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THE ROLE OF SEXUALLY TRANSMITTED INFECTIONS IN THE ONSET AND DEVELOPMENT OF CHRONIC BACTERIAL PROSTATITIS

Actuality. *Emphasizing the role of sexually transmitted infections (STIs) in the development of chronic bacterial prostatitis.*

The purpose of the study *is to analyze the role of STIs in the onset and development of an inflammatory process in the prostate gland.*

Materials and methods*. The study included 375 patients with chronic prostatitis. The average age of patients is 24.8 ±2.4 years. Duration of the of the inflammatory process in the prostate gland for 1-3 years was 217 (32.0%), 4-6 years was 217 (57.9%), and 7–10 years was 38 (10.1%). Exacerbations of chronic disease occurred 1–2 times a year in 225 (60.0%) and 3–4 times a year in 71 (18.9%) patients. Physical, instrumental and specific laboratory tests are provided for by the regulations of the Ministry of Health of Ukraine.*

Results. *A comparative analysis of the course and clinical and morphological manifestations of urogenital pathology in patients. STI was detected in 252 (67.2%) patients with chronic prostatitis. The anamnesis established in 294 (78.4%) patients with chronic prostatitis was the sanitation of STIs prescription of a dermatovenerologist, urologist or treatment on the recommendation of a sexual partner. Among the identified infectious agents, a mixed chlamydial-trichomonas infection prevailed. The combination of STIs with enterobacteriaceae was detected in 272 (72.5%) patients and in 74 (19.7%) with staphylococci. In 30 (8%) patients with chronic prostatitis had a monoinfectious agent.*

Conclusion. *The most important sign of chronic prostatitis in men of the most sexually active age (18 to 42 years) is urethrogenic origin caused by chlamydial, trichomonas, ureaplasma and other urogenital infections, as well as their associations with opportunistic pathogens.*

Key words: *bacterial prostatitis, sexually-transmitted infections, transrectal ultrasound examination, chronic kidney disease, prostate-specific antigen, chlamydia, trichomoniasis, vasocongestion.*

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РОЛЬ ІНФЕКЦІЙ, ЯКІ ПЕРЕВАЖНО ПЕРЕДАЮТЬСЯ СТАТЕВИМ ШЛЯХОМ, У ВИНИКНЕННІ ТА РОЗВИТКУ ХРОНІЧНОГО БАКТЕРІАЛЬНОГО ПРОСТАТИТУ

Актуальність. *Акцентування ролі інфекцій, які передаються статевим шляхом (ІПСШ) у розвитку виникнення хронічного бактеріального простатиту.*

Мета дослідження *– проаналізувати роль інфекцій, які передаються статевим шляхом, у виникненні та розвитку запального процесу у передміхуровій залозі.*

Матеріал і методи*. Під спостереженням перебувало 375 хворих на хронічний простатит. Середній вік пацієнтів – 24,8±2,4 року. Тривалість запального процесу в передміхуровій залозі 1–3 роки становила 217 (32,0%), 4–6 років – 217 (57,9%), 7–10 років – 38 (10,1%) пацієнтів. Загострення хронічного простатиту виникали 1–2 рази на рік у 225 (60,0%), 3–4 рази на рік – у 71 (18,9%) пацієнта. Фізикальні, інструментальні та специфічні лабораторні дослідження передбачено нормативними актами МОЗ України.*

Результати дослідження. *Проведено порівняльний аналіз перебігу та клініко-морфологічних проявів урогенітальної патології у пацієнтів. ІПСШ виявлено у 252 (67,2%) хворих на хронічний простатит. Зібраний анамнез установив у 294 (78,4%) пацієнтів із хронічним простатитом факт санації інфекції, що передається статевим шляхом, за призначенням дерматовенеролога, уролога або лікування за рекомендацією статевого партнера. Серед виявлених збудників інфекції переважала змішана хламідійно-трихомонадна інфекція. Поєднання ІПСШ з мікроорганізмами типу ентеробактерій виявлено у 272 (72,5%) хворих та у 74 (19,7%) – стафілококами. У 30(8%) хворих на хронічний простатит виявлено моноінфекційний агент.*

