RESEARCH PAPER

Effectiveness of Intravesical Therapy Combined with Urethral Dilatation in the Management of Male Urethral Stricture: A Prospective Case Series

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ABSTRACT

Background and Objective: Male urethral stricture disease remains challenging to manage, as endoluminal treatments often provide rapid symptomatic relief but are associated with variable long-term patency. Integrative approaches combining conventional and traditional therapies may offer improved outcomes. This study aimed to evaluate the short-term functional and radiological outcomes of intravesical medicated oil instillation combined with serial urethral dilatation in men with urethral stricture disease.

Methods: A prospective case series was conducted in 10 men aged 27–66 years. Patients underwent daily transurethral intravesical medicated oil instillation for 15 days, along with scheduled urethral dilatation on days 5, 7, 9, and 11. Uroflowmetry parameters—maximum flow rate (Q-max), average flow rate (Q-avg), and post-void residual urine (PVR)—along with retrograde urethrogram (RGU), were assessed at baseline and post-treatment. Follow-up evaluations were performed at 30 and 60 days without self-dilatation.

Results: Mean Q max increased from 6.16 to 22.47 ml/s, and mean Q avg from 3.32 to 7.74 ml/s, while mean PVR decreased from 116.1 ml to 31.8 ml. Q max improved in all patients, Q avg in nine patients, and PVR in all patients. These improvements were sustained at 30- and 60-day follow-up, with no recurrence or requirement for additional intervention. RGU demonstrated complete resolution or significant improvement in urethral narrowing in the majority of patients, with no evidence of progression. No adverse events or urinary tract infections were reported.

Limitations: The study is limited by its small sample size, single-arm design, and short duration of follow-up.

Conclusions and Clinical Implications: This integrative treatment protocol appears to be feasible, safe, and associated with significant improvement in both functional and radiological outcomes in the short term. These findings support the need for larger, controlled studies with extended follow-up to validate long-term efficacy.

Keywords: Intravesical Instillation, Urethral dilatation, Urethral stricture, Uroflowmetry, Post-void residual urine, Lower Urinary Tract Symptoms

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Conflict of interest: None

Introduction

Male urethral stricture disease is characterized by pathological narrowing of the urethral lumen due to fibrosis and spongiofibrosis, resulting in significant impairment of urinary flow and deterioration in quality of life. Contemporary epidemiological data from the European Association of Urology (EAU) estimate an incidence ranging from 229 to 627 per 100,000 males, with the anterior urethra—particularly the bulbar segment—being most commonly affected. In well-resourced settings, iatrogenic injury has emerged as a leading etiological factor.

Current guidelines from the European Association of Urology (EAU) and the American Urological Association recommend endoscopic management or urethral dilatation primarily for carefully selected cases of short, non-obliterative strictures. However, repeated endoluminal interventions are generally discouraged due to high recurrence rates and the risk of increasing stricture complexity. Despite these recommendations, minimally invasive approaches remain widely practiced, underscoring the need for adjunctive therapies that can enhance treatment efficacy and reduce recurrence.

A traditional transurethral medicated oil instillation technique has been described as a localized therapeutic modality for lower urinary tract disorders. The proposed mechanisms include mucosal lubrication, reduction of intraluminal resistance, and facilitation of urinary flow. Additionally, the potential anti-inflammatory and tissue-modulating properties of medicated oils may contribute to improved urethral healing. However, current evidence supporting this approach remains

limited, largely restricted to small case series, and lacks robust evaluation using standardized urological outcome measures.

In clinical practice, objective assessment using uroflowmetry provides essential functional parameters, while radiological evaluation with retrograde urethrogram (RGU) remains the gold standard for assessing urethral calibre and structural changes. Furthermore, short-term follow-up is critical to determine the sustainability of treatment response and the need for further intervention.

In this context, the present prospective case series was designed to evaluate the short-term functional and radiological outcomes of a combined treatment protocol involving transurethral intravesical medicated oil instillation and serial urethral dilatation in men with urethral stricture disease. The study specifically assesses changes in uroflowmetry parameters, post-void residual urine (PVR), and RGU findings, along with follow-up outcomes at 30 and 60 days.

Study Design

This study was designed as a prospective, single-centre case series involving adult male patients diagnosed with urethral stricture disease. The protocol was implemented in an outpatient clinical setting. As an exploratory, hypothesis-generating study, no formal sample size calculation was performed.

