

A Study on The Association Between Prostatomegaly and Direct Inguinal Hernia in Patients with Lower Urinary Tract Symptoms¹Supriya S, Assistant Professor, Department of General Surgery, AJ Institute of Medical Sciences, Mangaluru, Karnataka²Karthik R Aithal, Assistant Professor, Department of General Surgery, AJ Institute of Medical Sciences, Mangaluru, Karnataka³Anokha Jagadish, Assistant Professor, Department of General Surgery, AJ Institute of Medical Sciences, Mangaluru, Karnataka**Corresponding Author:** Dr Karthik R Aithal, Assistant Professor, Department of General Surgery, AJ Institute of Medical Sciences, Mangaluru.**How to citation this article:** Supriya S, Karthik R Aithal, Anokha Jagadish, “A Study on The Association Between Prostatomegaly and Direct Inguinal Hernia in Patients with Lower Urinary Tract Symptoms”, IJMACR– September– 2026, Volume – 9, Issue – 5, P. No. 58 – 66.**Open Access Article:** © 2026 Supriya S, et al. This is an open access journal and article distributed under the terms of the creative common's attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract**

Background and aims: Benign prostatic hyperplasia (BPH) is a major cause of lower urinary tract symptoms (LUTS) and bladder outlet obstruction in elderly men, often leading to chronic straining during urination. Both BPH and direct inguinal hernia are common age-related conditions, and prolonged urinary obstruction may increase intra-abdominal pressure, contributing to hernia formation. This study evaluated the association between prostatomegaly and direct inguinal hernia in patients with LUTS using International Prostate Symptom Score (IPSS), prostate volume, and peak urinary flow rate. The aims of the study were to compare and assess the statistical significance of differences in IPSS, prostate

volume, and peak flow rate between patients with and without direct inguinal hernia.

Methods: A hospital-based observational study was conducted at tertiary care hospital involving 72 patients (36 per group) with LUTS. All patients were evaluated during their hospital stay using IPSS questionnaire assessment, ultrasonographic measurement of prostate volume and post-void residual urine, and uroflowmetry for peak urinary flow rate. Appropriate statistical analysis test were applied.

Results: The study included 72 patients with lower urinary tract symptoms, comprising 36 patients with direct inguinal hernia and 36 without hernia. The mean age was comparable between the groups. Chronic obstructive pulmonary disease was more common in the

hernia group, while smoking prevalence was similar. Right-sided hernia predominated (69.44%). Patients with hernia had significantly larger prostate volumes (97.45 ± 47.3 cc vs 62.53 ± 12.66 cc) and higher post-void residual urine volumes (149.13 ± 26.65 mL vs 85.91 ± 27.49 mL). Uroflowmetry showed significantly lower Qmax in the hernia group ($p < 0.001$). IPSS scores and quality of life impairment were significantly higher among hernia patients. A strong positive correlation existed between age and prostate volume, especially in patients with hernia.

Conclusion: These findings suggest a strong association between prostatomegaly, severity of LUTS, and direct inguinal hernia in elderly males.

Keywords: Inguinal Hernia, Benign Prostatic Hyperplasia, Lower Urinary Tract Symptoms, International Prostate Symptom Score.

Introduction

One of the most prevalent urological disorders affecting older men is benign prostatic enlargement, often known as benign prostatic hyperplasia (BPH). Prostatomegaly is more common as people age and is frequently associated with lower urinary tract symptoms (LUTS), which have a substantial negative impact on quality of life. Urinary frequency, urgency, nocturia, hesitancy, weak urine stream, intermittency, incomplete bladder emptying, and straining during micturition are symptoms of the lower urinary tract. Elderly men frequently experience these symptoms, which can lead to significant physical discomfort, psychological stress, sleep difficulties, and social constraints ¹⁻³.