Висновок. *Найбільш важливою ознакою хронічного простатиту у чоловіків найбільш сексуально активного віку (від 18 до 42 років) є уретрогенне походження, спричинене хламідійною, трихомонадною, уреаплазмовою та іншими урогенітальними інфекціями, а також їх асоціаціями з умовно-патогенними мікроорганізмами.*

Ключові слова: *бактеріальний простатит, інфекції, які передаються статевим шляхом, трансректальне ультразвукове дослідження, хронічна хвороба нирок, простатспецифічний антиген, хламідіоз, трихомоніаз, вазоконгестія.*

Actuality. The high prevalence and problems in the treatment of patients with inflammatory diseases of the genitourinary system are often associated with not fully understood aspects of their origin and development (Jianzhong et al., 2020; Motrich et al., 2018; Papeš et al., 2017).

Chronic bacterial prostatitis (CBP) affects 20–45% of men with reduced sexual activity and significantly changes the quality of life. One of the main causes of inflammatory diseases of the genitourinary organs is various associations of infections, mostly sexually transmitted infections (STIs), such as Chlamydia trachomatis, Trichomonas vaginalis, Mycoplasma, Candida, Herpes, Papillomavirus. These infectious agents differ in their biological properties, but they lead to the formation of approximately the same lesions of the genitourinary system, which makes it possible to combine them into one group according to clinical characteristics and study the role of these pathogens in the onset and development of diseases (Etienne et al., 2019; Jianzhong et al., 2020; Papeš et al., 2017; Schuppe et al., 2017).

The prevalence of urogenital infections varies considerably among different age groups in different regions of the world, but these diseases are widespread everywhere (Jianzhong et al., 2020; Papeš et al., 2017).

The consequences of STIs in the form of chronic inflammatory diseases lead to the development of prostatitis, epididymitis and other urogenital and systemic diseases, which significantly affect the reproductive function of men (Cai et al., 2017; Diudiun et al., 2021; Schuppe et al., 2017).

Given the ability of each of the STIs and their associations to cause similar inflammatory diseases of the genitourinary system, the main task of medical tactics is timely laboratory diagnosis of the infectious agent and its prompt elimination (Bielecki et al., 2020; Cai et al., 2017; Ghobish et al., 2020; Jianzhong et al., 2020; Schuppe et al., 2017).

The spread of STIs is regulated by certain mechanisms, which include the properties of the pathogen, its virulence, immune characteristics (susceptibility of the population to the disease), and the specifics of the pathogen transmission mechanisms. (Jianzhong et al., 2020; Sheng-Jing et al., 2022).

Microbial associations contribute to the adaptation of the pathogen to intracellular parasitism and increase the pathogenicity of each pathogen, as well as its resistance to the human immune system and antibiotics. In the presence of a mix-infection, residual phenomena are often formed, which are difficult to correct and have more severe manifestations [Papeš et al., 2017; Su et al., 2020; Toth et al., 2018].

As a result of evolution, Trichomonas vaginalis has adapted to a special type of parasitism. Tr. vaginalis is capable of infecting the mucous membranes of the genitourinary system, as well as the epithelium of the genital skin, causing ulcerative and erosive processes. Penetrating into the urethra, the protozoal agent spreads over the surface of the mucous membranes and then enters the subepithelial connective tissue through the intercellular spaces, causing an inflammatory reaction. The inflammatory process is enhanced by the action of proteolytic substances on epithelial cells and subepithelial tissues produced by Trichomonas vaginalis. Spreading through the urethral mucosa, Trichomonas infect the lacunae and glands, penetrate the lymphatic spaces and blood vessels, and are transferred to the gonads, causing inflammatory changes. The normal state of the vascular walls is disturbed and abundant migration of leukocytes begins with infiltration of the upper layers of the subepithelial tissue. The urethral mucosa is infiltrated, thickens, loses elasticity, and bleeds easily. The cavities of the glands and excretory ducts are filled with leukocytes and various microorganisms [Sheng-Jing et al., 2022; Su et al., 2020; Zegarra et al., 2018; Zilbermana et al., 2017].

