BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg
BG PULSE JOURNAL

NEW DIRECTIONS IN THE DIAGNOSIS AND TREATMENT OF WOMEN WITH SALPINGO-OOPHORITIS COMPLICATED BY PAIN SYNDROME

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Abstract

Salpingo-oophoritis remains one of the most common inflammatory diseases in gynecological practice and represents a serious medical and social problem due to its high prevalence among women of reproductive age, chronic recurrent course, and negative impact on reproductive health. Chronic inflammatory diseases of the uterine appendages are frequently accompanied by Chronic Pelvic Pain, which significantly decreases quality of life, causes psycho-emotional disorders, menstrual dysfunction, infertility, and sexual disturbances. Persistent inflammatory processes contribute to pelvic adhesions, vascular impairment, immune dysfunction, and sensitization of nociceptive pathways, resulting in chronic pain persistence and recurrent disease exacerbation. The aim of the present study was to investigate modern approaches to the diagnosis and treatment of women with salpingo-oophoritis complicated by pain syndrome and to evaluate the effectiveness of comprehensive multimodal therapy compared with standard treatment methods. The study included 86 women aged 20–42 years diagnosed with acute or chronic salpingo-oophoritis. All patients underwent comprehensive clinical, laboratory, microbiological, and instrumental examination, including gynecological assessment, inflammatory marker analysis, bacteriological testing, polymerase chain reaction diagnostics, transvaginal ultrasonography, and Doppler evaluation of pelvic circulation.

The patients were divided into two groups. The control group received standard therapy consisting of antibacterial agents, nonsteroidal anti-inflammatory drugs, detoxification therapy, and vitamin support. The main group additionally received immunomodulatory therapy, antioxidant treatment, physiotherapeutic procedures, and multimodal pain management interventions. Treatment effectiveness was evaluated according to reduction of pain intensity, normalization of inflammatory laboratory indicators, improvement of ultrasound findings, restoration of menstrual function, and recurrence frequency during follow-up observation. The obtained results demonstrated that comprehensive multimodal treatment produced significantly better clinical outcomes compared with conventional therapy alone. Women receiving combined treatment showed greater reduction in pelvic pain intensity, faster normalization of inflammatory markers, improved pelvic microcirculation, decreased frequency of adhesions, and lower recurrence rates of inflammatory symptoms. The average Visual Analog Scale pain score decreased more significantly in the main treatment group, indicating the effectiveness of integrated therapeutic approaches targeting inflammatory, vascular, immune, and neurofunctional mechanisms of chronic pain syndrome. Furthermore, comprehensive therapy contributed to improvement of psycho-emotional status and restoration of reproductive function in women of reproductive age. The study confirms that effective management of salpingo-oophoritis complicated by pain syndrome requires individualized and pathogenetically oriented therapeutic strategies rather than isolated antibacterial treatment alone. Integration of modern diagnostic technologies and multimodal therapy may

significantly improve clinical outcomes, prevent chronic complications, and preserve reproductive health in women with chronic inflammatory pelvic diseases.

Keywords

Salpingo-oophoritis; chronic pelvic pain; pelvic inflammatory disease; gynecology; reproductive health; inflammatory markers; multimodal therapy; physiotherapy; immunomodulatory therapy; pelvic adhesions; ultrasound diagnostics; women's health; chronic inflammation; pain syndrome; pelvic microcirculation.

Introduction

Salpingo-oophoritis remains one of the most pressing problems in modern gynecology due to its high prevalence among women of reproductive age and its tendency toward chronic recurrence, reproductive dysfunction, and persistent pain syndrome. According to international epidemiological data, inflammatory diseases of the pelvic organs account for a significant proportion of gynecological hospitalizations and are closely associated with infertility, ectopic pregnancy, menstrual disorders, and decreased quality of life (Brunham et al., 2015). Chronic inflammatory processes in the uterine appendages frequently develop after acute untreated infections or recurrent bacterial contamination, leading to structural and functional damage of the reproductive organs. The pathological process is commonly caused by polymicrobial infection involving aerobic and anaerobic microorganisms, including sexually transmitted pathogens such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae* (Workowski & Bolan, 2021). One of the most clinically significant manifestations of salpingo-oophoritis is Chronic Pelvic Pain, which is observed in a large proportion of patients with chronic inflammatory pelvic diseases. Pain syndrome develops as a result of inflammatory edema, vascular disturbances, adhesions, tissue ischemia, and sensitization of peripheral and central nociceptive pathways (Howard, 2014). Long-term pelvic pain negatively influences the psycho-emotional status of women, reduces working capacity, disrupts sexual function, and worsens reproductive prognosis. In many cases, conventional antibacterial therapy alone is insufficient to eliminate chronic pain because inflammatory and neuropathic mechanisms persist even after suppression of infectious activity.

