

# Prospective Study Comparing Lower Urinary Tract Symptoms (LUTS) Before and After Laparoscopic Inguinal Hernia Surgery in Adult Patients with and without Benign Prostatic Hyperplasia with Repaired Hernia

Apichaya Swaisuanwong, M.D.<sup>1</sup>, Sonthidetch Sivilaikul, M.D.<sup>1</sup>, Pawan Chansaenroj, M.D.<sup>2</sup>

<sup>1</sup>Division of Urology, Department of Surgery, Faculty of Medicine, Somdech Phra Pinklao (Royal Thai Navy) Hospital, Bangkok 10600, Thailand.

<sup>2</sup>Department of Surgery, Queen Sirikit Naval Hospital, Chon Buri 20180, Thailand.

## ABSTRACT

**Objective:** Benign prostatic hyperplasia (BPH) is the most prevalent cause of bladder outlet obstruction in elderly males. The occurrence of both inguinal hernia and BPH with lower urinary tract symptoms increases with age. This study is aimed at comparing lower urinary tract syndrome using the International Prostate Symptom Score (IPSS) before and after laparoscopic inguinal hernia surgery.

**Material and Methods:** This prospective study was conducted at Somdech Phra Pinklao Hospital. Thirty-five patients who presented with lower urinary tract symptoms (LUTS) and underwent inguinal hernia repair were selected according to inclusion criteria and evaluated using an IPSS scoring chart for urinary symptoms before and after an operation.

**Results:** Thirty-five patients who presented with LUTS symptoms and underwent inguinal hernia repair between 1 December 2020 and 30 November 2021 were included in the study. Statistical analysis by Wilcoxon Signed-Rank test for the 35 patients resulted in an average IPSS that was compared at 2 weeks with a preoperative score of 6.54 and postoperative score of 4.69 (p-value<0.001), preoperative obstructive score of 2.6 and postoperative score of 1.51 (p-value<0.001), preoperative irritative score of 3.94 and postoperative score of 3.17 (p-value<0.001). At 4 weeks, there was an average preoperative IPSS score of 6.54 and postoperative score of 3.86 (p-value<0.001), preoperative obstructive score of 2.6 and postoperative score of 1.03 (p-value<0.001), and preoperative irritative score of 3.94 and postoperative score of 2.83 (p-value<0.001). At 8 weeks, there was an average preoperative IPSS score of 6.54 and postoperative score of 3.49 (p-value<0.001), preoperative obstructive score of 2.6 and postoperative score of 0.80 (p-value<0.001), and preoperative irritative score of 3.94 and postoperative score of 2.69 (p-value<0.001).

Corresponding author: Apichaya Swaisuanwong, M.D.

Division of Urology, Department of Surgery, Faculty of Medicine, Somdech Phra Pinklao (Royal Thai Navy) Hospital, Bangkok 10600, Thailand.

E-mail: [stam\\_ford\\_chelsea@hotmail.com](mailto:stam_ford_chelsea@hotmail.com)

doi: [10.31584/psumj.2023261718](https://doi.org/10.31584/psumj.2023261718)

<https://he01.tci-thaijo.org/index.php/PSUMJ/>

PSU Med J 2023;3(3):119-125

Received 9 March 2023

Revised 28 March 2023

Accepted 6 April 2023

Published online 26 December 2023

**Conclusion:** Comparison of LUTS before and after laparoscopic inguinal hernia surgery showed a significant decrease in the IPSS score after laparoscopic surgery inguinal hernia at 2, 4 and 8 weeks for both obstructive and irritative scores.

**Keywords:** benign prostatic hyperplasia; BPH; IPSS; inguinal hernia

## INTRODUCTION

Benign prostatic hyperplasia is a pathologic process that is one, but not the only, cause of lower urinary tract symptoms (LUTS) in aging men. Also referred to as male LUTS, a significant portion of its occurrence is caused by age-related detrusor dysfunction and other conditions such as polyuria, sleep disorders, and a variety of systemic medical conditions unrelated to the prostate-bladder unit<sup>1</sup>.

LUTS includes voiding or obstructive symptoms (hesitancy, poor and/or intermittent stream, straining, prolonged micturition, feeling of incomplete bladder emptying, dribbling, etc.) and storage or irritative symptoms (frequency, urgency, urge incontinence, and nocturia). The severity of LUTS is best measured using quantitative symptom indices<sup>1</sup>.

