CASE REPORT
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Hybrid Endoscopic Technique for Obstructive Urethral Stricture Management in Elderly

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Abstract

Iatrogenic urethral injuries, often resulting from traumatic or misdirected catheterisation, represent a significant yet under-recognised cause of urethral strictures, especially in elderly patients with multiple comorbidities. Such strictures can lead to severe urinary obstruction, necessitating surgical intervention. While open urethroplasty is the gold standard for managing long-segment, obliterative strictures, it is not always feasible in frail patients due to surgical risks. Minimally invasive alternatives, particularly hybrid endoscopic approaches, may offer effective management options in these high-risk cases. We report the case of an 82-year-old male with a history of hypertension, diabetes, coronary artery disease (ejection fraction 30%), chronic obstructive airway disease, and chronic kidney disease, who presented with acute urinary retention following a failed Foley catheterisation attempt. Imaging and urethroscopy revealed a complete, dense urethral stricture at the proximal bulbar urethra. Open surgery was deemed unsuitable. A novel hybrid endoscopic "rendezvous" technique was employed, involving simultaneous retrograde and antegrade cystoscopy. Through coordinated visualisation, scar tissue was gradually resected using the resectoscope loop, guided by bulging and light transmission from the antegrade scope. This allowed restoration of urethral continuity and safe Foley catheter placement. Postoperatively, the patient was managed with self-calibration and showed satisfactory voiding at six-week follow-up. This case illustrates the utility of a minimally invasive hybrid endoscopic approach for managing complex urethral strictures in patients unfit for open surgery. The rendezvous technique, using visual guidance from dual endoscopic access, can provide a safe and effective alternative in select high-risk patients, avoiding the morbidity of open reconstruction.

Keywords: Urethral stricture, endoscopy, cystoscope, elderly

Introduction

Iatrogenic urethral injury is an under-recognised yet significant complication encountered during urethral instrumentation, particularly Foley catheterisation. These injuries, often resulting from forceful or blind catheter insertion, can lead to urethral strictures, which cause considerable morbidity and impact the quality of life in affected patients. The incidence of such strictures following catheter-related trauma is reported to be around 20-25% (1), with the bulbo-membranous junction being the most commonly affected site due to its anatomical angulation and fixed position (2).

While short, soft, and passable anterior urethral strictures may respond well to endoscopic treatment such as optical internal urethrotomy (OIU), dense, long-segment strictures with complete luminal obliteration pose a far greater therapeutic challenge. These often require open urethral reconstruction-an effective but invasive procedure that may not be suitable for elderly or medically compromised patients.

This dilemma underscores the need for minimally invasive alternatives. In this context, we present a case of an elderly male with multiple comorbidities who developed a complete iatrogenic urethral stricture. Given his unsuitability for open surgery, an innovative endoscopic technique was employed, demonstrating that creative, patient-tailored approaches can provide successful outcomes even in complex cases.

Case Presentation

Proper informed consent was taken from the patient prior to writing this case report. An 82-year-old hypertensive, diabetic

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male with a history of coronary artery disease (CAD) (ejection fraction - 30%), chronic obstructive airway disease and chronic kidney disease (CKD) presented with an acute urinary retention with blood at the urethral meatus. He had a history of iatrogenic urethral injury during an attempt (failed) at Foley catheterisation 6-7 hours prior. Examination revealed a palpable, tender bladder.

In view of the acute presentation, the patient was admitted, and an emergency suprapubic catheterisation (SPC) was done along with a bulbar compression application. The SPC drained ~1000 mL of urine immediately. His blood parameters revealed a haemoglobin of 9.2 g/dL, total leucocyte counts of 17000/mm^3, platelet counts of 1.65 lakhs/mm^3 and a serum creatinine of 2.1. He was kept on broad-spectrum antibiotics. Gradually, his condition improved, and he was discharged in stable condition with SPC *in situ*.

