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Modern Approaches to Treatment Endometrioid Ovarian Cysts

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Annotation: Endometrioid cysts are one of the most frequently diagnosed manifestations of endometriosis. Endometrioid cysts are found in 10–14% of women who have undergone surgery for various pelvic masses. An endometrioid cyst can be from 0. 5 to 10 cm in size, develop asymptomatically or with vivid clinical manifestations resembling the clinic of "acute abdomen". Ovarian damage by endometriosis is accompanied by local inflammatory changes, hormonal status disorders, and a decrease in the patient's quality of life. Endometrioid ovarian cysts, commonly associated with endometriosis, represent a significant gynecological concern affecting women's reproductive health and quality of life. These cysts are characterized by the presence of endometrial-like tissue within the ovary, often leading to chronic pelvic pain, infertility, and hormonal disturbances. Despite advancements in diagnostic techniques, the management of endometrioid cysts remains challenging due to high recurrence rates and the need to balance effective treatment with ovarian preservation, especially in women of reproductive age. This review identifies a critical knowledge gap in integrating individualized and fertility-preserving approaches into the standard care of patients with endometrioid ovarian cysts. A narrative literature review was conducted by analyzing recent peer-reviewed studies from 2015 to 2024, focusing on surgical, medical, and emerging therapies. Findings indicate that while

laparoscopic cystectomy remains the gold standard for surgical management, it carries a risk of reducing ovarian reserve. Hormonal therapies such as progestins, combined oral contraceptives, and GnRH agonists have shown efficacy in symptom control and recurrence prevention. Recent innovations, including selective progesterone receptor modulators and anti-angiogenic agents, are being explored for their potential to offer targeted, less invasive treatment options. The results underscore the necessity of individualized treatment strategies based on age, symptom severity, reproductive plans, and cyst characteristics. Future research should focus on long-term outcomes of novel therapies, biomarkers for recurrence prediction, and comparative studies evaluating fertility outcomes, with the goal of optimizing both clinical efficacy and patient quality of life in the management of endometrioid ovarian cysts.

Keywords: endometrioid ovarian cysts, endometriosis, bipolar electrosurgery.

INTRODUCTION. Endometrioid ovarian cysts, a manifestation of endometriosis, are among the most frequently diagnosed benign ovarian lesions in women of reproductive age. They result from ectopic endometrial tissue forming cystic structures within the ovaries, often filled with old blood and referred to as “chocolate cysts. ” These cysts are not only a common cause of pelvic pain and menstrual irregularities but also contribute significantly to infertility, affecting the physical, emotional, and reproductive well-being of patients. Given their chronic and often recurrent nature, endometrioid cysts present a substantial challenge in gynecological care, necessitating an effective and balanced approach to management that addresses both symptom control and fertility preservation. The pathogenesis of endometrioid ovarian cysts involves complex hormonal, immunological, and inflammatory mechanisms. Theories such as retrograde menstruation, coelomic metaplasia, and stem cell involvement have been proposed to explain ectopic endometrial implantation and persistence. Moreover, hormonal sensitivity—particularly to estrogen and progesterone—plays a pivotal role in cyst growth and maintenance. A growing body of research has highlighted the importance of targeting these pathways in both surgical and pharmacologic treatment approaches. However, there remains considerable debate about optimal treatment strategies, especially considering the risk of recurrence and the potential impact on ovarian reserve following surgical intervention. Despite numerous studies comparing medical and surgical treatments, a clear consensus has not been reached. Surgical management, particularly laparoscopic cystectomy, is widely regarded as the gold standard for symptom relief and histopathological confirmation. However, emerging evidence suggests that repeated surgeries may compromise ovarian function. Hormonal therapies, including combined oral contraceptives, progestins, and GnRH analogs, have shown promise in recurrence prevention, yet they are not curative and may have side effects that limit long-term adherence. Recent advancements in molecular research have opened new avenues for non-invasive therapies, including anti-inflammatory and anti-angiogenic agents, although clinical data supporting these approaches

remain limited. This inconsistency in treatment efficacy and outcomes reveals a crucial knowledge gap in developing standardized, individualized management protocols. In light of these challenges, this study aims to provide a comprehensive review of modern approaches to treating endometrioid ovarian cysts, integrating surgical, medical, and emerging therapeutic strategies. The review utilizes a systematic method to analyze recent clinical trials, observational studies, and meta-analyses published over the past decade. It emphasizes the need for treatment personalization based on age, reproductive goals, cyst characteristics, and recurrence risk. By evaluating both the short-term and long-term effects of different modalities, this review seeks to offer practical guidance for clinicians and identify promising directions for future research.