Recent scientific studies emphasize that chronic salpingo-oophoritis should be considered not only as an infectious disease but also as a multifactorial inflammatory syndrome involving immune, vascular, neuroendocrine, and microcirculatory disorders (Haggerty & Ness, 2008). Persistent inflammatory activation contributes to cytokine imbalance, oxidative stress, fibrosis, and adhesion formation within the pelvic cavity. These pathological mechanisms create conditions for chronic pain persistence and recurrent exacerbations. Therefore, modern gynecology increasingly focuses on pathogenetically oriented diagnostic and therapeutic approaches aimed at early detection of inflammatory activity and prevention of chronic complications. Advances in laboratory and instrumental diagnostics have significantly expanded the possibilities for early identification of inflammatory diseases of the pelvic organs. Modern diagnostic approaches include transvaginal ultrasonography with Doppler assessment, polymerase chain reaction methods for detecting infectious agents, evaluation of inflammatory biomarkers, and assessment of cytokine profiles (Revzin et al., 2016). These methods improve diagnostic accuracy, allow differentiation between acute and chronic inflammatory processes, and facilitate individualized treatment planning.

Additionally, minimally invasive diagnostic procedures such as laparoscopy remain important for detecting adhesions, tubo-ovarian formations, and chronic inflammatory changes in complicated cases. Therapeutic strategies for salpingo-oophoritis complicated by pain syndrome have also undergone substantial evolution in recent years. Contemporary treatment concepts involve not only antibacterial therapy but also combined use of anti-inflammatory drugs, antioxidants, immunomodulators, hormonal correction, physiotherapy, and rehabilitation methods aimed at restoring reproductive function and reducing chronic pain (ACOG Practice Bulletin, 2020). Special attention is being paid to multimodal pain management approaches that target inflammatory, neuropathic, and psychosomatic components of pain syndrome. The integration of physiotherapeutic methods, including magnetotherapy, laser therapy, and electrophoresis, has demonstrated promising results in improving pelvic microcirculation and reducing adhesion-related complications.

Despite significant advances in gynecological diagnostics and therapy, recurrence rates and chronic pain persistence remain high among women with salpingo-oophoritis. Existing treatment protocols often fail to adequately address the complex pathogenetic mechanisms underlying chronic inflammation and pain sensitization. Consequently, the development of new comprehensive approaches for diagnosis and treatment represents an important scientific and practical task in modern gynecology. The present study is devoted to investigating modern directions in the diagnosis and treatment of women with salpingo-oophoritis complicated by pain syndrome, with particular emphasis on improving therapeutic effectiveness, reducing chronic pain manifestations, and preserving reproductive health.

Materials and Methods

This study was conducted to evaluate new approaches in the diagnosis and treatment of women with Salpingo-oophoritis complicated by Chronic Pelvic Pain. The research included 86 women of reproductive age between 20 and 42 years who were diagnosed with acute or chronic salpingo-oophoritis and hospitalized in the gynecology department during the study period. The diagnosis was established based on clinical symptoms, gynecological examination, laboratory findings, and instrumental diagnostic methods. Women with malignant gynecological diseases, severe endocrine disorders, pregnancy, active tuberculosis, or autoimmune inflammatory diseases were excluded from the study in order to minimize confounding factors. All patients underwent comprehensive clinical evaluation, including detailed anamnesis collection, assessment of reproductive history, analysis of menstrual function, obstetric complications, and duration of pelvic pain syndrome. The intensity of pain was assessed using the Visual Analog Scale (VAS), where patients independently rated pain severity on a 10-point scale. General clinical examinations included complete blood count, biochemical blood analysis, urinalysis, and determination of inflammatory markers such as C-reactive protein and erythrocyte sedimentation rate. Microbiological investigation of cervical and vaginal samples was performed using bacteriological culture and polymerase chain reaction methods for identification of infectious pathogens, including *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Mycoplasma hominis*, and mixed anaerobic flora (Workowski & Bolan, 2021). Instrumental diagnostic methods included transvaginal ultrasonography with Doppler evaluation of pelvic blood flow. Ultrasound examination assessed ovarian structure, tubal changes, inflammatory infiltrates, fluid accumulation, and the presence of adhesions or tubo-ovarian formations. Doppler examination was used to evaluate pelvic microcirculation disturbances associated with chronic

inflammatory processes. In selected complicated cases, diagnostic laparoscopy was performed to confirm pelvic adhesions, chronic inflammatory changes, and the extent of anatomical damage within the pelvic cavity (Revzin et al., 2016).

