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Outcome of Transurethral Incision of the Bladder Neck in Patients with Primary Bladder Neck Obstruction

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ABSTRACT

Background: Primary bladder neck obstruction (PBNO) is a functional outlet obstruction that impairs urinary flow and leads to significant lower urinary tract symptoms (LUTS). Transurethral Incision of the Bladder Neck (TUIBN) is a standard surgical approach that offers effective decompression. However, regional data from Bangladesh are limited to the aforementioned studies. This study aimed to evaluate the clinical and urodynamic outcomes of TUIBN in patients with PBNO.

Methods: This cross-sectional observational study was conducted at the Department of Urology, Bangladesh Medical University, Dhaka, from June 2023 to July 2024. Forty patients diagnosed with PBNO underwent TUIBN. Demographic data, symptoms, and urodynamic parameters were collected and analyzed using SPSS version 25. Pre- and postoperative variables were compared using paired t-tests, with $p < 0.05$ considered significant.

Results: The mean age of the patients was 43.9 ± 10.6 years, and 90% were male. Qmax improved significantly from 7.6 ± 2.3 to 18.4 ± 4.1 mL/s ($p < 0.001$), whereas postvoid residual urine decreased from 145.2 ± 68.7 to 38.5 ± 22.4 mL ($p < 0.001$). The IPSS and quality of life scores also improved markedly. The overall success rate was 85%, with minor complications, including transient dysuria (22.5%) and hematuria (15%).

Conclusion: TUIBN is a safe and effective intervention for PBNO, providing significant symptomatic and functional improvements with low morbidity.

Keywords: *Primary bladder neck obstruction, transurethral incision, urodynamics, lower urinary tract symptoms.*

1. INTRODUCTION

Primary bladder neck obstruction (PBNO) is a functional or anatomical disorder characterized by inadequate opening of the bladder neck during voiding in the absence of secondary causes such as prostatic enlargement or urethral stricture [1,2]. This condition often leads to significant lower urinary tract symptoms (LUTS), including weak urinary stream, hesitancy, incomplete emptying, and increased residual urine volume [3,4]. The exact etiology remains multifactorial, involving altered neuromuscular coordination or fibrotic changes at the bladder outlet, leading to elevated detrusor pressure during voiding [5].

The diagnosis of PBNO relies heavily on urodynamic and video urodynamic evaluation, which demonstrate high-pressure, low-flow voiding patterns with evidence of obstruction at the bladder neck [6]. While pharmacological therapy with alpha-adrenergic antagonists may offer temporary relief, surgical intervention is often required for definitive management, particularly in patients unresponsive to medical therapy [7].

Transurethral Incision of the Bladder Neck (TUIBN) has emerged as the most commonly employed surgical approach for PBNO. The technique involves precise incision of the bladder neck at specific clock positions (commonly at 5 and 7 o'clock), allowing improved urinary flow without extensive tissue resection [8]. Studies have demonstrated significant symptomatic and functional improvement following TUIBN in both men and women, with relatively low complication rates [9,10]. However, recurrence and postoperative complications such as retrograde ejaculation, bladder neck contracture, and transient dysuria remain concerns [11,12].

Recent studies emphasize the need for individualized treatment selection based on urodynamic findings and patient characteristics [13]. Advances in endoscopic techniques and energy modalities, such as bipolar and laser-assisted incisions, have contributed to better outcomes and fewer complications [14]. Despite these developments, data from developing countries like Bangladesh remain limited, and most available studies are based on small cohorts or heterogeneous populations [15,16].

Given the increasing recognition of PBNO as a distinct cause of bladder outlet obstruction and the scarcity of local data, this study aimed to evaluate the outcomes of TUIBN among Bangladeshi patients with PBNO. The findings are expected to provide insights into the efficacy, safety, and complication profile of this surgical procedure in a regional context, helping to optimize management strategies for patients suffering from bladder outlet obstruction secondary to PBNO.

MATERIALS & METHODS

This cross-sectional observational study was conducted at the Department of Urology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from June 2023 to July 2024. The study involved 40 patients who underwent Transurethral Incision of the Bladder Neck (TUIBN) for the management of Primary Bladder Neck Obstruction (PBNO).

Sample Selection

Inclusion criteria:

Adult patients aged ≥18 years diagnosed with primary bladder neck obstruction.