Participants

Inclusion Criteria

- Adult men aged 25–75 years
- Diagnosed with urethral stricture disease
- Patients with controlled comorbidities, including:
- Diabetes mellitus (HbA1c < 7% and random blood glucose < 180 mg/dL)
- Hypertension (< 150/90 mmHg)

Exclusion Criteria

- Impacted urethral or bladder neck calculus
- Benign prostatic hyperplasia
- Nephrotic syndrome
- Lower urinary tract malignancy
- Significant infectious conditions (HIV, HBsAg, HCV positive)

Sample Size

A total of 10 patients were enrolled in the study.

Intervention Protocol

Patients underwent a 15-day treatment protocol consisting of:

- Daily transurethral intravesical instillation of sterile medicated oil (approximately 50 mL per session)
- Serial urethral dilatation performed on treatment days 5, 7, 9, and 11

All procedures were performed under strict aseptic precautions using a standardized technique.

Outcome Measures

Primary Outcomes

Functional outcomes assessed using uroflowmetry:

- Maximum urinary flow rate (Qmax)
- Average urinary flow rate (Qavg)
- Post-void residual urine (PVR)

Radiological assessment:

Retrograde urethrogram (RGU) to evaluate urethral calibre and structural changes

Secondary Outcomes

Safety outcomes included:

- Procedure-related complications
- Urinary tract infection
- Other adverse events

Assessment and Follow-up

Uroflowmetry parameters (Q-max, Q-avg, and PVR) were recorded at baseline and after completion of the 15-day treatment protocol. Radiological evaluation using retrograde urethrogram (RGU) was performed pre-treatment and post-treatment to assess changes in urethral calibre and residual narrowing.

Patients were followed up at 30 and 60 days after completion of therapy. At each follow-up visit, clinical evaluation and uroflowmetry parameters were reassessed to evaluate the durability of treatment response. No patient underwent self-dilatation during the follow-up period.

Ethical Consideration

The study protocol was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

Results

Patient Demographics-

A total of 10 male patients with urethral stricture disease were enrolled in the study. The mean age was 44.7 ± 15.1 years (range: 27–66 years). The mean duration of symptoms was 7.4 ± 5.8 years, with a median duration of 5 years (interquartile range: 3–13 years). All participants completed the planned treatment protocol, and no dropouts or protocol deviations were observed.

Baseline Clinical Characteristics

All patients presented with longstanding obstructive lower urinary tract symptoms consistent with urethral stricture disease. Controlled comorbid conditions, including diabetes mellitus and hypertension, were noted in a subset of patients. Baseline uroflowmetry demonstrated reduced urinary flow parameters, with decreased maximum flow rate (Qmax) and average flow rate (Qavg), along with elevated post-void residual urine (PVR) in all patients, indicating significant functional obstruction.

Treatment Outcomes

Significant improvement in objective voiding parameters was observed following completion of the treatment protocol.

- **Maximum urinary flow rate (Qmax)** increased from 6.16 ± 3.81 ml/s at baseline to 22.47 ± 4.62 ml/s post-treatment
  - Mean change: +16.31 ml/s (95% CI: 11.34–21.28; $p = 0.002$)
- **Average urinary flow rate (Qavg)** increased from 3.32 ± 2.00 ml/s to 7.74 ± 2.93 ml/s
  - Mean change: +4.42 ml/s (95% CI: 2.23–6.61; $p = 0.0039$)
- **Post-void residual urine (PVR)** decreased from 116.1 ± 52.6 ml to 31.8 ± 28.4 ml

- Mean change: −84.3 ml (95% CI: −131.35 to −37.25; p = 0.002)

Improvement in Qmax was observed in all patients (100%), while Qavg improved in 9 out of 10 patients (90%). A reduction in PVR was noted in all patients (100%). One patient demonstrated a slight decline in Qavg despite concurrent improvement in Qmax and PVR.

Table 2. Objective outcomes before and after treatment

Outcome	Before, mean ± SD	mean ± SD	ean change (95% CI)	Median change	p value
Qmax, ml/s	6.16 ± 3.81	22.47 ± 4.62	+16.31 (+11.34 to +21.28)	+17.8	0.0020
Qavg, ml/s	3.32 ± 2.00	7.74 ± 2.93	+4.42 (+2.23 to +6.61)	+4.2	0.0039
PVR, ml	116.10 ± 52.64	31.80 ± 28.42	-84.30 (-131.35 to -37.25)	-72.5	0.0020

P values are from exact Wilcoxon signed-rank tests. CI = confidence interval; PVR = postvoid residual urine; Qavg = average flow rate; Qmax = maximum flow rate; SD = standard deviation.

Adverse Events

No procedure-related urinary tract infections, acute complications, or treatment-related adverse events were observed during the study period.