About 6 weeks later, a retrograde urethrogram was done that revealed the contrast reaching till proximal bulbar urethra and a complete cut-off beyond this (Figure 1). An open urethral surgery was not feasible in this patient because of his multiple comorbidities. So, instead, an attempt of endo-assessment of the urethra was made. Firstly, a per urethral (retrograde) urethroscopy was done that revealed scarring was seen at the proximal bulbar urethra beyond which even the guidewire was not negotiable. Next, keeping the cystoscope at the bulbar urethra, using a new vision cart system, an antegrade cysto-urethroscopy was done via the SPC tract and it was found that the cystoscope could be negotiated till the prostatic urethra, beyond which even a guidewire couldn't be negotiated. However, the light of the antegrade cystoscope could be appreciated easily by the earlier placed retrograde cystoscope, kept in the bulbar urethra. Also, the bulge of the antegrade cystoscope could be well appreciated via the retrograde cystoscope vision. Using the intermittent bulges produced by the antegrade cystoscope as a guide, the scarring over the proximal urethra was resected using the resectoscope loop, slowly and gradually. This urethral scar resection ultimately led the retrograde cystoscope to enter the normal prostatic urethra, and finally able to maintain the continuity till the bladder (Figure 2). Next, an 18 French Foley catheter was placed. So, an endo-assessment of the urethra with the cut on the intermittent scar bulges (produced antegradely) was found to be a safe alternative to an open urethral reconstruction.

The patient was given a voiding trial after 1 week, and he voided satisfactorily. He was kept on self-calibration of the urethra once weekly for 6 weeks. Currently, after 6 weeks, he is doing well and voiding satisfactorily. The patient has normal urinary continence without any episodes of stress or urge incontinence. Uroflowmetry demonstrated a maximum flow rate (Qmax) of 16.4 mL/sec, an average flow rate of 11.6 mL/sec, and a voided volume of 312 mL, postvoid residual urine volume being 28 mL, indicating satisfactory bladder emptying.

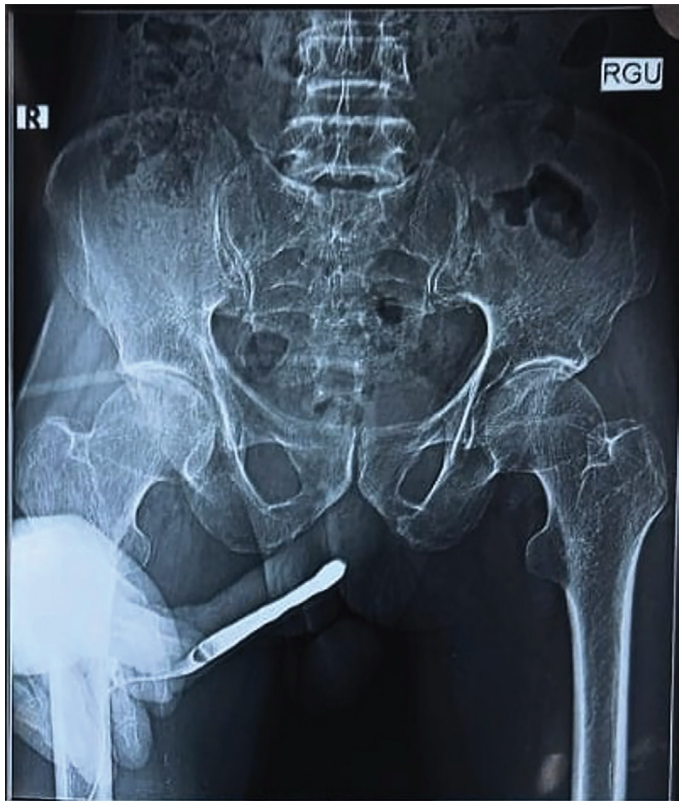

Figure 1. Retrograde urethrogram showing complete cut-off of contrast in proximal bulbar urethra

