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Bladder Outlet Deobstruction in Men with Detrusor Underactivity: Beyond Contractility

João Antonio Pereira-Correia*, Eduardo Santos Cruz, Pedro Caldas Pereira and Daniel de Morais Perpétuo

Department of Urology, Servidores do Estado Federal Hospital, Rio de Janeiro-RJ, Brazil.

***Correspondence:**
João Antonio Pereira-Correia, Department of Urology, Servidores do Estado Federal Hospital, Rio de Janeiro-RJ, Brazil.

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ABSTRACT

Objective: *To critically evaluate contemporary evidence regarding the outcomes of bladder outlet deobstructive surgery in men with urodynamically confirmed detrusor underactivity (DUA), focusing on functional, urodynamic, and patient-reported outcomes following transurethral resection of the prostate (TURP), holmium laser enucleation (HoLEP), and photoselective vaporization of the prostate (PVP).*

Methods*: An integrative review was conducted using PubMed, Embase, and SciELO databases to identify studies published between January 2017 and March 2024. Eligible studies included adult men with urodynamically confirmed DUA undergoing surgical treatment for benign prostatic obstruction (BPO). Outcomes of interest included International Prostate Symptom Score (IPSS), maximum urinary flow rate (Qmax), postvoid residual volume (PVR), and validated quality-of-life (QoL) measures. Prospective and retrospective cohort studies, systematic reviews, and meta-analyses were included. Due to methodological heterogeneity, findings were synthesized narratively.*

Results: *Across the included studies, patients presented with severe baseline dysfunction, including high symptom burden, markedly reduced urinary flow, and elevated PVR volumes. Following outlet deobstruction, consistent and clinically meaningful improvements were observed. IPSS decreased by approximately 50–60%, with postoperative scores frequently reaching mild-to-moderate symptom ranges. Qmax nearly doubled in most studies, while PVR decreased by more than 60% on average. Subjective QoL improvement was reported in 80–85% of patients. Although a subset of men with severe detrusor impairment remained dependent on intermittent catheterization, many experienced reductions in catheterization frequency and improved voiding efficiency. Meta-analyses confirmed the reproducibility of these benefits across different surgical modalities.*

Conclusion: *Bladder outlet deobstructive surgery may provide substantial symptomatic, functional, and quality-of-life benefits in men with DUA, despite impaired detrusor contractility. These findings challenge the traditional assumption that DUA predicts poor surgical outcomes and support a more individualized, urodynamics-based approach to patient selection and counseling. In this population, reduction of outlet resistance appears to play a more decisive role in postoperative improvement than detrusor strength alone.*

Keywords

Underactive Urinary Bladder, Benign Prostatic Hyperplasia, Transurethral Resection of Prostate, Lower Urinary Tract Symptoms, Urodynamics

Introduction

Detrusor underactivity (DUA) has emerged as a clinically significant yet poorly understood contributor to male lower urinary tract dysfunction. Defined by reduced strength and/or duration of detrusor contraction, DUA leads to prolonged bladder emptying and

elevated postvoid residual urine (PVR) [1,2]. Its pathophysiology is multifactorial, involving myogenic failure, afferent dysfunction, and central nervous system alterations [3].

The clinical relevance of DUA is amplified by its frequent coexistence with benign prostatic obstruction (BPO), particularly in older men. Epidemiological studies suggest that up to 40% of men presenting with voiding symptoms may exhibit some degree of impaired detrusor contractility [4]. However, symptom overlap with bladder outlet obstruction (BOO) limits diagnostic accuracy, rendering urodynamic testing essential for proper phenotyping [5].

Historically, the presence of DUA has been viewed as a negative prognostic factor for surgical intervention, based on the assumption that impaired contractility would preclude effective bladder emptying even after relief of obstruction [6]. Nonetheless, emerging evidence challenges this paradigm, suggesting that reduction of outlet resistance may significantly improve voiding efficiency regardless of intrinsic detrusor strength [7].

This review aims to critically appraise contemporary evidence regarding the impact of outlet deobstruction on clinical and urodynamic outcomes in men with DUA, with particular emphasis on the interplay between obstruction and contractility.

Methods

A comprehensive integrative review was conducted to synthesize current evidence regarding surgical outcomes in men with detrusor underactivity undergoing bladder outlet deobstruction. The literature search encompassed PubMed, Embase, and SciELO databases and included studies published between January 2017 and March 2024.

The search strategy combined controlled vocabulary and free-text terms related to detrusor underactivity, underactive bladder, benign prostatic hyperplasia, and surgical techniques such as TURP, HoLEP, and PVP. Reference lists of relevant articles were also manually screened to identify additional studies.

Eligible studies included those enrolling adult male patients with urodynamically confirmed DUA who underwent surgical treatment for BOO and reported quantitative outcomes related to symptom scores (IPSS), urinary flow (Qmax), postvoid residual volume (PVR), or validated quality-of-life measures. Both prospective and retrospective cohort studies, as well as systematic reviews and meta-analyses, were considered.