Discussion

This prospective case series demonstrates that transurethral intraluminal instillation combined with serial urethral dilatation is associated with significant improvement in objective voiding parameters in men with urethral stricture disease. The mean increase in Qmax exceeded 16 ml/s, with a post-treatment mean Qmax >20 ml/s. According to contemporary European Association of Urology (EAU) follow-up criteria, a post-treatment Qmax >20 ml/s and an improvement of >10 ml/s from baseline are considered indicative of satisfactory urethral patency, thereby supporting the clinical relevance of the observed outcomes.

A notable strength of the present study is the incorporation of short-term follow-up along with radiological evaluation. Improvements in uroflowmetry parameters were sustained at 30 and 60 days, with no recurrence of obstructive urinary symptoms, no requirement for self-dilatation, and no need for additional intervention. Radiological assessment using retrograde urethrogram (RGU) demonstrated resolution or significant reduction in urethral narrowing, with restoration of luminal calibre and smooth passage of contrast in the majority of patients. These findings provide objective structural corroboration of the functional improvements observed.

The therapeutic effect of this combined intervention may be attributed to both mechanical and biological mechanisms. Serial urethral dilatation facilitates immediate luminal expansion, while intraluminal instillation of sterile sesame oil may enhance mucosal lubrication, reduce intraluminal resistance, and improve urinary flow dynamics. In addition, sesame oil possesses documented anti-inflammatory and antioxidant properties, which may contribute to modulation of local tissue response, attenuation of periurethral fibrosis, and promotion of epithelial healing. These synergistic effects may account for the observed short-term maintenance of urethral patency.

These findings should be interpreted within the framework of contemporary reconstructive urology. Current EAU and American Urological Association guidelines recommend urethral dilatation or endoscopic management only in carefully selected cases of short, non-obliterative strictures, while discouraging repeated endoluminal interventions due to high recurrence rates and increasing procedural complexity. Accordingly, the present protocol should be considered an exploratory adjunctive strategy for selected patients, rather than a replacement for definitive surgical reconstruction such as urethroplasty in complex or recurrent disease.

Several limitations warrant consideration. This study was conducted as a small, single-centre, uncontrolled case series with a limited sample size. Stricture characteristics, including location, length, and aetiology, were not standardised, which may influence treatment response. Although follow-up at 60 days demonstrated sustained improvement, the long-term durability of outcomes and recurrence rates remain uncertain. Furthermore, the combined intervention design does not allow for independent assessment of the relative contribution of intravesical therapy and urethral dilatation.

Future research should focus on controlled comparative studies with larger sample sizes, standardized stricture characterization, and incorporation of validated symptom scoring systems. Extended follow-up of at least 6–12 months will be essential to determine long-term efficacy, recurrence patterns, and the potential role of this integrative approach in contemporary urological practice.

Conclusion

In this prospective case series, transurethral intraluminal sesame oil instillation combined with serial urethral dilatation was associated with significant improvement in uroflowmetry parameters and radiological outcomes, with sustained benefits observed at 60-day follow-up without recurrence or need for re intervention. These findings suggest that this approach is feasible and may serve as a promising adjunctive modality in selected patients. However, larger controlled studies with

extended follow-up are required to establish its long-term efficacy and clinical applicability.

Declarations

Ethics Approval and Consent to Participate

The authors certify that all appropriate patient consent forms were obtained. In these forms, patients provided consent for the use of their clinical information and images for publication in the journal. Patients were informed that their names and initials would not be disclosed, and that all reasonable efforts would be made to maintain confidentiality; however, complete anonymity cannot be guaranteed.

Declaration of Interest

The authors declare that there are no conflicts of interest related to the publication of this manuscript.

Data Availability

De-identified data underlying this study are available from the corresponding author upon reasonable request.

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Figure legends

Figure 1. Treatment protocol. Daily transurethral Uttar Basti was administered for 15 d, with serial urethral dilatation on treatment days 5, 7, 9, and 11.

Figure 2. Patient-level change in maximum flow rate (Qmax) before and after treatment. Thin lines indicate individual patients; squares and error bars indicate the mean and standard deviation.

Figure 3. Patient-level change in average flow rate (Qavg) before and after treatment. Thin lines indicate individual patients; squares and error bars indicate the mean and standard deviation.

