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Chronic prostatic inflammation as a prognostic marker for post-operative improvement in clinical parameters after transurethral resection of prostate

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ABSTRACT

Background: Medical therapy of prostatic symptoms and reduce study on benign prostatic hyperplasia (BPH) recently demonstrated a link between histological prostatic inflammation and prostate enlargement or symptoms scores. **Aims and Objectives:** Prognostication of symptoms of lower urinary tract based on pathological diagnosis following transurethral resection of prostate (TURP). **Materials and Methods:** This was a prospective observational study. A total of 60 BPH patients who underwent TURP were studied; 30 patients in each group, BPH without inflammation (Group I), and BPH with inflammation (Group II). Pre-operative and post-operative international prostate symptom score (IPSS), overactive bladder symptom score (OABSS), and uroflowmetry were compared in both groups. Chronic prostatic inflammation was assessed by the grade (lymphocyte density), extent (lymphocyte distribution), and location of inflammation. **Results:** The prostate volume was significantly higher in Group II as compared to Group I (53.2 ± 1.29 vs. 50.87 ± 1.48). The improvement in IPSS and OABSS in each group, before and after surgery, was significant but the between-group difference was not significant. The post-operative voided volume (in ml) in Group I was 273.27 ± 52.34 and in Group II, it was 289.47 ± 34.25 (P = 0.03). The post-operative post-void residual volume (in ml) was 21.97 ± 2.55 in Group I and 13.28 ± 2.11 in Group II (P = 0.017). The post-operative Qmax (ml/s) in Group I was 15.41 ± 2.1 and in Group II it was 19.28 ± 2.11. (P = 0.041). **Conclusion:** Surgical resection of the prostate helps in a higher degree of improvement in post-operative clinical parameters in BPH patients with inflammation.

Key words: Benign prostatic hyperplasia; Lower urinary tract symptoms; Prostatic inflammation

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is considered a major health problem affecting more than half of males in their sixth decade of life. BPH is defined histologically as an overgrowth of the epithelial and stromal cells from the transition zone and peri-urethral area. Incidence of pathological BPH could be over 70% at 60 years old and over 90% at 70 years old.[1] Non-modifiable risk factors, which include age, genetics, and geography, play significant roles in the etiology of BPH. Recent data have revealed some modifiable risk factors that give new opportunities for treatment and prevention, including sex steroid hormones, metabolic syndrome and cardiovascular disease, inflammation, obesity, diabetes, diet, and physical activity.[2]

There is some evidence that inflammation of the prostate could be a key component in the pathology of prostate

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enlargement and BPH progression. Clinical studies on BPH such as medical therapy of prostatic symptoms (MTOPS) and REDUCE recently demonstrated a link between histological prostatic inflammation and prostate enlargement or symptoms scores.[3] Transurethral resection of the prostate is currently the standard of treatment for patients with BPH. However, the degree of improvement in post-operative clinical parameters can often vary depending on the case.[4] Removal of inflamed sites by transurethral surgery of the prostate simultaneously can improve the lower urinary tract symptoms (LUTS) caused by mechanical obstruction and functional obstruction in patients with strong inflammation.[5]

Aims and objectives

To assess the degree of improvement in clinical parameters in patients with chronic prostatic inflammation following transurethral prostate surgery than in those without such inflammation.

MATERIALS AND METHODS

This was a prospective observational study to access the degree of improvement in post-operative clinical parameters in patients with chronic prostatic inflammation than those without such inflammation. The study was conducted from November 2019 to October 2021 at our tertiary care center. The study was approved by the Institutional Ethics Committee.

A total of 60 patients undergoing transurethral resection of prostate (TURP) in our department were studied; 30 patients showing chronic inflammation on post-operative histopathology were randomly included in one group, and 30 without much inflammation were included in another group.

