CLINICAL AND IMMUNOLOGICAL CHARACTERISTICS OF PATIENTS WITH BENIGN PROSTATE HYPERPLASIA UNDER VARIOUS TECHNOLOGICAL TREATMENT APPROACHES

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Abstract: *Benign prostatic hyperplasia (BPH) presents with clinical symptoms of LUTS (lower urinary tract symptoms), classified as storage symptoms (frequency, urgency) and voiding symptoms (weak stream, hesitancy), while its immunological characteristics include chronic inflammation and potential autoimmune reactions, with the degree of immune system involvement varying and potentially variable among patients. A total of 107 prostate specimens from elderly men with BPH who failed medical therapy and underwent transurethral resection of the prostate (TURP) between August 2022 and December 2025 were collected and retrospectively analyzed. The patients' ages ranged from 40 to 89 years, and the mean age was 71.28 ± 7.43 years. For each patient with BPH whose prostate was pathologically confirmed, complete clinical information was provided, including age, prostate volume, preoperative International Prostate Symptom Score (IPSS), quality of life (QOL) score, maximum urinary flow rate (Qmax), and bladder outlet obstruction index (BOOI).*

Key words: *Benign prostatic hyperplasia, immunology, transurethral resection of the prostate, IPSS, QOL.*

Relevance. Benign prostatic hyperplasia (BPH) refers to the non-cancerous growth or hyperplasia of prostate tissue and is a common cause of lower urinary tract symptoms (LUTS) in older men. The prevalence of the disease has been shown to increase with age. The histologic prevalence of BPH at autopsy reaches 50-60% in men over 60 years of age, increasing to 80-90% in those over 70 years of age.[1] According to the Global Burden of Disease (GBD) database, the incidence of BPH-related LUTS in the population significantly exceeds the incidence of other urologic diseases [1,10]. LUTS/BPH have a significant negative impact on the quality of life of many people, but the pathophysiological mechanisms are not fully understood. Numerous studies have demonstrated a positive association between prostate enlargement (PE) and increased severity of histological inflammatory conditions, although the cause of inflammation remains controversial [2,11,12]. There is evidence that the microbiome influences prostate inflammation and is associated with benign prostate diseases [13,14]. Currently, an increasing number of researchers emphasize that the histological diagnosis of BPH is not only “prostate adenoma”, but also the ratio and composition of hyperplastic nodules, which can affect LUTS and the tactics of patient management by physicians [1,4,5]. Studies have shown that obstructive symptoms in patients with BPH are not necessarily related to the size of the prostate gland, but correlate with the proportion and composition of its volume occupied by stromal tissue [2,6,7]. Some patients had small prostate sizes, a predominance of fibromuscular nodules in the stroma, and obvious urination disorders. However, another patient was found to have a large prostate gland, mainly epithelial nodules, and relatively mild urinary symptoms [3,8,9]. The prostate gland is composed of acinar epithelial tissues and supporting stromal tissues. Histopathologically, hyperplastic nodules in BPH are composed of stroma and epithelial tissue in varying proportions and mainly of stroma [5]. In this review, we focus on the influence of the human microbiome on BPH, a clinically intractable disease. First, to gain a comprehensive understanding of the relationship between the microbiome and BPH, we summarize existing studies regarding the microbiome of various anatomical sites in the human body, including the urinary tract, prostate, intestine, oral cavity, and blood. Furthermore, we explore the potential mechanisms by which the microbiome is associated with BPH. The link between the human microbiome and prostate adenoma may be mediated by inflammation, metabolic syndrome (MetS), and advancing age.

Purpose of the research. To study clinical and immunological characteristics of patients with benign prostate hyperplasia under various technological treatment approaches

Materials and methods. A total of 107 prostate samples from elderly men with BPH who failed medical therapy and underwent transurethral resection of the prostate (TURP) between August 2022 and December 2025 were collected and retrospectively analyzed. The patients' ages ranged from 40 to 89 years, and the mean age was 71.28 ± 7.43 years. Complete clinical information, including age, prostate volume, preoperative International Prostate Symptom Score (IPSS), quality of life (QOL) score, maximum urinary flow rate (Qmax), and bladder outlet obstruction index (BOOI), was provided for each BPH patient with a pathologically confirmed prostate. These patients were divided into two groups, namely, epithelial-dominated hyperplasia (EDH) group and stromal-dominated hyperplasia (SDH) group, according to the percentage of stroma in the hyperplastic nodules. Briefly, HE-stained sections were used for image analysis in the image analysis system, stromal contours were outlined with a cursor, images were collected and segmented, and the percentage of stromal area was calculated. The percentage of stroma in the microscopic field area <50% was defined as EDH, and the percentage of stroma in the microscopic field area ≥50% was defined as SDH. In addition, 10 prostate samples were collected from elderly men with BPH who had not received medical therapy and underwent TURP since November 2022. The patients' ages ranged from 40 to 77 years, and the mean age was 71.25 ± 4.1 years. All patients with BPH who had a pathologically confirmed diagnosis were divided into EDH (5 cases) and SDH (5 cases) groups. Prostate samples were collected from these 10 patients, and mRNA sequencing was performed.

Results of the study. The difference in clinical indices of BPH patients between the EDH and SDH groups. We calculated the percentage of stromal area in hyperplastic nodules and identified 40 cases in EDH patients (stromal percentage in the microscopic field area <50%) and 67 cases in SDH patients (stromal percentage in the microscopic field area ≥50%). In this study, 40 cases of ED (29.9%) and 67 cases of SDH (70.1%) were identified in 67 BPH patients. The IPSS score was significantly higher in the SDH group than in the EDH group ($p < 0.01$). However, no significant differences were found in age, prostate size, quality of life, Qmax, or BOOI between the EDP and SDP groups.

In this study, 67 patients with BPH were retrospectively analyzed and divided into EDH and SDH groups based on the percentage of stroma in the hyperplastic nodules. Twenty cases of EDH (29.9%) and 47 cases of SDH (70.1%) were recorded, further confirming the presence of BPH as predominantly stromal hyperplasia.

Our data showed that patients in the SDH group had higher IPSS than those in the EDH group, suggesting that patients with predominant stromal hyperplasia had more severe clinical obstructive symptoms and that the stroma in BPH nodules may play a significant role in the development of LUTS, which is consistent with the studies of Shapiro et al. However, our data did not reveal a significant difference in age, prostate size, QOL, Qmax, or BOOI between the two groups. The QOL category indicates the overall level of dissatisfaction and anxiety. Although useful, it is currently believed that the use of QOL measures to assess the severity of BPH/LUTS may be a subjective and inaccurate approach. Perceived symptoms of urinary tract obstruction (IPSS) and objective indications (Qmax) often contradict each other. IPSS depends on subjective patient factors, while Qmax depends on urine volume and temporary physical factors. The BOOI, calculated based on the results of a urodynamic examination, can help determine the presence or absence of BOO. Our data showed that Qmax was slightly lower and BOOI was slightly higher in patients in the SDH group compared with those in the EDH group, indicating the presence of bladder outlet obstruction in these two types. LUTS and BOO symptoms were more severe in the SDH group. However, no statistical differences were found in quality of life scores, Qmax, BOOI, or prostate size between these two patient types, and we speculate that these differences are due to the smaller number of cases in our study.

Conclusion. Thus, despite the small size samples, our data Also indicate that symptoms in patients With BPH with nodular formations of SDH can be connected With fibrosis prostate gland. Although stromal fibrosis Not is unknown a factor contributing to the development of the disease.

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