The patients were randomly divided into two groups. The control group consisted of 42 women who received standard therapy including broad-spectrum antibacterial treatment, nonsteroidal anti-inflammatory drugs, detoxification therapy, and vitamin support according to conventional clinical protocols. The main group included 44 women who, in addition to standard therapy, received a comprehensive multimodal treatment program consisting of immunomodulatory therapy, antioxidant agents, physiotherapeutic procedures, and personalized pain management strategies. Physiotherapeutic treatment included low-frequency magnetotherapy, electrophoresis with anti-inflammatory agents, and laser therapy aimed at improving pelvic circulation and reducing adhesion formation. Antioxidant therapy included administration of vitamins C and E, while immunomodulatory treatment was selected according to inflammatory activity and immune status indicators. Treatment effectiveness was evaluated according to clinical improvement, reduction in pain intensity, normalization of inflammatory laboratory markers, restoration of menstrual function, and ultrasound findings after therapy. Follow-up assessment was carried out after 1 and 3 months following completion of treatment. Statistical analysis of the obtained data was performed using standard statistical software. Quantitative indicators were expressed as mean values with standard deviation (M±m). Differences between groups were assessed using Student's t-test and chi-square test, while p-values less than 0.05 were considered statistically significant (Haggerty & Ness, 2008). Ethical principles of biomedical research were maintained throughout the study, and informed consent was obtained from all participants prior to inclusion in the investigation.

Results

The conducted study demonstrated that women with Salpingo-oophoritis complicated by Chronic Pelvic Pain had pronounced clinical, laboratory, and functional disorders before treatment. The majority of patients complained of persistent lower abdominal pain, menstrual irregularities, dyspareunia, weakness, and psycho-emotional discomfort. Clinical examination revealed tenderness in the adnexal region, while laboratory analysis showed elevated inflammatory markers, including leukocytosis, increased erythrocyte sedimentation rate, and elevated C-reactive protein levels. Similar clinical manifestations of chronic inflammatory pelvic diseases have been described in previous investigations emphasizing the role of chronic inflammation and immune imbalance in pain persistence (Howard, 2014; Brunham et al., 2015). Microbiological analysis identified mixed infectious flora in most patients. *Chlamydia trachomatis* was detected in 29.1% of women, mixed anaerobic flora in 37.2%, *Mycoplasma hominis* in 18.6%, and *Neisseria gonorrhoeae* in 9.3% of cases. These findings support the concept that chronic salpingo-oophoritis is commonly associated with polymicrobial infection and prolonged inflammatory activation (Workowski & Bolan, 2021). Transvaginal ultrasonography demonstrated inflammatory thickening of the fallopian tubes, ovarian enlargement, pelvic venous congestion, and adhesive changes in a substantial proportion of patients. Doppler examination revealed decreased pelvic microcirculation and signs of vascular resistance, especially among women with severe chronic pain syndrome.

After completion of treatment, significant improvement was observed in both groups; however, therapeutic outcomes were more pronounced in the main group receiving comprehensive

multimodal therapy. Patients treated with additional immunomodulatory and physiotherapeutic interventions demonstrated faster reduction of inflammatory symptoms, greater pain relief, and better restoration of reproductive function compared to the control group receiving standard therapy only. Similar observations have been reported in studies evaluating integrated approaches for pelvic inflammatory disease management (Haggerty & Ness, 2008; ACOG Practice Bulletin, 2020). The average pain intensity measured by the Visual Analog Scale decreased from 8.1±0.4 to 2.3±0.2 points in the main group, while in the control group pain intensity decreased from 7.9±0.5 to 4.8±0.3 points after treatment ($p<0.05$). Normalization of inflammatory laboratory parameters occurred more rapidly among women receiving comprehensive therapy. Additionally, ultrasound findings showed partial regression of inflammatory infiltrates and improvement of pelvic blood circulation after physiotherapeutic treatment. These results indicate that multimodal therapeutic approaches may effectively influence inflammatory, vascular, and neuropathic components of chronic pelvic pain.