As the blood flow is obstructed and slowed down, microcirculation and transcapillary metabolic processes are disrupted. This leads to the development of morphofunctional changes in the pelvic organs, urodynamic disorders, which have various clinical manifestations. These changes create conditions of high vulnerability even for infectious agents with low virulence [Curtis et al., 2019; Paez-Canro et al., 2019; Zegarra Montes et al., 2018; Zilbermana et al., 2017].

Purpose. To study the role of various STIs on the course of chronic bacterial prostatitis (category II).

Material and methods. We studied 375 patients with chronic kidney disease (CKD) aged 19 to 42 years. The average age of the examined patients was 24.8±2.4 years. The duration of the inflammatory process in the prostate was 1–3 years in 120 (32.0%), 4–6 years in 217 (57.9%), and 7–10 years in 38 (10.1%) patients. Exacerbations of CKD were 1–2 times per year in 225 (60.0%), 3–4 times per year in 71 (18.9%) patients. After the first complex treatment, 79 (21.1%) of the patients we observed had no exacerbation of the inflammatory process in the prostate.

The study was conducted in accordance with the principles of bioethics set forth in the Helsinki Declaration for Ethical Principles for Medical Research Involving Human Subjects and the Universal Declaration on Bioethics and Human Rights (UNESCO). The Medical Ethics Committee of the Municipal Nonprofit Enterprise «City Clinical Hospital No. 16» of the Dnipro City

Council approved the study, and each subject signed an informed consent form before the start of the study.

The diagnosis of CKD was made on the basis of patient complaints, anamnestic data, clinical manifestations, generally accepted methods of urological examination and microbiological examination of biological materials. Bacterioscopic, bacteriologic, immunologic, and molecular biologic methods were used to identify infectious agents. To exclude the possibility of malignant lesions of the prostate gland, the level of serum prostate-specific antigen (PSA) was determined in the patients under observation. All patients underwent general clinical examinations and, if indicated, consultations with other specialists.

When examining patients with CKD, we took into account the standard, which includes four symptom complexes of this disease: pain, dysuria, and disorders of the reproductive system. Each of these symptom complexes was considered as the only one or was the main one in the complex of clinical manifestations of the disease.

Patients underwent ultrasound examination using an ACUSON 128 XP/10 ultrasound scanner and an Aloka SSD-1400 ultrasound scanner with a 3.5 MHz convection transducer for transabdominal scanning. Transrectal examination in halftone mode was performed according to the generally accepted method.

To detect abnormalities in prostate hemodynamics, the method of transrectal ultrasound Doppler (TRUSDG) with color mapping was used on the Acuson Sequoia 512 (Japan) with a 7.0 MHz sensor. To assess arterial blood flow in the prostate gland, the quantitative angular parameter of peak (maximum) systolic velocity (Vmax.) was used in relation to the central zone (blood flow in the prostatic and urethral arteries) and the peripheral zone of the prostate (blood flow in the capsular arteries). The average blood flow velocity was used to assess venous blood flow.

To assess peripheral resistance, the calculated Pursillot's resistivity index (IR) was used. Statistical processing of the study results was performed using the method of biometric analysis implemented using licensed software packages Excel-2003® Statistica 6.1 (StatSoft Inc., serial number AGAR909E415822FA) [Papeš et al., 2017].

Research results and discussion. In most cases, the inflammatory process in CKD proceeds as primary chronic. Patients complained of generalized weakness, fatigue, and subfebrile temperature.

Lower abdominal and perineal pain was reported by 296 (78.9%) patients. According to various authors, pain in prostatitis is one of the leading clinical symptoms and reaches 82% [Nathan et al., 2021]. The localization and intensity of pain in the patients we examined were mosaic in nature. The pain increased during prolonged sitting, defecation, and physical activity. More than 30% of patients with chronic prostatitis (CP) reported a feeling of incomplete bladder emptying.