International prostate symptom score (IPSS) and overactive bladder symptom score (OABSS) questionnaires were used to evaluate the symptomatology of BPH. IPSS is a questionnaire designed for the patient to be self-administered with speed and ease in mind to assess BPH. IPSS questionnaire is an eight-question written screening tool to screen, rapidly diagnose, track the symptoms, and suggest the management of BPH. It is based on answers to seven questions related to urinary symptoms and one question related to the quality of life. The questions related to urinary symptoms include incomplete emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia. The answers are assigned points or scores from 0 to 5. Therefore, the overall score can range from 0 to 35 (asymptomatic to very symptomatic). Quality of life question grades patients delighted to terrible. (0–6)

The OABSS is a symptom assessment questionnaire. It is designed to quantify overactive bladder (OAB) symptoms into a single score. The questionnaire consists of four questions on OAB symptoms with maximum scores ranging from 2 to 5: daytime frequency (two points), night-time frequency (three points), urgency (five points), and UUI (five points). The total score ranges from 0 to 15 points, with higher scores indicating higher symptom severity.

Pre-operative and post-operative IPSS, OABSS, and uroflowmetry were compared in both groups. Transabdominal ultrasonography was used to assess the prostatic volume (in cc/ml). The volume of the transitional zone was measured by transrectal ultrasound, and the ratio of prostatic resection was calculated using the following formula: The weight of prostatic resection/the pre-operative volume of the transitional zone. A ratio of more than 0.8 was defined as complete resection.

Chronic prostatic inflammation was evaluated by the grade, that is, lymphocyte density, extent, that is, lymphocyte distribution and location of inflammation on histopathological examination.

Statistical analysis

Continuous data such as age, IPSS score, OABS score, voided volume, post-void residual volume, and Qmax were expressed in mean±standard deviation and compared within the groups using paired t-test and between the groups using unpaired t-test. Statistical analysis was done using IBM SPSS version 24.0 software (SPSS Inc, Chicago, IL). $P<0.05$ is considered statistically significant for all the results.

RESULTS

This study was conducted to compare patients with BPH with and without inflammation after undergoing the surgical procedure. A total of 60 patients were included in the study; 30 patients in each Group BPH without inflammation (Group I) and BPH with inflammation (Group II). The mean age (in years) of the study population in Group I was 65.33±8.66, and in Group II was 64.13±9.07, with no significant difference between the groups. The prostate volume was significantly higher in BPH patients with inflammation (53.2±1.29 ml) as compared to BPH patients without inflammation (50.87±1.48 ml) with a P=0.024. The IPSS scores and OABSS for Groups I and II before and after surgery are given in (Table 1 and Figure 1).

The IPSS scores and OABSS reduced statistically significantly in both groups after the surgery. However, the post-surgery IPSS and OABSS scores were similar between

both groups. The voided volume, post-void residual volume, and Q-max for Groups I and II before and after surgery are given in (Table 2 and Figure 2).

The voided urine, post-void residual volume, and Q-max improved significantly in both the groups after the surgical procedure. However, the improvement in the parameter was significantly higher in patients of BPH with inflammation as compared to those without inflammation.

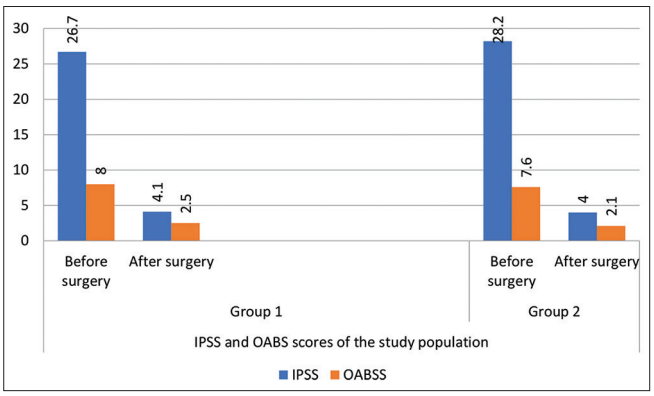

Figure 1: International prostate symptom score and overactive bladder symptom score scores of the study population