Table 1. Comparative effectiveness of treatment methods in women with salpingo-oophoritis complicated by pain syndrome

Indicators	Control Group (n=42) Before Treatment	Control Group After Treatment	Main Group (n=44) Before Treatment	Main Group After Treatment
VAS pain score	7.9 ± 0.5	4.8 ± 0.3	8.1 ± 0.4	2.3 ± 0.2
Leukocyte count (×10⁹/L)	11.8 ± 0.7	8.9 ± 0.4	12.1 ± 0.6	6.8 ± 0.3
ESR (mm/h)	31.4 ± 1.8	20.7 ± 1.1	32.1 ± 1.6	13.2 ± 0.8
C-reactive protein (mg/L)	19.3 ± 1.4	10.6 ± 0.9	20.1 ± 1.2	5.1 ± 0.4
Menstrual dysfunction (%)	57.1%	35.7%	59.0%	15.9%
Pelvic adhesions detected by ultrasound (%)	42.8%	33.3%	45.4%	18.1%

Follow-up examination after three months showed that recurrence of pelvic pain and inflammatory symptoms occurred less frequently in the main group compared with the control group. Recurrence was observed in 11.3% of patients receiving comprehensive therapy and in 28.5% of women treated with conventional methods alone. Patients from the main group also demonstrated improved psycho-emotional status, reduced fatigue, normalization of sleep, and increased quality-of-life indicators. These findings correspond with recent evidence suggesting that chronic pelvic pain requires not only antibacterial treatment but also integrated pathogenetic correction targeting inflammation, immune dysfunction, and neurovascular disturbances (Reiter, 2019; Zondervan et al., 2020). The obtained results confirm the effectiveness of comprehensive multimodal treatment strategies in women with salpingo-oophoritis complicated by pain syndrome. Combined use of antibacterial therapy, immunomodulators, antioxidants, and physiotherapeutic methods contributed to more effective suppression of inflammatory activity, significant reduction

of pain syndrome, improvement of pelvic microcirculation, and prevention of chronic complications.

Discussion

The results of the present study demonstrated that women with Salpingo-oophoritis complicated by Chronic Pelvic Pain experience complex clinical and pathogenetic disturbances involving inflammatory, vascular, immune, and neurofunctional mechanisms. The obtained findings confirm that chronic pelvic pain associated with inflammatory diseases of the uterine appendages cannot be explained solely by infectious factors, since prolonged inflammation contributes to adhesion formation, pelvic microcirculatory impairment, and sensitization of nociceptive pathways. Similar conclusions have been reported in previous studies emphasizing the multifactorial nature of chronic pelvic inflammatory disorders (Howard, 2014; Zondervan et al., 2020). The high frequency of polymicrobial infection observed in the present investigation supports current concepts regarding the etiology of chronic salpingo-oophoritis. Detection of *Chlamydia trachomatis*, anaerobic microorganisms, and mixed bacterial flora in a considerable number of patients corresponds with international epidemiological data indicating that pelvic inflammatory disease is commonly caused by ascending mixed infection (Workowski & Bolan, 2021). Persistent microbial colonization may lead to chronic activation of cytokine-mediated inflammatory pathways, resulting in tissue fibrosis and adhesion development. Such pathological changes contribute significantly to chronic pain persistence and reproductive dysfunction.

An important finding of this study was the significantly greater therapeutic effectiveness observed in the group receiving comprehensive multimodal treatment compared with patients treated using conventional protocols alone. Reduction of pain intensity, normalization of inflammatory markers, and improvement in ultrasound findings were considerably more pronounced after combined therapy involving antibacterial agents, immunomodulators, antioxidants, and physiotherapy. These observations are consistent with the reports of Haggerty and Ness (2008), who emphasized the importance of pathogenetically oriented treatment approaches in chronic pelvic inflammatory diseases. The findings also support modern gynecological recommendations advocating multidisciplinary management of chronic pelvic pain syndromes (ACOG Practice Bulletin, 2020). The substantial decrease in pain intensity in the main group suggests that multimodal treatment positively influences both inflammatory and neuropathic components of pain syndrome. Chronic pelvic pain in women with salpingo-oophoritis is frequently associated with central sensitization mechanisms, prolonged nociceptive stimulation, and autonomic nervous system dysfunction (Reiter, 2019). Therefore, the use of physiotherapeutic methods aimed at improving blood circulation and reducing tissue hypoxia may contribute not only to suppression of inflammation but also to restoration of normal neurovascular regulation within the pelvic organs. Improvement of pelvic microcirculation observed during Doppler examination further supports this assumption.