Among the dysuric disorders fig. 1, which were reported by our patients, were: 315 (84%) – polakiuria, 326 (86.9%) – nocturia, 195 (52%) – sluggish urine output, 67 (17.9%) – stranguria. The manifestations of dysuric disorders in our patients with CKD are caused not only by urethral inflammation, but also by the involvement of the bladder neck in the process. According to the literature, urinary disorders overwhelmingly accompany the clinic of prostatitis and are also a leading clinical symptom [Imothy et al., 2016; Lin et al., 2023; Schuppe et al., 2017].

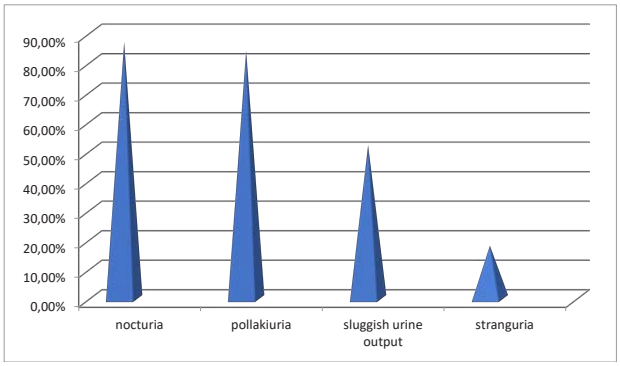

Fig. 1. Frequency of dysuric disorders among the examined patients

Finger rectal examination of the prostate revealed its enlargement in 322 (85.9%) patients, decreased tone in 247 (65.9%) patients, compaction and retraction of the gland in 183 (48.8%), and doughy consistency of the gland in 22 (18.9%). Palpation of the prostate was painful in 262 (69.9%) patients, and smoothness of the interlobular furrow – in 116 (30.9%). Changes in the prostate during finger rectal examination, characteristic of CP, range from 20.5% to 68% according to studies by various authors [Bielecki et al., 2020].

The study of prostate express in 332 (88.5%) patients revealed the presence of more than 10 leukocytes in the high-magnification field, and in 225 (60.0%) patients – a reduced number of lecithin grains. In all the studied cases, the titer of bacterial contamination of the prostate express was diagnostically significant (> 103 CFU/ml).

Carefully and purposefully collected anamnesis made it possible to establish in 294 (78.4%) patients with CKD the fact of STI sanitation as prescribed by a dermatovenerologist, urologist or treatment on the recommendation of a sexual partner.

A comprehensive examination of 375 patients with CKD revealed STIs in 252 (67.2%) patients (fig. 2). Mixed

chlamydial-trichomonas infection prevailed among the identified pathogens. The combination of STIs with microorganisms such as enterobacteriaceae was detected in 272 (72.5%), and in 74 (19.7%) – with staphylococci. Only 30 (8%) patients with CP had a monoinfectious agent.

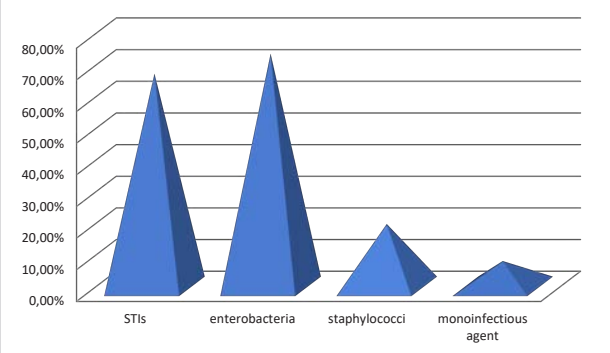

Fig. 2 Frequency of exposure to infectious agents in patients with chronic prostatitis