A major public health concern is the persistent prevalence of BPH. In 2021, there were 137.88 incident cases, 1125.02 prevalent cases, and 22.36 DALYs of BPH per 100,000 people worldwide. The need to address this

widespread condition is highlighted by the increasing frequency among middle-aged and older populations ⁴.

The combination of an inguinal hernia and symptomatic BPH is a common finding for urologists. In 1982, Thompson et al. discovered that 20% of males with LUTS-BPH had inguinal hernias during transurethral resection of the prostate ⁵. Prostatomegaly is caused by nonmalignant enlargement of the prostate gland, especially in the transitional zone, which results in variable degrees of obstruction of the bladder outflow. Patients with chronic obstruction are forced to strain repeatedly when urinating, which raises intravesical pressure. Long-term straining caused by urinary obstruction may raise intra-abdominal pressure, weakening the muscles and fascia of the abdominal wall ⁶⁻⁸. This mechanism has led researchers to hypothesize a possible association between prostatomegaly and the development of inguinal hernias, particularly direct inguinal hernias.

One of the most frequent surgical conditions seen in clinical practice is an inguinal hernia. It occurs due to protrusion of abdominal contents through a weakened area in the inguinal region. Due to acquired weakening of the posterior wall of the inguinal canal, direct inguinal hernia specifically arises through Hesselbach's triangle ⁹. ¹⁰. However, approximately 66 percent of affected individuals may experience more severe symptoms, such as pain or discomfort, particularly when lifting, physical activity, coughing, or bowel movements. However, approximately 66 percent of affected individuals may experience more severe symptoms, such as pain or discomfort, particularly when lifting, physical activity, coughing, or bowel movements. The most dreadful occurrence is when intestines are trapped and compressed in the scrotum or groin and are unable to

return to the abdomen, which can result in an inguinal hernia that is strangulated. This typically results in excruciating pain and tenderness in the affected area as well as intestinal strangulation, which occurs when the blood supply to a portion of the intestine is cut off, potentially leading to gangrene or bowel rupture. It requires immediate surgery because it is life-threatening¹¹⁻¹³. A number of risk factors, such as advanced age, persistent cough, constipation, obesity, smoking, hard lifting, connective tissue disorders, and conditions generating elevated intra-abdominal pressure, have been linked to the development of direct inguinal hernia. Prostatomegaly-related chronic straining during micturition has also been suggested as a major contributing factor in LUTS patients^{14, 15}.

The coexistence of prostatomegaly and inguinal hernia is commonly observed in elderly male patients. Many patients presenting with inguinal hernia also report urinary symptoms suggestive of bladder outlet obstruction. Similarly, patients undergoing evaluation for LUTS are occasionally found to have clinically detectable inguinal hernias. Despite this frequent coexistence, the exact nature of the relationship between prostatomegaly and direct inguinal hernia remains incompletely understood. Moreover, most available studies have focused broadly on inguinal hernias without specifically evaluating direct inguinal hernias in patients with LUTS. Comprehending the correlation between direct inguinal hernia and prostatomegaly has significant clinical consequences. In patients with severe LUTS, early detection of a hernia may assist avoid consequences like incarceration or strangulation. Similarly, in patients who present with a direct inguinal hernia, addressing underlying bladder outlet obstruction may enhance perioperative care and lessen urinary complications

following surgery. In addition to facilitating thorough treatment planning, simultaneous evaluation of both disorders may enhance patient results. Furthermore, knowledge of this association may aid surgeons and urologists in identifying high-risk individuals and implementing preventive strategies. Hence, the present study was conducted with an aim to determine the prevalence of direct inguinal hernia among patients with prostatomegaly and assess the clinical relationship between the severity of urinary symptoms and occurrence of hernia.

Methods

The current hospital-based cohort observational study was carried out between September 2019 and August 2021 at A. J. Institute of Medical Sciences. The study commenced after obtaining clearance from the institutional ethics committee and written informed consent from study participants. The study comprised patients over 50 years who had presented with LUTS. The study excluded patients undergoing treatment or having surgery for prostatomegaly, those who had previously undergone surgery for an abdominal wall hernia, and those who had previously received therapy for voiding dysfunction.