Several symptom scoring systems have been developed to assess the degree of symptom severity of LUTS. The most widely used scoring system is the International Prostate Symptom Score (IPSS), developed by the American Urological Association (AUA) and adopted by the World Health Organization (WHO). It is a valid tool for objectively assessing patients' symptoms, deciding on the type of treatment for patients with LUTS, and monitoring the effects of any intervention procedure. The IPSS is used to assess both the severity of urinary symptoms and quality of life, with severity scores of mild (0–7), moderate (8–19), and severe (20–35)<sup>1</sup>.

The incidence of inguinal hernias (IH) generally increases with age, and various factors contribute to the development of IH, including obesity and work-related physical activity. It is not uncommon for urologists to encounter patients presenting with LUTS associated with

IH, as inguinal hernias account for 75% of all abdominal hernias. The coexistence of inguinal hernia and LUTS due to BPH is especially common. Patients with inguinal hernia are commonly reported to have higher IPSSs than those without inguinal hernia.

Both IH and symptomatic BPH are often found together in increased frequency in the elderly. Hence, a significant association between IH and BPH may be expected. However, a number of studies have indicated that their occurrence together is a matter of co-existence rather than cause and effect.

Previous studies have found that in patients with an enlarged prostate with inguinal hernia disease and those without, the IPSS scores were higher for those without inguinal hernia. However, the exact role of IPSS as a marker to predict the development of clinical IH is still to be determined<sup>2–5</sup>. There are no comparative studies on whether the inguinal hernia or prostate hernia should be treated first, or if treatments should be performed at the same time.

In this research, assumptions were made based on the findings of previous studies conducted on patients with inguinal hernia and LUTS with diagnosed and undiagnosed prostate enlargement. The objective of the current study was to compare LUTS before and after laparoscopic inguinal hernia surgery in adult patients with and without BPH who have had a hernia repair operation by using the IPSS before and after laparoscopic inguinal hernia surgery. This included treating inguinal hernia by laparoscopic methods to exclude surgical factors and methods of open surgery and complications after open surgery for comparing LUTS.

## MATERIAL AND METHODS

### Study population

This prospective study was conducted at the Department of Surgery, Somdech Phra Pinklao Hospital. The method of selection was to include male patients as per the inclusion and exclusion criteria who came to the hospital for laparoscopic hernia repair between 1 December 2020 and 30 November 2021. Demographic data were collected and LUTS was quantified using the 7-question IPSS questionnaire regarding pre-operation and post-operation IPSS at 2, 4, and 8 weeks.

We enrolled patients 18 years of age and above who had LUTS symptoms and IH that required laparoscopic inguinal hernia repair between 1 December 2020 and 30 November 2021. Patients with acute postoperative urinary retention (required more than 1 time of catheterization after surgery), who had already had any form of surgery for BPH in the past and who had changed the treatment of BPH during the time of hernia treatment and time of follow-up for postoperative hernia repair were excluded.

All enrolled patients had the same surgeon and the same technique for laparoscopic inguinal hernia repair.

A total of 35 patients were included in the study sample. Informed written consent was obtained from each of the patients. All subjects were interviewed and examined by a single observer.

Statistical analysis was conducted using SPSS software. Wilcoxon Signed-Rank Test was done and p-value was calculated. The level of statistical significance was set at p-value of <0.05.

## RESULTS

The study population (n=35) included patients who had had laparoscopic hernia repair and experienced LUTS symptoms between 1 December 2020 and 30 November 2021 in Somdech Phra Pinklao Hospital. In patients aged between 31 years and 85 years (with the mean age equaling 64.43 years), 60% (n=21) had a right-side hernia, 17.1% (n=6) had a left-side hernia and 22.9% (n=8) had a hernia

involving both sides. Patients who had a right-side indirect hernia accounted for 60% (n=21), those having a right-side direct hernia accounted for 20% (n=7), and those having a 'both-sides' or 'pantaloon' hernia accounted for 2.9% (n=1). Patients who had a left-side indirect hernia accounted for 20% (n=7) and those who had a right-side direct hernia accounted for 20% (n=7). Patients who had been previously diagnosed as having BPH accounted for 40% (n=14), all of whom had medical treatment for BPH by alpha-blocker, 5-ARI or both drugs group (Table 1).

