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MODERN DIAGNOSTICS, ETIOPATHOGENETIC ASPECTS, AND STRATEGIC DIRECTIONS OF COMPLEX THERAPY FOR ENDOMETRIOSIS IN WOMEN OF REPRODUCTIVE AGE

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Abstract: This fundamental research paper is dedicated to one of the most pressing and socio-medical challenges in modern gynecology, reproductology, and endocrinology—endometriosis pathology. The article provides a fundamental analysis of the molecular-biological basis, hormonal-metabolic dysfunctions, epigenetic modifications of the disease, and their pathological impact on various systems of the female organism. Within the framework of the study, the latest achievements of the obstetric-gynecological schools of the Republic of Uzbekistan are examined, specifically the principles of organ-preserving minimal invasive (laparoscopic) surgery, long-term anti-proliferative hormonal therapy, immunomodulation, and the integrated model of postoperative psycho-social rehabilitation. The primary objective of the research is to improve the methodology for early (pre-clinical) detection of endometriosis in reproductive-aged women presenting with chronic pelvic pain, various degrees of infertility, and hormonal imbalance. Additionally, the article is enriched with scientifically grounded statistical data regarding differential diagnosis algorithms, modern tumor markers (CA-125, HE4), and the pharmacological efficacy of hormonal modulators. The results demonstrate the superiority of innovative diagnostic-therapeutic approaches in preserving the fertile health of women in the conditions of Uzbekistan.

Keywords: Endometriosis, gynecological surgery, infertility, laparoscopy, adenomyosis, dienogest, chronic pelvic pain (CPP), reproductive health, hormonal imbalance, medicine of Uzbekistan, immunological markers, invasive diagnostics, progesterone resistance, cyst enucleation, CA-125 dynamics, quality of life indicators, recurrence prophylaxis, metaplasia theory, epigenetic modification, cytokine balance.

Introduction: Endometriosis is a systemic and progressive pathological process characterized by the localization of endometrial tissues (stromal and glandular cells) outside their normal anatomical boundaries, namely the uterine cavity, their infiltration into healthy surrounding tissues, and their destructive inflammatory changes in accordance with the menstrual cycle. In modern medicine, endometriosis is viewed not merely as a local pathology but as a "benign yet aggressive-acting" disease resulting from a disruption of the body's immunological tolerance [1]. Etiologically, although Sampson's "retrograde menstruation" theory remains leading, in recent years, theories of "coelomic metaplasia" and "genetic induction" have also gained significant importance. An analysis of the demographic indicators of Uzbekistan shows that approximately 40-50 percent of infertility causes among women of reproductive age are directly related to endometriosis [2]. The disease often develops in young girls during the first years after the onset of the menstrual cycle (menarche) and, due to incorrect diagnosis (often as adnexitis or cystitis), becomes complicated over the years. This, in turn, causes the stabilization of progesterone resistance and a state of hyperestrogenism in the female organism [6]. The dangerous aspect of endometriosis is that it can encompass not only the small

pelvic organs but also distant organs (e.g., lungs, diaphragm, postoperative scars). To improve the quality of diagnostics and treatment in the conditions of Uzbekistan, it is crucial to study not only instrumental methods (Ultrasound, MRI) but also molecular markers. This article is a fundamental study aimed at developing a modern classification of endometriosis, its mechanisms of causing infertility, and the most optimal, economically efficient, and clinically reliable diagnostic-treatment tactics for local obstetric-gynecological practice.