All study participants were evaluated during their hospital stay using three principal assessment parameters. The International Prostate Symptom Score (IPSS) questionnaire was administered in the prescribed format, and the cumulative score was calculated to determine the severity of urinary symptoms in each patient. Transabdominal ultrasonography was performed in both groups to assess prostate volume. Uroflowmetry was used to measure the urinary flow rate over time and evaluate voiding function.

Based on a study by Thompson et al, which found that approximately 20% of individuals with prostatomegaly also had an inguinal hernia, the sample size was determined⁵. With a 95% confidence interval, 80% research power, and a prevalence (P1) of 20%, the estimated sample size for each group was found to be 36. Of the 72 patients that were chosen, 36 had a direct inguinal hernia (Group A) at the same time, while the other 36 did not (Group B). Participants were divided into two groups based on the inclusion criteria using a convenience sampling technique.

Baseline characteristics of the study population were represented using tables and diagrams. Descriptive statistical measures including mean, median, range, and standard deviation were utilized to summarize the variables. The Chi-square test was applied to compare the International Prostate Symptom Score between the two groups, while the Z test was used to assess significant differences in prostate volume and uroflowmetry findings between patients with and without direct inguinal hernia.

Results

The study population comprised 36 patients with inguinal hernia (Group A) and 36 patients without inguinal hernia (Group B). The mean age of patients in Group A was 59.81 ± 6.56 years, compared to 61.64 ± 8.88 years in Group B. Statistical analysis using the unpaired t-test demonstrated that the difference in age distribution between the two groups was not statistically significant ($p = 0.28$). The distribution of associated comorbidities among the two study groups showed that ischemic heart disease was present in 2 patients (5.56%) in both Group A and Group B. Diabetes mellitus alone was observed in 6 patients (16.67%) in the hernia group and 4 patients (11.11%) in the non-hernia group. Diabetes associated with hypertension was noted in 6 patients (16.67%) in

Group A and 7 patients (19.44%) in Group B. Chronic obstructive pulmonary disease was more commonly seen among patients with hernia, affecting 15 patients (41.67%) compared to 8 patients (22.22%) in the non-hernia group. A history of smoking was present in 16 patients (44.44%) in Group A and 17 patients (47.22%) in Group B.

Among the 36 patients with direct inguinal hernia, 25 patients (69.44%) had right-sided hernias, whereas 11 patients (30.56%) had left-sided hernias. On clinical examination, a doughy consistency of the prostate was observed in 23 cases (63.89%), while an elastic consistency was noted in 13 cases (36.11%).

Ultrasound findings

Ultrasonographic assessment demonstrated that the mean prostate volume in the hernia group was 97.45 ± 47.3 cc, whereas the mean prostate volume in the non-hernia group was 62.53 ± 12.66 cc. This difference was found to be highly statistically significant on unpaired t-test analysis ($p < 0.0001$). Similarly, the mean post-void residual urine volume measured by ultrasound was significantly higher in the hernia group, with a mean value of 149.13 ± 26.65 mL, compared to 85.91 ± 27.496 mL in patients without hernia. The difference between the two groups was statistically significant ($p = 0.001$) (Figure 1).

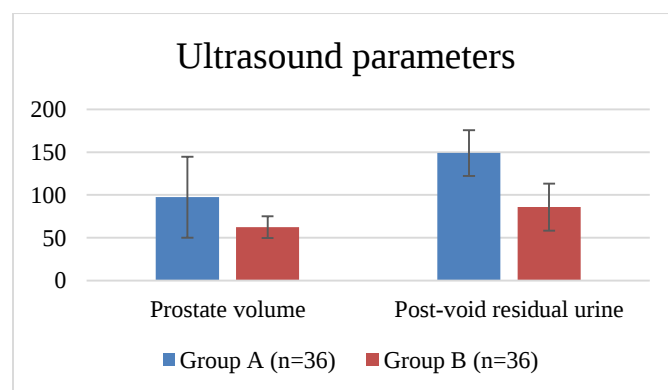


Figure 1: Comparison of ultrasound parameters.