Obligate chlamydial infection is characterized by an initially asymptomatic or slightly asymptomatic course, and therefore is often diagnosed late or with the development of residual effects. Moreover, in men, total damage to the urethra and prostate gland is usually observed during this period. It should also be noted that trichomoniasis of the genitourinary tract is very often the cause of the onset and development of prostatitis. The latter is due to the fact that in men, the prostate gland and seminal vesicles are a frequent habitat for trichomonads. In this case, clinical signs of the disease can be extremely scarce or completely absent for a long time. Despite the prolonged asymptomatic course of chronic prostatitis caused by Trichomonas, the pathogenicity of Tr. vaginalis persists and is transmitted to the sexual partner. Periodic, so-called «causeless» urethritis is possible throughout the course of CKD. The absence of an epidemiologic history of «causeless» urethritis has created a condition under which this group of patients is not given due attention. According to a number of authors, mixed infection in patients with prostatitis is detected in 12.3 to 78.4% of cases [Curtis et al., 2019; Su et al., 2020; Toth et al., 2018].

Transrectal ultrasound (TRUS) in 311 (82.9%) patients revealed an increase in the size of the prostate, in 42 (11.2%) – normal size and in 22 (5.9%) – a decrease in the size of the gland.

Ultrasound Doppler revealed vascular architectural disorders in 327 (87.2%) patients: in 263 (70.1%) – decreased vascularization, in 75 (20.0%) – increased vascularization, and only in 37 (9.9%) – normal prostate vascularization. Hemodynamic disorders in patients with CKD were observed both with normal prostate size and with its enlarged size. Hemodynamic disorders of the prostate gland prevail in patients with enlarged prostate. According to E.Zilberman's research, foci of sclerosis, heteroechoic heterogeneity, increased prostate size, local and diffuse changes in prostate hemoperfusion are detected in 69.2% to 79.8% of cases [Cai et al., 2017].

Thus, in the examined patients, an increase in prostate size was associated with vasocongestion, and a decrease in prostate size was associated with the development of fibrosis in certain areas of the gland with a more pronounced process in the peripheral zone. Changes in hemodynamics in the venous vessels reflect the presence of vasocongestive phenomena and contribute to the maintenance of chronic inflammation of the prostate gland and its relapses.

Changes in the prostate suggest the presence of pre-existing foci of the infectious and inflammatory process. Chronic prostatitis occurs, as a rule, in patients with infectious urethritis who have not received treatment or have received therapy insufficient to completely destroy the infectious agent and restore the mucous membrane.

In cases of a combination of congestion and an infectious factor, the so-called infectious nonspecific or specific (with chlamydia, trichomoniasis and other microbial pathogens) prostatitis develops.

Thus, according to the results of our study, the most important feature of chronic prostatitis in men of the most sexually active age (18 to 42 years) is its urethrogenic origin, which is caused by chlamydia, trichomonas, ureaplasma and other STIs as their association with opportunistic pathogens.

Conclusions

1. The results of a comprehensive examination of patients with chronic prostatitis and epidemiological analysis suggest the role of sexually transmitted infections in the onset and development of pathological processes in the prostate gland in men of the most sexually active age. A comprehensive examination of 375 patients with chronic prostatitis revealed sexually transmitted infections in 252 (67.2%) patients. Mixed chlamydial-trichomonas infection prevailed among the identified pathogens. The combination of sexually transmitted infections with microorganisms such as enterobacteriaceae was detected in 272 (72.5%), and in 74 (19.7%) – with staphylococci. Only 30 (8%) patients with chronic prostatitis had a monoinfectious agent.

2. All patients with chronic prostatitis and their sexual partners, especially young men, should be re-examined for sexually transmitted infections.

3. Implementation of the rule «failure to detect an infectious agent in a sexual partner does not exclude a diagnosis» will contribute to both early detection and eradication of sexually transmitted infections and prevention of chronic prostatitis.

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Diudiun A. – development of the study concept, idea of the study design, correction of the clinical section;
Gubar A. – statistical processing of the clinical section of the work, conclusions, summary;
Polion M. – analysis of the results, abstracts, choice of research strategy;
Polion N. – interpretation of the results, justification of the purpose and objectives of the study, summary;
Hladkykh N. – collection and analysis of literature, correction of the work performed, participation in writing the article;
Kryzhanovskyi I. – correction and literary editing.

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