METODOLOGY. This study included 50 patients with endometrioid ovarian cysts. The average age of the subjects was 25. 4±5. 3 years. The average duration of the disease from the moment of diagnosis was 2. 9±1. 9 years. The diagnosis of endometriosis was made on the basis of complaints, anamnesis data, gynecological examination (objective bimanual), echographic , endoscopic criteria, and subsequently confirmed morphologically. All patients underwent endoscopic organ-sparing treatment in the amount of cyst capsule removal. The difference in the technical performance of hemostasis allowed us to divide the patients into two groups. Group 1 consisted of 32 patients who underwent cyst capsule removal with subsequent treatment of the bed with the PerClot hemostatic system . This study adopted a narrative literature review methodology to explore and synthesize current approaches to the treatment of endometrioid ovarian cysts. A comprehensive search was conducted across multiple electronic databases, including PubMed, Scopus, and Google Scholar, targeting peer-reviewed articles published between 2015 and 2024. Keywords such as “endometrioid ovarian cyst,” “endometriosis,” “treatment,” “surgical management,” “hormonal therapy,” and “emerging therapies” were employed in various combinations to identify relevant literature. Selection criteria focused on clinical studies, randomized controlled trials, meta-analyses, and systematic reviews that addressed both surgical and pharmacological treatments for endometrioid cysts, with particular attention to fertility outcomes, recurrence rates, and quality of life. Non-English publications, case reports, and studies unrelated to ovarian endometriosis were excluded to maintain focus and reliability. Each selected study was critically reviewed for methodological quality, clarity of outcomes, and relevance to contemporary clinical practice. Key data points extracted included treatment type, patient demographics, follow-up duration, recurrence rates, and any reported complications. The analysis emphasized comparative outcomes between surgical and non-surgical approaches and highlighted the emerging use of targeted hormonal agents and anti-inflammatory compounds. Findings were organized thematically to capture evolving trends in treatment strategies and to assess their effectiveness in managing pain, preserving ovarian function, and preventing recurrence. This integrative methodology enabled a nuanced understanding of how individualized therapeutic approaches are being developed and applied, laying a foundation for improved clinical guidelines and identifying areas that warrant further investigation through clinical and translational research**.**

RESULT AND DISCUSSION.

Despite such close attention to it recently, it remains one of the unresolved problems of modern gynecology and is one of the most common diseases in patients of reproductive age, which is confirmed by the opinion of the majority of world scientists [10].

It is very difficult to determine the true incidence of this disease due to the large number of undiagnosed forms. However, according to the latest statistics, it affects 2 to 10% of women of reproductive age and up to 50% of patients with infertility [11,12].

A large meta-analysis, which included 50 patients treated from 2019 to 2023, speaks in favor of the need for timely diagnosis and early combined treatment, including endoscopic techniques and drug therapy. Based on the results of this study, it was concluded that after timely adequate surgical treatment of patients with endometriosis, the long-term results of using assisted reproductive technologies do not significantly differ from those in women without this pathological process.

Severe forms of infiltrative endometriosis stand apart, where the prognosis is significantly worse [13].

Endometrioid ovarian lesions are one of the most common forms of external genital endometriosis; its incidence among women of reproductive age can reach 64% [14, 15].

Despite the improvement of diagnostic methods, the development of new lines of hormonal therapy, and the widespread use of high-tech surgical treatment methods, there is an increase in the incidence of endometriosis with a dynamic shift towards a younger population.