Uroflowmetry $Q_{\max}$:

Assessment of uroflowmetry findings revealed a significant difference in maximum urinary flow rate ($Q_{\max}$) between the two study groups. In Group A, comprising patients with direct inguinal hernia, 21 patients (58.33%) had a $Q_{\max}$ of less than 10 mL/sec, compared to only 2 patients (5.56%) in Group B. A $Q_{\max}$ between 10–15 mL/sec was observed in 9 patients (25%) in the hernia group and 11 patients (30.56%) in the non-hernia group. In contrast, a $Q_{\max}$ greater than 15 mL/sec was seen in only 6 patients (16.67%) in Group A, whereas it was observed in 23 patients (63.89%) in Group B. Statistical analysis demonstrated that the difference in uroflowmetry patterns between the two groups was highly significant ($p < 0.001$) [Table 1].

Uroflowmetry $Q_{\max}$	Group A (n=36)	Group B (n=36)	P-value
<10 mL	21 (58.33%)	2 (5.56%)	<0.001 [^]
10-15 mL	9 (25%)	11 (30.56%)	
>15 mL	6 (16.67%)	23 (63.89%)	

Table 1: Comparison of Uroflowmetry $Q_{\max}$ [[^]represent $p < 0.05$ on Chi-square test]

International prostate symptom score:

Comparison of International Prostate Symptom Score (IPSS) parameters showed significantly higher symptom severity in patients with direct inguinal hernia (Group A) compared to those without hernia (Group B). Scores for incomplete emptying (3.17 ± 1.07 vs 1.11 ± 0.99), frequency (3.03 ± 1.36 vs 1.56 ± 0.99), intermittency (3.33 ± 1.24 vs 1.58 ± 0.6), urgency (3.64 ± 0.87 vs 1.56

± 0.9), weak stream (3.56 ± 1.30 vs 1.78 ± 0.7), and straining (3.42 ± 1.04 vs 1.28 ± 0.6) were significantly higher in Group A ($p < 0.00001$ for all). Nocturia (2.58 ± 1.25 vs 2.03 ± 1.01 ; $p = 0.011$) and quality of life scores (3.81 ± 1.52 vs 2.88 ± 1.02 ; $p = 0.04$) were also significantly elevated in the hernia group. The mean total IPSS was markedly higher in Group A (26.75 ± 5.81) compared to Group B (10.5 ± 4.3), indicating more severe lower urinary tract symptoms among patients with direct inguinal hernia ($p = 0.02$) [Table 2, Figure 2].

International prostate symptom score	Group A (n=36)	Group B (n=36)	P-value
Incomplete	3.17 ± 1.07	1.11 ± 0.09	<0.00001*
Frequency	3.03 ± 1.36	1.56 ± 0.99	<0.00001*
Intermittency	3.33 ± 1.24	1.58 ± 0.6	<0.00001*
Urgency	3.64 ± 0.87	1.56 ± 0.9	<0.00001*
Weak stream	3.56 ± 1.3	1.78 ± 0.7	<0.00001*
Straining	3.42 ± 1.04	1.28 ± 0.6	<0.00001*
Nocturia	2.58 ± 1.25	2.03 ± 1.01	0.011*
QoL	3.81 ± 1.52	2.88 ± 1.02	0.04*
Total IPSS	26.75 ± 5.81	10.5 ± 4.3	0.02*

Table 2: Comparison of International prostate symptom score [* represent $p < 0.05$ on unpaired T-test]