The role of physiotherapy in chronic inflammatory gynecological diseases remains a subject of active scientific discussion. In the present study, low-frequency magnetotherapy, electrophoresis, and laser therapy demonstrated positive effects on inflammatory regression and reduction of adhesive complications. Similar therapeutic benefits have been reported in investigations evaluating rehabilitation methods for chronic pelvic inflammatory disease, where physiotherapeutic

interventions improved local blood flow, accelerated tissue repair, and decreased inflammatory edema (Revzin et al., 2016). These mechanisms may explain the lower recurrence rate observed among patients receiving combined treatment. Another important aspect of this study is the improvement in menstrual and reproductive function after comprehensive therapy. Chronic inflammatory changes in the uterine appendages often disrupt ovarian hormonal activity and tubal patency, thereby increasing the risk of infertility and ectopic pregnancy (Brunham et al., 2015). Restoration of pelvic circulation and reduction of chronic inflammation may therefore play a critical role in preserving reproductive potential among women of reproductive age. The lower frequency of persistent menstrual dysfunction in the main group supports the importance of early and comprehensive therapeutic intervention.

Despite the positive outcomes, several limitations of the study should be acknowledged. The relatively small sample size and limited follow-up period may restrict the generalizability of the findings. In addition, long-term reproductive outcomes and recurrence rates require further investigation using larger multicenter studies. Future research should also evaluate the role of molecular inflammatory biomarkers, cytokine profiles, and individualized immunotherapy in optimizing treatment strategies for chronic salpingo-oophoritis complicated by pain syndrome. Overall, the findings of the present study indicate that comprehensive multimodal treatment approaches provide superior clinical effectiveness compared with standard therapy alone. Integration of antibacterial, anti-inflammatory, immunomodulatory, antioxidant, and physiotherapeutic methods contributes to significant reduction of inflammatory activity, improvement of pelvic hemodynamics, and effective control of chronic pain syndrome. These results highlight the necessity of personalized and pathogenetically oriented management strategies in modern gynecological practice.

Conclusion

The results of the present study demonstrated that Salpingo-oophoritis complicated by Chronic Pelvic Pain is a multifactorial pathological condition characterized by persistent inflammatory activity, pelvic microcirculatory disturbances, immune dysfunction, and chronic pain sensitization. The disease significantly affects reproductive health, menstrual function, psycho-emotional status, and quality of life in women of reproductive age. The obtained clinical and laboratory findings confirmed the important role of chronic infection, inflammatory cytokine activation, and adhesive pelvic changes in the development and persistence of pain syndrome. Comprehensive diagnostic evaluation involving clinical examination, laboratory inflammatory markers, microbiological testing, transvaginal ultrasonography, and Doppler assessment improved the accuracy of diagnosis and allowed early identification of chronic inflammatory and vascular disorders within the pelvic organs. The use of modern diagnostic approaches facilitated more individualized therapeutic planning and timely prevention of chronic complications. The study demonstrated that multimodal treatment strategies combining antibacterial therapy, anti-inflammatory agents, immunomodulators, antioxidants, and physiotherapeutic methods were significantly more effective than standard treatment alone. Patients receiving comprehensive therapy showed greater reduction in pain intensity, faster normalization of inflammatory markers, improvement in pelvic blood circulation, decreased frequency of adhesive complications, and better restoration of menstrual and reproductive function. The recurrence rate of inflammatory symptoms and chronic pelvic pain was also substantially lower in the main treatment group.

The findings suggest that effective management of chronic salpingo-oophoritis requires not only eradication of infectious agents but also correction of inflammatory, vascular, immune, and neurofunctional disturbances contributing to chronic pain persistence. Personalized and pathogenetically oriented therapeutic approaches may therefore improve long-term clinical outcomes and reproductive prognosis in affected women. Further large-scale multicenter investigations are necessary to evaluate long-term reproductive outcomes, optimize individualized treatment protocols, and investigate the role of molecular inflammatory biomarkers and targeted immunotherapy in women with chronic pelvic inflammatory diseases. Nevertheless, the present study confirms the clinical importance and перспективность of integrated multimodal approaches in the diagnosis and treatment of salpingo-oophoritis complicated by pain syndrome.

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