Data extraction was performed in a structured manner, capturing study design, patient characteristics, surgical modality, follow-up duration, and pre- and postoperative outcomes. Given the heterogeneity in study design, patient selection, and outcome reporting, a narrative synthesis approach was adopted, complemented by comparative tabulation of key findings.

Results

The included studies collectively provide a coherent and clinically meaningful picture of outcomes following bladder outlet deobstruction in patients with DUA. Despite variability in methodology and patient selection, the direction of effect was remarkably consistent across all series. Detailed characteristics and comparative outcomes of the included studies are summarized in Table 1.

Patients typically presented with severe baseline dysfunction, characterized by high symptom burden (IPSS >22), markedly reduced urinary flow (Qmax <7 mL/s), and elevated postvoid residual volumes frequently exceeding 250–300 mL. These findings reflect the combined impact of impaired contractility and increased outlet resistance, underscoring the complex interplay between bladder and urethra in these patients.

Following surgical intervention, a substantial reduction in symptom burden was consistently observed. Across studies, IPSS values declined by approximately 50–60%, often reaching levels below 11 points, which corresponds to a transition from severe to mild/moderate symptom categories. This degree of improvement is clinically meaningful and comparable to outcomes observed in patients without DUA.

Urinary flow rates demonstrated parallel improvement, with Qmax values nearly doubling in most series. This increase reflects the mechanical effect of reducing outlet resistance, allowing even a weak detrusor to generate sufficient flow.

Perhaps most striking was the reduction in postvoid residual volume. Across studies, PVR decreased by more than 60% on average, suggesting that detrusor inefficiency can be partially compensated by improved outlet dynamics. While complete normalization was uncommon, the magnitude of reduction was

Table 1: Comparative outcomes of outlet deobstruction in men with detrusor underactivity (European Urology–style synthesis).

Study	Design	N	Procedure	Follow-up	ΔIPSS	ΔQmax (mL/s)	ΔPVR (mL)	QoL improvement	Key Interpretation
Sokhal 2017[7]	Prospective	92	TURP	6 mo	↓56%	+7.3	−188	78%	Significant functional gain despite DUA
Jiang 2017[8]	Retrospective	85	TURP	12 mo	NA	NA	−101	60%	Partial improvement, limited by severe DUA
Lebani 2023[9]	Cohort	210	TURP	12 mo	↓58%	+5.8	−195	84%	Robust symptom and flow improvement
Wroclawski 2023[10]	Meta-analysis	534	Mixed	12 mo	↓61%	+6.3	−210	82%	Consistent benefit across techniques
Zou 2024[11]	Meta-analysis	333	Mixed	12 mo	↓58%	+6.0	−204	85%	Confirms reproducibility of outcomes

sufficient to translate into meaningful clinical benefit.

Quality-of-life measures closely mirrored objective improvements. Between 80% and 85% of patients reported subjective improvement following surgery, reinforcing the clinical relevance of these findings.

Notably, a subset of patients with severe baseline detrusor impairment remained dependent on intermittent catheterization. However, even among these individuals, reductions in catheterization frequency and improvements in voiding efficiency were frequently reported.

Discussion

The findings of this review challenge the long-standing notion that detrusor contractility is the primary determinant of surgical success in men with LUTS. Instead, they support a more nuanced model in which bladder outlet resistance plays a central and potentially dominant role in voiding dysfunction.

From a physiological standpoint, even a weak detrusor may generate sufficient pressure to achieve effective voiding if outlet resistance is adequately reduced. This concept aligns with fundamental principles of fluid dynamics and has been increasingly supported by clinical data [7,10].

Importantly, these observations call into question the traditional reluctance to offer surgical treatment to patients with DUA. While it is true that not all patients will achieve complete functional recovery, the consistent improvements in symptom burden, urinary flow, and quality of life suggest that many derive meaningful benefit.

Another critical aspect is the temporal dimension of recovery. Several studies indicate that improvements in patients with DUA may occur more gradually than in those with preserved contractility, often reaching comparable outcomes after 12 months or longer [12]. This delayed response may reflect adaptive changes in bladder function following relief of chronic obstruction.

Nevertheless, the heterogeneity of DUA remains a major challenge. The condition likely encompasses multiple pathophysiological subtypes, ranging from primarily myogenic failure to neurogenic dysfunction [13]. Future research should aim to better characterize these subgroups and identify predictors of surgical response.

The role of urodynamics in this context cannot be overstated. Accurate differentiation between obstruction and impaired contractility is essential for appropriate patient selection and counseling. In the absence of urodynamic data, the risk of both overtreatment and undertreatment increases substantially [14].

Conclusion

Bladder outlet deobstructive surgery in men with detrusor underactivity should no longer be viewed through the narrow lens of contractility alone. The evidence consistently demonstrates that relief of outlet resistance can yield substantial clinical and functional benefits, even in the presence of impaired detrusor function.

Rather than excluding these patients from surgical consideration, clinicians should adopt a more individualized approach grounded in urodynamic assessment and realistic expectation setting. In doing so, it becomes possible to redefine success—not as complete restoration of normal voiding, but as meaningful improvement in function and quality of life.

Ultimately, the paradigm is shifting: in the management of DUA, the obstruction may matter more than the bladder itself.

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