The pre-operative IPSS score for obstructive symptoms averaged 2.9 (min 0, max 9), for irritative symptoms averaged 3.94 (min 0, max 9), and for overall symptoms averaged 6.54 (min 1, max 14). The postoperative IPSS score at 2 weeks for obstructive symptoms averaged 1.51 (min 0, max 8), for irritative symptoms averaged 3.17 (min 0, max 9), and for overall symptoms averaged scores 4.69 (min 1, max 13). The postoperative IPSS score at 4 weeks for obstructive symptoms averaged 1.03 (min 0, max 8), for irritative symptoms averaged 2.83 (min 0, max 8), and for overall symptoms averaged 3.86 (min 0, max 13). The postoperative IPSS score at 8 weeks for obstructive symptoms averaged 0.80 (min 0, max 7), for irritative symptoms averaged 2.69 (min 0, max 8), and for overall symptoms averaged 3.49 (min 0, max 12) (Table 1).

For statistical analysis by Wilcoxon Signed-Rank test, among the 35 patients, the average preoperative and postoperative IPSS scores were compared at 2 weeks. The preoperative IPSS score was 6.54 and the postoperative IPSS score was 4.69 (W -4.595, 95% CI 1.206-2.509, p-value<0.001), the preoperative obstructive score was 2.6 and the postoperative score was 1.51 (W -4.002, 95%CI 0.627-1.545, p-value<0.001), and the preoperative irritative score was 3.94 and the postoperative score was 3.17 (W -3.135, 95%CI 0.338-1.205, p-value<0.001) (Table 2).

Comparing the preoperative and postoperative scores at 4 weeks, the preoperative IPSS score was 6.54 IPSS and the postoperative score was 3.86 (W -4.887, 95% CI 1.956-3.416, p-value<0.001), the preoperative

obstructive score was 2.6 and the postoperative score was 1.03 (W -4.517, 95% CI 1.070–2.073, p-value<0.001), and the preoperative irritative score was 3.94 and the postoperative score was 2.83 (W -3.789, 95%CI 0.616–1.613, p-value<0.001) (Table 3).

Comparing the preoperative and postoperative scores at 8 weeks, the preoperative IPSS score was 6.54

and the postoperative IPSS score was 3.49 (W -4.960, 95%CI 2.298–3.816, p-value<0.001), the preoperative obstructive score was 2.6 and the postoperative score was 0.80 (W -4.580, 95% CI 1.261–2.339, p-value<0.001), the preoperative irritative score was 3.94 and the postoperative score was 2.69 (W -3.921, 95% CI 0.728–1.786, p-value <0.001) (Table 4).

**Table 1** Characteristics of patients and IPSS scores

Demographic data	Number	Min	Max	Average	S.D.
Age (years)	N=35	31	85	64.43	13.69
Weight (kg)	N=35	49	99	68.82	9.81
Height (cm)	N=35	155	180	169.77	6.13
		N	Percent (%)		
Hernia site	Right	21	60		
	Left	6	17.1		
	Both	8	22.9		
Right side	Indirect	21	60		
	Direct	7	20		
	Pantaloon	1	2.9		
Left	No	6	17		
	Indirect	7	20		
	Direct	7	20		
Hypertension	Pantaloon	0	0		
	No	21	60		
	Yes	15	42.9		
Diabetes	No	20	57.1		
	Yes	2	5.7		
Previously diagnosis BPH	No	33	94.3		
	Yes	14	40		
Currently on medical treatment BPH	No	21	60		
	Yes	14	40		
	No	21	60		
		Min	Max	Average	S.D.
Preoperative IPSS	Obstructive IPSS scores	0	9	2.6	2.25
	Irritating IPSS scores	0	9	3.94	2.16
	IPSS scores	1	14	6.54	2.99
Postoperative 2 weeks	Obstructive IPSS scores	0	8	1.51	1.82
	Irritating IPSS scores	0	9	3.17	2.09
	IPSS scores	1	13	4.69	2.82
Postoperative 4 weeks	Obstructive IPSS scores	0	8	1.03	1.65
	Irritating IPSS scores	0	8	2.83	1.98
	IPSS scores	0	13	3.86	2.77
Postoperative 8 weeks	Obstructive IPSS scores	0	7	0.80	1.37
	Irritating IPSS scores	0	8	2.69	1.95
	IPSS scores	0	12	3.49	2.55

BPH=benign prostatic hyperplasia; IPSS=international prostate symptom score; S.D.=standard deviation; N=number