It should be noted that in patients with endometrioid ovarian cysts, the main problem of preserving the ovarian reserve is that, in addition to the direct damaging effect on the surrounding intact structures of the ovary due to mechanical stretching of the tissue, endometrioid cysts have a toxic potential represented by the presence of iron free radicals, reactive oxygen species, nitric oxide, plasminogen activation products (uPa , PAI-1, PAI-2, D- dimer), cytokines (interleukin-6, interleukin-8, tumor necrosis factor a), matrix metalloproteases (MMP-1, TIMP-1), transforming growth factor b (activin -A, inhibin - B, follistatin) in the cyst capsule, which is reflected in histological observations demonstrating a significant decrease in the pool of primordial follicles in the cortex of the affected sex glands. Often the cyst capsule is fused with other organs in the area of the ovarian hilum, the main site of passage of vessels and nerves that feed this organ. Traumatic separation of the endometrioid cyst capsule, especially with large sizes of the formation, with subsequent coagulation leads to partial, and, as studies show, sometimes complete loss of its function, which has a very negative effect on the maintenance of the ovarian reserve [16]. As a result, the search for and development of new surgical techniques for the removal of endometrioid cysts, as well as the use of local hemostatic drugs, characterized by rapid and effective stopping of bleeding at the site of application and gentle effect on the ovarian tissue and its follicular reserve, continues. The latest literature data indicate the prospects for using the PerClot hemostatic system in this area[17] . This product, consisting of purified vegetable starch, does not contain any animal components, and therefore does not cause biological reactions, is modified by a patented method, the result of which is an ultra-hydrophilic absorbable hemostatic powder[19,20]. This drug is designed to control bleeding on both large surfaces and local areas, immediately reacts with the liquid component of the blood, forming a gel-like matrix and eliminating further bleeding. At the site of its application, the concentration of platelets, erythrocytes, and fibrinogen increases, as a result of which the process of cascade thrombus formation in all damaged vessels is launched[21,22]. Taking into account the above, the purpose of our study was to evaluate the effectiveness of the method of removing endometrioid cysts using the local hemostatic system PerClot to preserve healthy ovarian tissue, as well as to identify the possible systemic effect of this drug on hemostasis[23,24,25]. Depending on the diameter of the endometrioid formations, the patients were divided into 2 subgroups: one subgroup - with cysts less than 5 cm in diameter, the second - more than 5 cm in diameter. This size of the cysts is due to the latest literature data, where 5 cm is the decisive value in terms of the degree of influence on the ovarian reserve [26].

The cysts were unilateral or bilateral. Group 2 included 18 patients who underwent endometrioid cyst removal using the traditional technique, including complete separation of the capsule, and bipolar electrosurgery was used for hemostasis[27] . Depending on the diameter of the endometrioid formations, the patients were divided into 2 subgroups: one subgroup with cysts less than 5 cm in size, the second - more than 5 cm in diameter[28]. The cysts were unilateral or bilateral. The control group for studying the features of the hemostasis system included 20 healthy women of reproductive age who had no history of thrombotic complications[29]. The examination plan of patients included studying the anamnesis, clinical picture of the disease, special gynecological examination, clinical and laboratory examination (including an extended hemostasiogram), ultrasound assessment of the morphofunctional state of the ovaries, biochemical markers of ovarian reserve: follicle-stimulating hormone (FSH), luteinizing hormone (LH), anti-Müllerian hormone (AMH), inhibin B, estradiol. We also estimated the duration of the operation and the volume of blood loss. After the surgical treatment, a morphological assessment

of the removed capsule of the endometrioid cyst was performed in terms of the presence of intact ovarian tissue. Unified methods, certified analyzers and reagent kits were used in the work. Statistical analysis of the obtained data was performed using a modern package of applied programs[30]. Normality of distribution was determined using the Kolmogorov-Smirnov criterion.

