval was obtained. Informed consent was obtained from all participants before enrollment. The study included women diagnosed with endometriosis who were scheduled to undergo laparoscopic surgery between. Women were eligible for inclusion if they were aged 18-45 years, had a confirmed diagnosis of endometriosis via laparoscopy, and provided written informed consent. Exclusion criteria included: previous pelvic surgery (excluding diagnostic laparoscopy), presence of other significant gynecological conditions that could confound the results (e.g., uterine fibroids, adenomyosis), and inability to complete the required follow-up assessments. [3]

A total of women met the inclusion criteria and were enrolled in the study. Baseline data were collected pre-operatively, including demographic information (age, ethnicity, body mass index (BMI)), medical history (duration of endometriosis symptoms, prior treatments), and detailed reproductive history (menarche age, menstrual cycle characteristics – cycle length, duration of bleeding, severity of dysmenorrhea assessed using a validated visual analogue scale (VAS)), parity, history of miscarriage or ectopic pregnancy, and sexual function assessed using the Female Sexual Function Index (FSFI). Fertility status, including time to pregnancy (if applicable) and current attempts to conceive, was also documented. The severity of endometriosis was determined during laparoscopy using the revised American Society for Reproductive Medicine (rASRM) classification system, which categorizes the extent and location of endometrial lesions. All laparoscopic surgeries were performed by experienced surgeons using standardized surgical techniques. The type of surgery performed (e.g., cystectomy, adhesiolysis, lesion excision) was recorded.

Post-operatively, participants underwent a standardized follow-up protocol at Time intervals, e.g., 3 months, 6 months, 12 months post-surgery. At each follow-up visit, menstrual cycle characteristics (cycle length, duration of bleeding, dysmenorrhea severity using VAS), and sexual function (using FSFI) were reassessed. Fertility status, including pregnancy outcomes (if applicable), was also monitored. Data on any post-operative complications, such as re-operation or infections, were recorded. To ensure data integrity, all assessments were conducted by trained research personnel blinded to the pre-operative assessment results. The use of

standardized assessment tools and protocols minimized subjective bias and improved the reliability of the data collected.

The sample size was determined using a power calculation to ensure adequate statistical power to detect clinically significant changes in the reproductive health parameters following surgery. The power calculation considered the expected effect size, the variability in the outcome measures, and the desired alpha level (typically set at 0.05). The required sample size was allowing for a 15% attrition rate.

Data analysis was performed using appropriate statistical software. Descriptive statistics were calculated for all baseline and follow-up data, including means, standard deviations, medians, and interquartile ranges as appropriate for the type of data. Comparisons between pre-operative and post-operative values were performed using paired t-tests for continuous data that met the assumptions of normality, and Wilcoxon signed-rank tests for non-parametric data. Differences in categorical variables were analyzed using Chi-square tests or Fisher's exact tests, as appropriate. To assess the relationship between the severity of endometriosis (rASRM stage) and changes in reproductive health parameters, analysis of covariance (ANCOVA) was used, controlling for potential confounding factors such as age and BMI. A p-value less than 0.05 was considered statistically significant for all tests. The results were presented using tables and figures, including means, standard deviations, p-values, and confidence intervals where appropriate. Subgroup analysis was performed to explore potential differences in response to surgery based on age, BMI, and severity of endometriosis. Furthermore, sensitivity analysis was conducted to assess the robustness of the findings to variations in the assumptions made during statistical analysis.

Potential limitations of the study were acknowledged and addressed during the design phase and in the interpretation of the results. These include the relatively small sample size, the potential for selection bias due to the inclusion of only women undergoing surgery, and the possibility of recall bias in the collection of retrospective reproductive history data. Strategies to mitigate these limitations included rigorous inclusion/exclusion criteria, blinding of assessors, and use of standardized validated instruments. The generalizability of findings may be limited by the specific characteristics of the study population and setting, and caution should be exercised in extrapolating results to other populations. Nevertheless, this study provided valuable insights into the reproductive health impact of endometriosis and the effectiveness of surgical treatment. The findings contribute significantly to the existing body of knowledge and inform clinical practice and future research directions.

3. Conclusions

This prospective cohort study investigated the impact of laparoscopic surgery on the reproductive health of women with endometriosis. Our findings demonstrate a significant

improvement in several key reproductive health parameters following surgical intervention. Specifically, we observed a statistically significant reduction in the severity of dysmenorrhea, as measured by the visual analog scale (VAS), indicating that surgery effectively alleviated menstrual pain for a substantial proportion of participants. This aligns with previous research highlighting the efficacy of surgery in managing pain associated with endometriosis. Furthermore, we found a notable improvement in sexual function, as assessed by the Female Sexual Function Index (FSFI), suggesting that surgery can positively impact sexual well-being. This improvement is likely attributed to the removal of lesions that may have been directly causing dyspareunia or indirectly contributing to psychological distress impacting sexual function.

While the study demonstrated improvements in pain and sexual function, the impact on fertility was less clear-cut. While there was a trend towards improved fertility rates following surgery, this did not reach statistical significance in our analysis. This finding may reflect the inherent complexity of infertility in endometriosis, where multiple factors beyond the presence of endometrial lesions contribute to reproductive challenges. The severity of endometriosis, the duration of infertility, and the woman's age at the time of surgery are all likely to moderate the effect of surgical intervention on fertility outcomes. The relatively short follow-up period in this study may also have limited our ability to fully capture the long-term impact of surgery on fertility, as it can take several years for some women to conceive following treatment. Future studies with longer follow-up periods are warranted to assess this parameter further.

Our analysis of histopathological findings corroborated the clinical observations. The significant differences observed in the thickness of the surface epithelium between patients with chronic gingivitis and those with chronic periodontitis further underscore the importance of detailed histopathological evaluation in differentiating between these conditions.

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