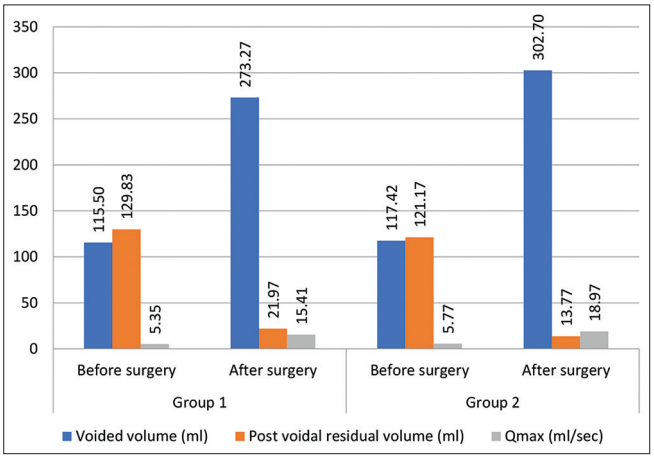

Figure 2: Voided volume, post-void residual volume, and Q-max of the study population

DISCUSSION

BPH, a common benign neoplasm in men greater than 50 years, is defined as hyperplasia in the stroma and glands of the prostate.[6] BPH has been majorly characterized by either LUTS and/or bladder outlet obstruction. Although LUTS is a non-specific symptom and can be seen as a manifestation of various systemic illnesses, BPH is the leading cause of it, and more than 50% of men aged above 50 years are believed to experience LUTS secondary to an enlarged prostate gland.[3,7] Although the exact pathophysiology of BPH is unclear, epidemiological and histopathological studies have indicated the possible role of prostatic inflammation in the pathogenesis of LUTS and BPH.[5] In patients with moderate-to-severe LUTS, surgical treatment like TURP can be considered to improve symptoms. However, the degree of improvement in post-operative clinical parameters can often vary depending on the case. Removal of inflamed sites by transurethral surgery of the prostate simultaneously can improve the LUTS caused by mechanical obstruction and functional obstruction in patients with strong inflammation.

The present study was carried out to assess post-operative clinical parameters in patients with or without strong chronic prostatic inflammation after transurethral BPH. The study was conducted in the department of urology in a tertiary care hospital. It was a prospective observational study conducted on a study population of 60 patients. Patients who presented with symptoms of BPH were included in the study. The study participants were recruited over a period of 2 years. After obtaining

Table 1: IPSS and OABS scores of the study population

Parameter	Group I			Group II			P-value (between the groups)
	Before surgery	After surgery	P-value	Before surgery	After surgery	P-value	
IPSS	26.7±4.7	4.1±1.8	<0.001	28.2±5.1	4±1.9	<0.001	0.892
OABSS	8±1.7	2.5±0.9	<0.001	7.6±1.7	2.1±1.2	<0.001	0.155

IPSS: International prostate symptom score, OABSS: Overactive bladder symptom score

Table 2: Voided volume, post-void residual volume, and Q-max of the study population

Parameter	Group I			Group II			P-value (between the groups)
	Before surgery	After surgery	P-value	Before surgery	After surgery	P-value	
Voided volume (ml)	115.5±20.5	273.27±52.34	<0.001	117.42±21.12	302.7±35.64	<0.001	0.014
Post-void residual volume (ml)	129.83±6.24	21.97±2.55	<0.001	121.17±6.61	13.77±2.27	<0.001	0.017
Qmax (ml/sec)	5.35±1.64	15.41±2.1	<0.001	5.77±1.37	18.97±0.71	<0.001	<0.001