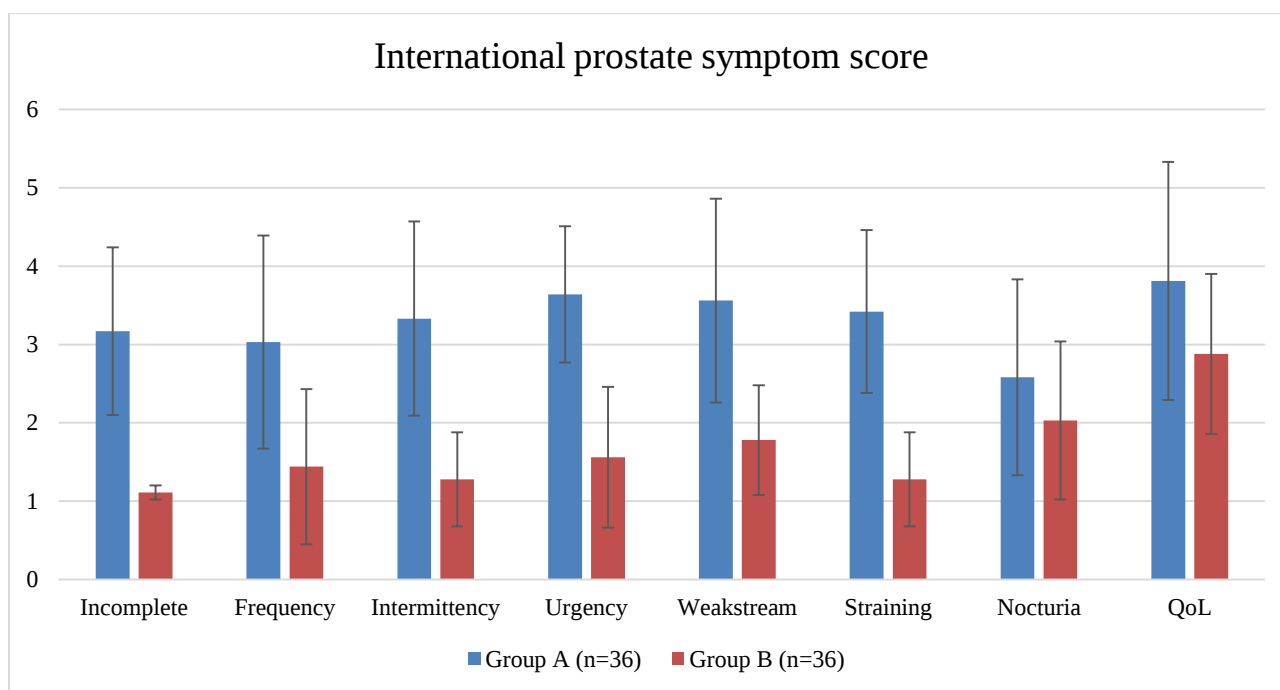


Figure 2: Comparison of International prostate symptom score [* represent $p < 0.05$ on unpaired T-test]

Histopathological examination revealed Grade 2 BPH (30–50 g) in 3 patients (4.17%), Grade 3 BPH (50–85 g) in 52 patients (72.22%), and Grade 4 BPH (>85 g) in 16 patients (22.22%). Final histopathological analysis of prostate tissue obtained after TURP showed that only 1 patient (1.39%) had focal malignancy, while the remaining cases were confirmed as BPH.

Correlation analysis demonstrated a significant positive relationship between advancing age and prostate volume ($r = 0.78$, $p < 0.001$), indicating that prostate size increased with increasing age. When subgroup analysis was performed, the correlation was found to be stronger among patients with direct inguinal hernia ($r = 0.82$, $p < 0.0001$) compared to patients without hernia ($r = 0.61$, $p < 0.05$). These findings suggest that age-related prostatic enlargement was more pronounced in patients with concomitant direct inguinal hernia.