Literature Review: The medical science of Uzbekistan works in integration with leading international scientific centers in studying the problem of endometriosis. Academician F.M. Ayupova, in her many years of fundamental research, deeply studied the genetic basis of endometriosis, particularly the role of cytochrome P450 system enzymes and estrogen receptor polymorphisms [1]. According to her findings, endometriosis in women with certain genotypes occurs with "progesterone resistance," which scientifically explains the low sensitivity to standard hormonal treatment. Professor M.N. Negmatullaeva, as a representative of the Bukhara gynecological school, systematically analyzed the pathogenetic link between endometriosis and the metabolic status of the female organism, particularly obesity, hyperinsulinemia, and dyslipidemia [3]. She proved that peripheral adipose tissue acts not only as an energy depot but also as a "source" producing excess estrogen with the help of the aromatase enzyme, stimulating the proliferation of endometrioid foci. In the works of Z.Sh. Kurbanova, immunological dysfunction—the "immune escape" mechanism—occupies a central place [2]. She proved that the inability of peritoneal macrophages to perform their function results in the adhesion of endometrial cells to the peritoneum. The leading specialist in operative gynecology, S.N. Sultonov, made a significant contribution to the standardization of laparoscopic techniques, demonstrating the advantages of not only coagulating foci but also their radical excision [4]. Additionally, scientists such as D.A. Asatova [8] and D.D. Kurbanova [9] improved the differential diagnosis system in Uzbekistan by researching the characteristics of endometriosis occurring alongside other gynecological pathologies, specifically uterine fibroids and chronic inflammatory processes.

Methods: The study was conducted between 2023 and early 2026 at the clinics of the Tashkent Medical Academy and the Republican Specialized Scientific-Practical Medical Center for Obstetrics and Gynecology. 350 women of reproductive age (18-45 years) were selected for participation in the study. Clinical-Visual and Anamnestic Analysis. A special questionnaire was developed for each patient. In this, the character, duration, and impact of pain on the quality of sexual life were assessed using the Visual Analog Scale (VAS) and the McGill Pain Questionnaire. The patients' past abortions, surgical procedures, and hereditary predisposition (familial endometriosis) were separately accounted for. Instrumental Diagnostics. Ultrasound examination was performed on high-resolution equipment using transvaginal probes along with the "sliding sign" test. To detect infiltrative forms, MRI examination of the small pelvic organs was performed in T2-weighted mode using contrast media [7]. Biochemical Monitoring. Serum levels of CA-125 and HE4 tumor markers, as well as the hormonal profile (FSH, LH, Estradiol, AMH), were studied on days 3-5 of the menstrual cycle [8]. Surgical-Histological Method. Laparoscopy was performed through 3-4 point entry sites. The obtained histological preparations were analyzed at the microscopic level, confirming the presence of endometrial glands and stroma.

Results: The research results revealed complex relationships between the clinical forms of endometriosis and their response to treatment. Diagnostic Efficacy. The accuracy of detecting endometrioid cysts using ultrasound was 92%, and 89% for detecting adenomyosis. MRI

examination showed 97% efficacy in diagnosing deep infiltrative endometriosis (DIE), which allowed for the correct planning of the surgical volume. Dynamics of Pain Syndrome. After surgery, the recurrence of pain in the control group (without hormonal therapy) was 34% after 12 months. In the group receiving complex treatment (surgery + dienogest 2mg), pain recurrence was observed in only 4% of cases [5]. Reproductive Outcomes. In 54 percent of women diagnosed with infertility (Stage I and II patients), spontaneous pregnancy occurred within the first year after surgery. In Stage III-IV patients, this figure was 26%. Psycho-emotional State. It was recorded that in women whose pain syndrome was eliminated, depression indicators decreased by 60%, and the level of social adaptation increased 2-fold.

Conclusion: Based on the conducted complex research and the obtained results, the following conclusions were reached. Early Diagnosis Strategy. In the conditions of Uzbekistan, every female patient presenting with infertility and chronic pelvic pain should be viewed as having "potential endometriosis," and a thorough ultrasound screening is mandatory [6]. Symbiosis of Surgery and Hormones. In the treatment of endometriosis, surgery alone is insufficient; postoperative long-term (6-12 months) hormonal therapy is the only method to bring the risk of recurrence close to zero. Organ-Preserving Approach. To preserve the ovarian reserve (AMH level) during surgical procedures, it is recommended to avoid bipolar coagulation and utilize hemostatic materials instead [4]. Systemic Approach. Endometriosis is a disease of the whole organism, and its treatment requires the activity of a multidisciplinary team including a gynecologist, a psychologist, and a dietitian.

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