Figure 4. Patient-level change in postvoid residual urine (PVR) before and after treatment. Thin lines indicate individual patients; squares and error bars indicate the mean and standard deviation

Figure 1

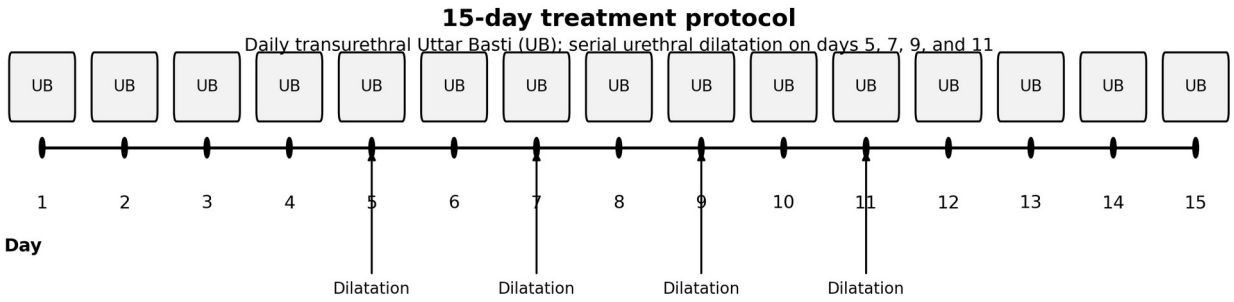

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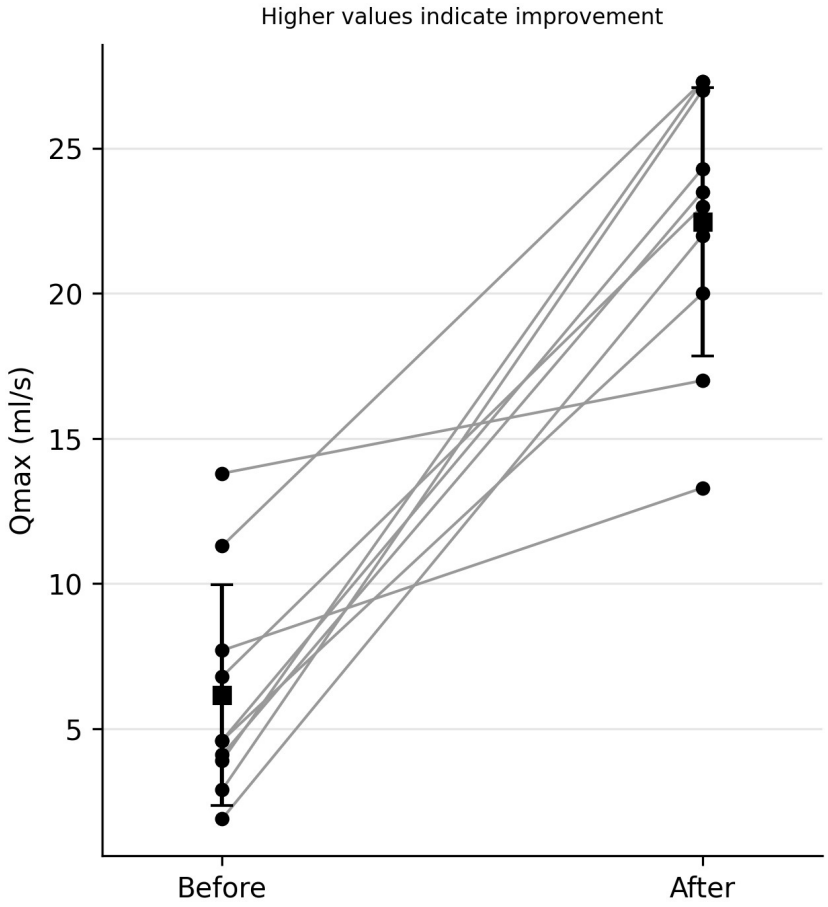
Figure 2



Patient-level change in maximum flow rate (Qmax) before and after treatment. Thin lines indicate individual