Discussion

The relationship between LUTS-BPH and IH may be more complex and entwined because both are impacted

by aging, despite numerous experts trying to explain the link between LUTS-BPH and hernia formation. We investigated the relationship between LUTS-BPH and the subsequent risk of IH using Indian men in this observational analysis.

In comparison to individuals without hernia, the current investigation showed that patients with direct inguinal hernia had significantly bigger prostate volumes, greater post-void residual urine (PVRU), worse uroflowmetry measures, and more severe LUTS. These results lend credence to the theory that BPH-related chronic bladder outlet obstruction causes repeated straining during micturition, which raises intra-abdominal pressure and weakens the posterior wall of the inguinal canal, increasing the risk of direct inguinal hernia formation.

The hernia group's mean prostate volume was 97.45 ± 47.3 cc, while the non-hernia group's was 62.53 ± 12.66 cc. This difference was statistically significant ($p < 0.0001$). In a similar vein, patients with hernias had much more post-void leftover urine. These results suggest

that patients with concurrent direct inguinal hernias had more severe bladder outlet obstruction. In a nationwide population-based cohort study, Wu YH et al. observed a similar correlation, showing that patients with LUTS/BPH had a markedly higher chance of developing an inguinal hernia later on because of persistent straining and elevated intra-abdominal pressure ¹⁶. The current study's results are likewise similar to those of Jain SK et al.'s study, which found that patients following inguinal hernia repair had a significant prevalence of LUTS and higher PVRU. Their investigation highlighted the potential role of untreated bladder outlet obstruction in the development of hernias and their recurrence after correction ¹⁷. Similarly, a significant percentage of older male patients with inguinal hernias experienced LUTS suggestive of BPH and enlarged prostate volumes, according to Bhandari S et al. The presence of these disorders is further supported by the fact that more than half of individuals with inguinal hernias had prostate volumes larger than 20 cm³ ¹⁸.

Additionally, the current investigation showed that patients with direct inguinal hernias had considerably lower maximum urine flow rates (Q_{max}). While the majority of patients without hernias had flow rates more than 15 mL/sec, over half of the hernia patients had a Q_{max} < 10 mL/sec. Reduced Q_{max} is correlated with the degree of prostatic hypertrophy and is an objective measure of bladder outlet obstruction. These results align with the findings of Robert Raharjo RA et al., who emphasized the value of imaging and uroflowmetry in assessing patients with LUTS suggestive of BPH ¹⁹.

Patients with direct inguinal hernias scored considerably higher on the IPSS for incomplete emptying, frequency, intermittency, urgency, weak stream, straining, nocturia, and quality of life. Severe LUTS was indicated by the

hernia group's significantly higher mean overall IPSS score. These results are consistent with a study by Singh H et al. that showed a significant correlation between the existence of an inguinal hernia in older male patients and the severity of LUTS ²⁰.

Marklund H et al. found that patients with LUTS suggestive of benign prostatic obstruction had significantly lower sleep quality and health-related quality of life when compared to patients with inguinal hernia and the general population. These findings corroborate the association between severe LUTS and impaired quality of life observed in the current study ²¹.

There were limitations on the current study. The study was carried out at a single tertiary care facility and had a rather small sample size, which may have limited generalizability of the findings. Selection bias may have been generated by convenience sampling. Obesity, work stress, persistent constipation, and connective tissue problems are examples of potential confounding factors that were not thoroughly assessed. Furthermore, no long-term monitoring was done to evaluate the course of symptoms or the results of surgery.

Conclusion

The results of the present study collectively support the concept that prostatomegaly and LUTS are important contributory factors in the development of direct inguinal hernia among elderly males. Larger prostate volume, increased residual urine, lower urinary flow rates, and higher IPSS scores observed in patients with hernia suggest more severe bladder outlet obstruction in this group. Therefore, evaluation for LUTS and prostatomegaly should be considered in elderly patients presenting with direct inguinal hernia, and similarly, screening for inguinal hernia may be beneficial in patients with severe LUTS due to BPH.

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