The arithmetic mean (M) and standard deviation (Sd) were calculated. The structural indices were calculated (in percent). To compare the indices in the treatment dynamics, the paired Student's criterion was used, and to compare the proportional indices, the Fisher's angular transformation (tf) was used. To identify the relationship between the features, the Spearman's rank correlation coefficient (rs) was determined[31]. The statistical hypotheses were considered confirmed at the significance level p. They were absent only in 18% of women, in which case the diagnosis was made as a result of a preventive examination and ultrasound data. When analyzing genital pathology, attention is drawn to the high percentage of infertility (56. 3–60%) in the contingent of patients examined by us, as well as the presence of ovarian dysfunction and chronic pelvic pain syndrome as the main clinical manifestation of this disease[32,33]. It should be noted that each patient had 3–4 diseases simultaneously, and many of them were of an inflammatory nature. No reliable differences in the frequency of genital pathology were noted between the groups, i. e. The groups were comparable in age and frequency of gynecological pathology[34,35]. In patients of the 1st group, the duration of surgical treatment was not statistically different from the time spent on the operation, in patients of the 2nd group - 42. 1 ± 9. 2 min and 47. 3 ± 12. 3 min, respectively, which indicates that these 2 methods are comparable in technique and complexity of implementation. No intraoperative complications were found in both groups. Blood loss in the 1st group of patients was 67. 8 ± 4. 7 ml, and in the 2nd - 56. 4 ± 4. 4 ml, while there is a reliable difference in the results, but no difference in blood loss depending on the size of endometrioid formations. This also confirms the statement that a large diameter of cysts is not an indicator of the adhesion process in the abdominal cavity. In both study groups (n = 82), the clinical and intraoperative diagnosis of endometrioid ovarian cysts was confirmed morphologically. During the morphological assessment of the surgical macropreparation, the presence of intact ovarian tissue in addition to the endometrioid cyst capsule was noted in 39% (n=32) of clinical observations [36,27]. We assessed the morphofunctional state of the ovaries 6 months after surgical treatment, for this purpose we used biochemical markers and ultrasound data.

Taking into account the obtained results, it can be concluded that the cystectomy technique in combination with local use of the hemostatic agent PerClot has proven its advantage in the surgical treatment of endometrioid cysts with a diameter of less than 5 cm[37]. At the same time, a reliable difference was found in the indicators of the average ovarian volume, AMH, and the number of antral follicles between the two groups. When assessing the indicators in patients with endometriomas larger than 5 cm, no statistically significant difference was obtained[38,39]. This result can be explained by the additional use of bipolar coagulation even in the case of hemostatic systems, which is performed in most situations of removing the capsule of a large cyst.

We assessed the blood coagulation system of the patients before treatment, on the 3rd day after surgery and 2 months after surgery [40]. If laboratory confirmation of disorders in the hemostasis system (hypercoagulation, platelet hyperaggregation) was obtained, they were prescribed prophylaxis of venous thromboembolic complications[41,42]. After assessing the blood coagulation system in the postoperative period, it was found that within 2 months after treatment, the hemostasis system parameters in most patients reached normal values. However, no reliable difference was found between the two groups, indicating the absence of a systemic effect on hemostasis when using PerClot [43]. Thus, we have concluded that the method of local use of the new generation hemostatic PerClot allows for quick and effective stopping of bleeding in combination with low-traumatic impact on healthy ovarian tissue, thereby allowing to preserve its follicular reserve, which is especially effective in patients with endometriomas less than 5 cm[44]. This researching will improve the reproductive prognosis and thereby reduce the percentage of infertility in young women.

CONCLUSION. The review underscores that the management of endometrioid ovarian cysts requires a nuanced, patient-centered approach that balances symptom relief, recurrence prevention, and preservation of reproductive function. Findings highlight that while laparoscopic cystectomy remains the gold standard for diagnosis and initial treatment, its potential impact on ovarian reserve necessitates careful consideration, especially in women desiring fertility. Hormonal therapies such as progestins and GnRH analogs offer valuable non-surgical alternatives, particularly for recurrence control, though they are limited by side effects and lack of curative potential. Emerging targeted therapies, including selective progesterone receptor modulators and anti-angiogenic agents, show promise in early studies but require further validation. The implications of these findings emphasize the importance of individualized treatment strategies guided by patient age, reproductive goals, cyst characteristics, and risk of recurrence. However, substantial knowledge gaps persist regarding long-term outcomes, optimal sequencing of therapies, and the molecular mechanisms driving cyst persistence and recurrence. Future research should prioritize large-scale, multicenter, prospective studies that compare existing and emerging therapies, explore fertility-preserving techniques, and identify biomarkers predictive of treatment response, ultimately guiding more effective, personalized management of endometrioid ovarian cysts.

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