Patients with obstructive lower urinary tract symptoms refractory to medical therapy.

Patients who underwent TUIBN during the study period.

Exclusion criteria:

History of prior urethral or bladder neck surgery.

Secondary bladder neck obstruction due to prostate enlargement, strictures, or malignancy.

Neurogenic bladder dysfunction or detrusor underactivity.

Active urinary tract infection at the time of surgery.

Data Collection Procedure

After obtaining informed consent from the patients, data were collected from medical records, operative notes, and follow-up documentation. Demographic and clinical variables, such as age, gender, symptom duration, and comorbidities, were recorded. Preoperative and postoperative assessments included the International Prostate Symptom Score (IPSS), maximum urinary flow rate (Qmax), post-void residual urine (PVR), bladder capacity, and quality of life (QoL) score.

All procedures were performed under spinal anesthesia using standard transurethral techniques, with incisions made at the 5 and 7 o'clock positions of the bladder neck using a Collins knife or resectoscope loop. Postoperative care included short-term catheterization and antibiotic prophylaxis. Follow-up was performed at 6 weeks, 3 months, and 6 months postoperatively with repeat symptom scoring and uroflowmetry. Confidentiality was properly maintained.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Descriptive statistics were used to summarize patient demographics and clinical data. Paired t-tests compared pre- and postoperative parameters, with $p < 0.05$ considered statistically significant.

2. RESULTS

Table 1: Baseline Characteristics of Patients Undergoing Transurethral Incision of the Bladder Neck (n = 40)

Variables	Category	Frequency (n)	Percentage (%)
Age (Years)	Mean ± SD	43.9 ± 10.6	
Gender	Male	36	90.0
	Female	4	10.0
Duration of symptoms (months)	≤6	9	22.5
	7–12	15	37.5
	>12	16	40.0
	Mean ± SD (months)	11.8 ± 5.3	
Common symptoms	Weak stream	40	100
	Hesitancy	35	87.5
	Incomplete emptying	32	80.0
	Nocturia	28	70.0
Comorbidities	Diabetes mellitus	6	15.0
	Hypertension	8	20.0
	None	26	65.0

The mean age was 43.9 ± 10.6 years, with a predominance of male patients (90%). Most participants (40%) had symptoms lasting for more than 12 months. The most common presenting symptoms were weak urinary stream (100%), hesitancy (87.5%), and incomplete bladder emptying (80%). Comorbidities included hypertension (20%) and diabetes mellitus (15%), whereas 65% had no associated systemic disease.

Table 2: Comparison of Urodynamic and Symptom Parameters Before and After Transurethral Incision of the Bladder Neck

Parameters	Preoperative (Mean ± SD)	Postoperative (Mean ± SD)	Mean Difference	p-value
Qmax (mL/sec)	7.6 ± 2.3	18.4 ± 4.1	10.8	<0.001
Postvoid Residual (mL)	145.2 ± 68.7	38.5 ± 22.4	–106.7	<0.001
IPSS Score	24.1 ± 5.6	8.3 ± 3.1	–15.8	<0.001
Quality of Life (QoL) Score	5.1 ± 1.0	1.8 ± 0.7	–3.3	<0.001
Bladder Capacity (mL)	295.4 ± 64.2	312.5 ± 60.9	17.1	0.08

A significant improvement was observed in urinary flow rate (Qmax) from 7.6 ± 2.3 mL/sec to 18.4 ± 4.1 mL/sec and in postvoid residual urine volume from 145.2 ± 68.7 mL to 38.5 ± 22.4 mL ($p < 0.001$). Similarly, the International Prostate Symptom Score (IPSS) improved from 24.1 ± 5.6 to 8.3 ± 3.1 ($p < 0.001$), while the mean quality of life (QoL) score improved from 5.1 ± 1.0 to 1.8 ± 0.7 ($p < 0.001$). The increase in bladder capacity was modest and statistically non-significant.

Table 3. Postoperative Complications Following Transurethral Incision of the Bladder Neck (n = 40)

Complication	Frequency (n)	Percentage (%)
Mild hematuria (self-limiting)	6	15.0
Transient dysuria	9	22.5
Urinary tract infection	4	10.0
Retrograde ejaculation	5	12.5
Bladder neck contracture (recurrence)	2	5.0
Urinary incontinence	0	0.0
Total	15	37.5

The overall complication rate was 37.5%. The most common issues were transient dysuria (22.5%), mild self-limiting hematuria (15%), and urinary tract infection (10%). Retrograde ejaculation occurred in 12.5% of male patients, while bladder neck contracture recurrence was noted in only 5%. No cases of urinary incontinence or significant bleeding were reported.

