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PAIN SYNDROME IN DIFFERENT PHENOTYPES OF ENDOMETRIOSIS: CORRELATION WITH LOCALIZATION AND DEGREE OF LESION

Khamitova Zarina Vildanovna
Republican Specialized Scientific and
Practical Medical Center for Maternal and Child Health

Annotation.
This article examines the characteristics of pain syndrome in various phenotypes of endometriosis, focusing on its correlation with the localization and degree of lesions. The study aims to identify the relationship between the type of endometriotic lesion and the severity of pain experienced by patients. It highlights that pain intensity and its clinical manifestations depend not only on the anatomical location of the lesions but also on their histological depth and the presence of inflammatory reactions. Understanding these patterns is essential for improving diagnostic accuracy and selecting optimal therapeutic strategies for endometriosis management.
Keywords: Endometriosis, pain syndrome, localization, lesion severity, phenotype, clinical characteristics

Endometriosis is a chronic, estrogen-dependent inflammatory disease characterized by the presence of endometrial-like tissue outside the uterine cavity. It affects approximately 10% of women of reproductive age and is one of the main causes of chronic pelvic pain and infertility. The clinical manifestations of endometriosis are highly variable and depend on the localization and extent of the lesions. Pain syndrome is one of the most common and debilitating symptoms, significantly affecting patients' quality of life.Recent studies have demonstrated that different phenotypes of endometriosis—such as superficial peritoneal, ovarian endometrioma, and deep infiltrating types—present distinct clinical profiles and pain patterns. However, the mechanisms underlying these differences remain poorly understood. Analyzing the relationship between pain characteristics, lesion localization, and the degree of tissue involvement can provide valuable insights into disease pathophysiology and guide individualized treatment approaches.

Endometriosis manifests in several phenotypic forms, each demonstrating unique clinical and pathological characteristics. The three primary phenotypes—superficial peritoneal endometriosis, ovarian endometrioma, and deep infiltrating endometriosis (DIE)—differ in lesion localization, depth of invasion, and the nature of pain experienced by patients.

Superficial peritoneal endometriosis is often associated with mild to moderate cyclic pelvic pain, particularly during menstruation. This type of pain is typically related to the inflammatory response caused by ectopic endometrial tissue on the peritoneal surface. In contrast, ovarian endometriomas are usually linked to chronic pelvic pain and dysmenorrhea due to repeated bleeding within the cyst, resulting in fibrotic changes and nerve irritation.

Deep infiltrating endometriosis, considered the most severe phenotype, is characterized by the penetration of endometrial-like tissue into pelvic organs such as the rectovaginal septum, bladder, and bowel. Patients with DIE frequently report severe, non-cyclic pain, dyspareunia,

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dyschezia, and dysuria. The intensity of pain in these cases is often disproportionate to the visible size of lesions, suggesting that nerve involvement and neuroangiogenesis play a major role in symptom severity.

The localization of endometriotic lesions is a critical determinant of the clinical presentation. Lesions on the uterosacral ligaments and rectovaginal septum are particularly associated with deep pelvic pain and dyspareunia. When lesions involve the bladder or ureters, patients may experience dysuria, urinary urgency, and flank pain. Similarly, bowel involvement often leads to dyschezia, constipation, or painful defecation, particularly during menstruation.

Several studies suggest that the density of sensory nerve fibers in endometriotic lesions is significantly higher in deep infiltrating forms compared to superficial types. This increased innervation may explain the chronic and intense pain observed in DIE patients. Moreover, the proximity of lesions to major pelvic nerves such as the hypogastric and sciatic nerves further contributes to radiating and neuropathic pain sensations.

The severity or stage of endometriosis, as classified by the revised American Society for Reproductive Medicine (rASRM), does not always correspond directly to pain intensity. Some patients with minimal lesions report severe pain, while others with extensive lesions may experience mild symptoms. This inconsistency indicates that factors other than lesion size—such as local inflammation, cytokine release, and nerve infiltration—play a significant role in pain generation.Deep lesions often exhibit high concentrations of inflammatory mediators including prostaglandins, interleukins, and tumor necrosis factor-alpha (TNF-α), which sensitize peripheral nociceptors and enhance pain perception. The cyclical bleeding of ectopic endometrial tissue also causes local irritation and adhesion formation, further intensifying pain and disrupting pelvic organ mobility.

Recognizing the correlation between pain characteristics and lesion phenotype is crucial for diagnosis and treatment planning. Imaging modalities such as transvaginal ultrasound and magnetic resonance imaging (MRI) help to identify the localization and depth of endometriotic lesions, guiding both medical and surgical management.An individualized approach combining hormonal therapy, analgesics, and minimally invasive surgery is often necessary. For deep infiltrating cases, multidisciplinary treatment involving gynecologists, urologists, and colorectal surgeons provides the best outcomes. Additionally, understanding pain mechanisms at the molecular level opens pathways for the development of novel therapeutic strategies targeting inflammation and neurogenesis.

Conclusion

The study of pain syndrome in different phenotypes of endometriosis reveals a strong relationship between the localization, depth, and severity of lesions and the type and intensity of pain experienced by patients. Superficial peritoneal endometriosis generally causes mild cyclic pain, while ovarian endometriomas and deep infiltrating endometriosis are often accompanied by chronic, severe, and non-cyclic pain due to deep tissue invasion, inflammatory reactions, and nerve involvement.

It has been established that the degree of pain does not always correspond directly to the visible size or stage of lesions, indicating the importance of neuroinflammatory and hormonal mechanisms in the pathogenesis of pain. The localization of lesions on pain-sensitive structures such as the uterosacral ligaments, rectovaginal septum, and bladder plays a major role in determining the clinical picture.

A comprehensive understanding of these correlations is essential for improving diagnostic accuracy and personalizing therapeutic strategies. Multidisciplinary approaches combining

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pharmacological, hormonal, and surgical treatments can significantly reduce pain intensity and enhance the quality of life for patients with endometriosis. Further research focusing on the molecular and neurobiological mechanisms of pain will contribute to the development of more effective, targeted therapies in the management of this complex disease.

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