**Table 2** Scores at preoperative and postoperative 2 weeks

	Average scores	Standard deviation	Wilcoxon signed-rank test	p-value
Obstructive IPSS scores preoperative	2.6	2.252	-4.002	<0.001
Obstructive IPSS scores postoperative 2 weeks	1.51	1.821		
Irritative IPSS scores preoperative	3.94	2.155	-3.135	0.001
Irritative IPSS scores postoperative 2 weeks	3.17	2.093		
IPSS scores preoperative	6.54	2.994	-4.595	<0.001
IPSS scores postoperative 2 weeks	4.69	2.816		

**Table 3** Scores at preoperative and postoperative 4 weeks

	Average scores	Standard deviation	Wilcoxon signed-rank test	p-value
Obstructive IPSS scores preoperative	2.6	2.252	-4.517	<0.001
Obstructive IPSS scores postoperative 4 weeks	1.03	1.645		
Irritative IPSS scores preoperative	3.94	2.155	-3.789	<0.001
Irritative IPSS scores postoperative 4 weeks	2.83	1.978		
IPSS scores preoperative	6.54	2.994	-4.887	<0.001
IPSS scores postoperative 4 weeks	3.86	2.767		

**Table 4** Scores at preoperative and postoperative 8 weeks

	Average scores	Standard deviation	Wilcoxon signed-rank test	p-value
Obstructive IPSS scores preoperative	2.6	2.252	-4.580	<0.001
Obstructive IPSS scores postoperative 8 weeks	0.80	1.368		
Irritative IPSS scores preoperative	3.94	2.155	-3.921	<0.001
Irritative IPSS scores postoperative 4 weeks	2.69	1.952		
IPSS scores preoperative	6.54	2.994	-4.960	<0.001
IPSS scores postoperative 8 weeks	3.49	2.548		

## DISCUSSION

As previously mentioned, the incidence of BPH, the most common cause of LUTS in elderly men, increases with age, as does the incidence of IHs. Past studies have found that in patients with an enlarged prostate with inguinal hernia disease, when compared with IPSS, have demonstrated a higher degree of IPSS than those without inguinal hernia<sup>2-5</sup>.

Previous studies have also found that patients with inguinal hernia present with higher IPSS. The role of

IPSS as a marker to predict the development of clinical inguinal hernia is still to be determined<sup>2</sup>. However, there was statistical significance in the Qmax between case and control groups (p-value=0.039). The differences of BOO (Bladder Outlet Obstruction) symptoms between lower and higher IPSS scores (p-value<0.05) were also statistically significant<sup>3</sup>.

Some studies have shown that, although both IH and BPH are seen with increased frequency in the higher-aged male population, there is no statistically significant

association between the two. Their occurrence together is considered a chance co-existence rather than cause and effect<sup>4</sup>.

Studies have also found no statistical relationship or difference in rates between IPSS scores, and that there was not a significant correlation between IPSS symptom severity and type of hernia based on chi-square analysis<sup>5</sup>.

Using these past findings as a starting point<sup>6-11</sup>, our study aimed to compare symptom scores before and after laparoscopic inguinal hernia surgery in adult patients with and without benign prostatic hyperplasia<sup>12</sup>. After data analysis with Wilcoxon Signed-Rank test, our study found that preoperative and postoperative IPSS symptom scores for obstructive, irritative and IPSS scores compared at 2, 4 and 8 weeks had a significant statistical decrease after laparoscopic inguinal hernia surgery in all data (Table 2-4).

All enrolled patients had no previous surgery for BPH, no one had their treatment for BPH changed during the time of hernia treatment and time of follow-up for postoperative hernia repair, and all had the same surgeon using the same technique for laparoscopic inguinal hernia repair. Thus, this factor may not be of impact for the results of the study<sup>13-19</sup>.

## CONCLUSION

Comparison of LUTS before and after laparoscopic inguinal hernia surgery showed a significant decrease in the IPSS score after laparoscopic surgery for inguinal hernia at 2, 4 and 8 weeks for both obstructive and irritative scores.

However, the mechanism by which laparoscopic hernia surgery could reduce LUTS or the IPSS score is still unexplained. Our study had several limitations. Due to time constraints, it was relatively small and conducted at a single center. To improve upon our results, further studies with more patients and a longer follow-up duration are necessary. These issues require more attention in future studies.

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