informed consent from the study participants, data pertaining to demographics, IPSS, OABSS, voided volume, post-void residual volume, prostate volume, and Qmax were obtained for the study population. The scores were also calculated postoperatively, and change in scores was evaluated. The prostatic resection ratio was calculated for all the patients, and value of >0.8 was defined as complete resection. Chronic prostatic inflammation will be assessed by the grade (lymphocyte density), extent (lymphocyte distribution), and location of the inflammation. Among the 60 participants included in the study population, 30 patients were included in a group with BPH without inflammation, and another 30 patients were included in the Group with BPH with inflammation. There have been various studies in the past that have shown that prostatic inflammation is commonly associated with BPH and has been shown to have a major role in prostatic cell overgrowth.[8,9] It has been proven that there is a direct relationship between the degree of prostate inflammation and LUTS.[10] Prostatic inflammation has been correlated with symptomatic progression, the risk for urinary retention, and the need for surgery. Research has suggested that there is an autoimmune component involved in BPH. Antigenic stimuli may lead to a chronic inflammatory response within the prostate that leads to tissue rebuilding and stromal growth in the prostate.[11] This inflammation-induced damage to the prostatic tissue leads to a chronic wound healing process which activates the hyperproliferative process in BPH.[12] These inflammatory processes may contribute to prostatic enlargement either through stimulation of prostate growth or, alternatively, through decreasing prostatic apoptosis. The origin of inflammation in the prostate has been described as multifactorial. Different pathogens have been described, including bacterial infections, urine reflux with chemical inflammation, dietary factors, hormones, autoimmune response, and/or a combination of these factors.[13-15]

In our study, the mean age of the patients in both groups was comparable to another study by Cakir et al.[16] IPSS and OABS scores were reduced in both groups after surgery. However, there was no significant difference in the post-operative scores between the groups. There was an improvement in various parameters such as voided volume, post-void residual volume, and Qmax as well after the surgery. In the present study, the prostate volume was higher in patients of BPH with inflammation as compared with those without inflammation. This finding was similar to the prostatic volume in the MTOPS study.[17] Another study done by Cakir et al., in 2018, also showed that prostate volume was higher in patients with BPH with inflammation. In the present study, there was a significant reduction in IPSS and OABS scores in both study groups after surgery. However, there was no significant difference in improvement between the groups in relation to IPSS and OABSS. Inamura et al., in 2019, also showed that there was no significant difference between the groups for IPSS score and OABS score after surgery.[2] Another study done by De Nunzio et al., in 2011, showed that patients with prostatic inflammation benefited from surgery, particularly in relation to storage symptoms.[18] In the present study, after surgery, the improvement in the Qmax and voided volume is greater in patients with prostatic inflammation, which is statistically significant (P<0.001). The findings were similar to the study conducted by Inamura et al., which showed that the rate of change in Q-max and voided volume has a strong positive correlation with the magnitude of inflammation.[2] Similarly, post-surgical improvement in the post-void residual volume is greater in patients with prostatic inflammation, which is statistically significant (P<0.001). These findings are in contrast to the results published by Inamura et al.

TURP is considered an excellent surgical procedure for the management of BPH as it is efficient, provides excellent outcomes, and represents a safe procedure with a low complication rate and almost zero-mortality rate. TURP is mainly considered to be effective due to its effect on prostatic obstruction. However, several studies have shown positive results even in BPH patients with no obstruction.[19] Symptom improvement after TURP is thought to be due to two main factors: Surgical relief from bladder outlet obstruction and simultaneous reduction of detrusor over activity as well as associated OAB.[20] In the present study as well, patients of both the groups had improvement in IPSS score, OABSS, voided volume, post-voided residual volume, and Qmax after undergoing TURP. These findings were very similar to the study done by De Nunzio et al., which reported better outcomes after surgery.

Limitations of the study

The limitation of this study was a smaller number of patients, as more numbers would result in better evaluation and valid conclusions. Another limitation was that the clinical parameters were only checked once after the surgery and were not repeated later to check for the long-term effects of TURP on prostate inflammation. Very few studies have compared post-operative clinical parameters in patients of BPH with or without inflammation, and more research is needed in future to validate the results.

CONCLUSION

The present study proves that surgical resection of the prostate helps in a higher degree of improvement in post-operative clinical parameters of BPH patients with inflammation. As patients of BPH with inflammation have a functional obstruction in addition to a mechanical obstruction, removal of inflamed sites by transurethral surgery of the prostate not only improves the LUTS caused by mechanical obstruction but also relieves the functional obstruction in patients with strong inflammation.

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VV- Conception, design, materials, data collection, and writing; **IAQ-** Writing, analysis and interpretation, and literature review; **TMM-** Literature review**;** **VRP-** Supervision and critical review; and **SKR-** Writing and literature review.

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