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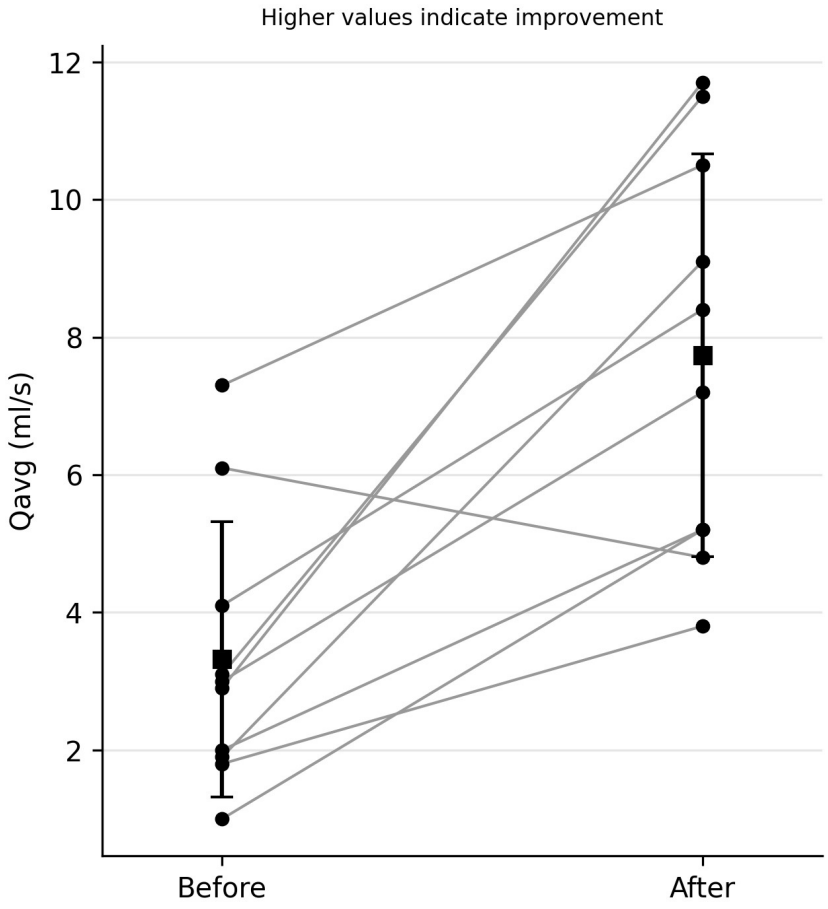
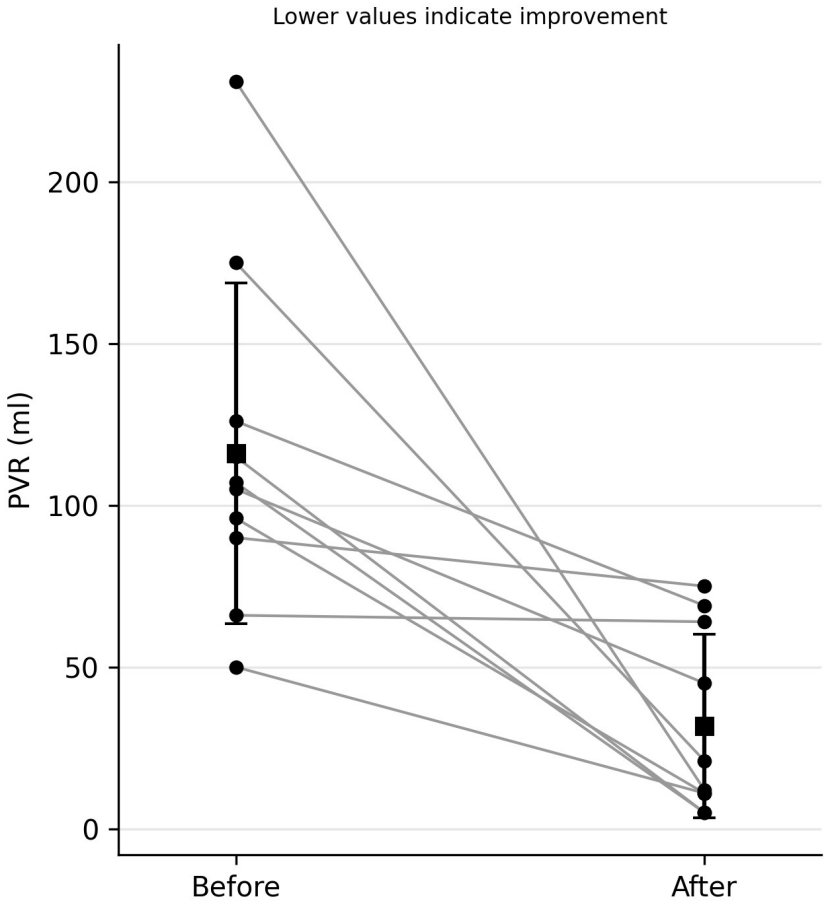
Figure 3



Patient-level change in average flow rate (Qavg) before and after treatment. Thin lines indicate individual patients; squares and error bars indicate the mean and standard deviation.

Figure 4



Patient-level change in postvoid residual urine (PVR) before and after treatment. Thin lines indicate individual patients; squares and error bars indicate the mean and standard deviation.