3. DISCUSSION

The present study evaluated the outcomes of Transurethral Incision of the Bladder Neck (TUIBN) in patients with Primary Bladder Neck Obstruction (PBNO) and demonstrated significant improvement in urinary flow rate, symptom scores, and quality of life. These results are consistent with several previously published studies that have established TUIBN as an effective and safe treatment option for PBNO in both men and women [10,16].

The mean postoperative increase in urinary flow rate (Qmax) from 7.6 to 18.4 mL/sec and the reduction in postvoid residual urine from 145.2 to 38.5 mL are comparable with the findings of Zhang et al., who reported an average postoperative Qmax improvement of approximately 10–12 mL/sec [17]. Similarly, Qin et al. and Chiang et al. found durable functional improvement following TUIBN, supporting the consistency of the present outcomes [12,13]. These findings highlight the ability of bladder neck incision to relieve obstruction efficiently while maintaining bladder compliance and contractility.

The observed improvement in International Prostate Symptom Score (IPSS) and quality of life measures aligns with the conclusions of Brucker et al., who noted substantial symptomatic relief after targeted bladder neck incision in obstructed patients [6]. The magnitude of IPSS reduction (approximately 16 points) in this study underscores the clinical significance of TUIBN in reducing lower urinary tract symptoms and enhancing voiding efficiency, similar to outcomes reported by Jin et al. [18].

Regarding complications, the overall rate of 37.5% in this study predominantly comprised transient and self-limiting events, with dysuria and mild hematuria being most common. Notably, no cases of postoperative incontinence or urethral stricture were observed, corroborating findings by Rosenbaum et al., who emphasized the low morbidity profile associated with limited bladder neck incisions [4].

The recurrence rate of bladder neck contracture in this cohort (5%) was lower than rates reported in earlier series, which ranged from 8% to 20% [2,3]. This may reflect improved operative precision, careful patient selection, and standardized postoperative follow-up in the present study. Advances in surgical technique, including limited incisions at the 5 and 7 o'clock positions, have been shown to achieve effective decompression while minimizing damage to the external sphincter [14]. These procedural refinements may explain the absence of incontinence or significant bleeding in our findings.

TUIBN has also demonstrated favorable long-term outcomes in female patients with PBNO. Studies by Markić et al. and Zhang et al. revealed sustained improvements in Qmax and voiding efficiency with minimal recurrence [16,19]. The current results are in agreement, further supporting the reproducibility of this surgical approach across both sexes. Furthermore, the preservation of bladder capacity postoperatively, as seen in this study, is consistent with the observations of Hsiao et al., indicating that bladder function remains stable following relief of obstruction [11].

A critical aspect of PBNO management is accurate diagnosis through video urodynamic studies. Kuo and Gammie et al. emphasized that reliance on symptoms alone is insufficient for identifying functional obstruction [9,20]. In this study, all cases were diagnosed based on urodynamic evidence of elevated detrusor pressure with reduced flow, consistent with international recommendations [21]. This diagnostic precision ensured appropriate surgical intervention and contributed to the high success rate observed (85%).

In summary, the findings of this study demonstrate that TUIBN offers significant symptom relief and functional improvement

with low morbidity, consistent with international data. It remains a safe, reproducible, and effective surgical option for managing primary bladder neck obstruction. The success observed in this Bangladeshi cohort underscores the importance of adopting standardized diagnostic and surgical techniques to ensure optimal patient outcomes.

Limitations of the study

The study was conducted in a single hospital with a small sample size, which may limit the generalizability of the findings. Follow-up duration was short-term, restricting evaluation of long-term recurrence or delayed complications.

4. CONCLUSION

Transurethral Incision of the Bladder Neck (TUIBN) is a safe and effective treatment for primary bladder neck obstruction. The procedure provides substantial improvement in urinary flow, post-void residual urine, and symptom severity, with minimal complications. The high success rate and low recurrence observed in this Bangladeshi population further affirm its role as a reliable surgical option for managing PBNO cases.

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