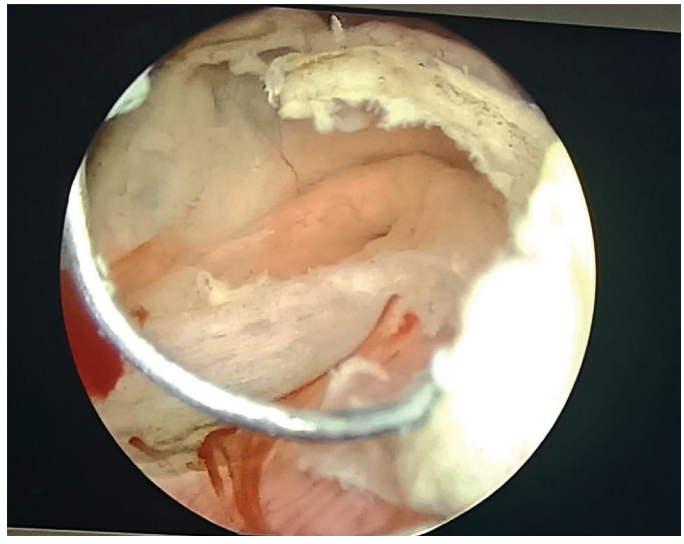

Figure 2. Endoscopic view of post-scar resection, the retrograde cystoscope entering into bladder

Discussion

Iatrogenic urethral injuries during Foley catheterisation are a significant clinical concern, especially in elderly and comorbid patients. These injuries commonly lead to urethral strictures, with an incidence as high as 25% in high-risk populations such as hospitalised or neurologically impaired individuals (3). The bulbo-membranous junction is particularly prone to injury due to its anatomical configuration and fixed position (4). Resultant strictures can vary in severity but may progress to dense, long-segment obliterations that are challenging to treat.

The initial failed catheterisation in this patient was likely due to an unrecognised urethral injury sustained during forceful, blind catheter insertion, leading to acute urethral obstruction. In elderly individuals, particularly those with comorbidities such as diabetes and CAD, the urethral mucosa is more susceptible to trauma. At the anatomically narrow and angulated bulbo-membranous junction, blind attempts at catheterisation often meet resistance. Continued forceful advancement against this resistance likely caused a mucosal tear and submucosal haematoma formation, resulting in immediate urethral narrowing and obstruction.

In this patient, retrograde catheterisation under direct vision with local anaesthesia was not attempted during the acute presentation due to the presence of complete urethral obstruction following recent iatrogenic injury, evidenced by blood at the meatus and failure to negotiate even a guidewire during later endoscopic assessment. Attempting retrograde catheterisation, even under direct vision, in such a scenario would likely have exacerbated the existing mucosal injury, increased the risk of creating a false passage, and contributed to further urethral trauma.

While OIU remains the preferred approach for short (<1.5 cm), passable, and soft anterior urethral strictures, its success in complex strictures is limited. Complete obliteration with dense fibrosis often necessitates open urethral reconstruction, which remains the gold standard for long-segment strictures. Open urethroplasty has demonstrated high success rates, often exceeding 85% in expert centres (5). However, these surgeries require general anaesthesia and pose significant perioperative risks, especially in patients with multiple comorbidities such as CAD, CKD, and chronic obstructive pulmonary disease, as was the case in our patient.

In complex strictures with complete obliteration, combined urethrograms may fail to opacify the entire stricture segment accurately, as contrast cannot traverse the fibrotic zone. So, with the prior information of a complete obliterative stricture on retrograde urethrogram, an endoscopic assessment from both antegrade and retrograde routes (functional endoscopic evaluation) was planned rather than a combined urethrogram.

For high-risk surgical candidates, alternative minimally invasive strategies must be considered. The described case employed an innovative endoscopic technique, drawing from the "rendezvous" principle, which involves the simultaneous use of retrograde and antegrade endoscopy to facilitate urethral alignment or access (6). Although traditionally applied for traumatic disruptions or complex strictures, its application in iatrogenic strictures remains underreported.

In our patient, retrograde urethroscopy revealed dense scarring at the proximal bulbar urethra with an impassable lumen. Antegrade endoscopy through the suprapubic tract allowed illumination and physical bulging of the stricture zone, which was visible from the retrograde end. Guided by this bulge, targeted and cautious resection of the fibrous tissue with a resectoscope loop enabled the creation of a new channel and restoration of urethral continuity. This method minimised the risk of creating false passages or extravasation, often associated with blind or forceful attempts at catheterisation or internal urethrotomy.

The traditional "cut-to-the-light" technique involves incising towards the illuminated tip of the opposing endoscope to establish urethral continuity; however, this carries inherent risks, especially in densely fibrosed, obliterative strictures, where blind cutting -even when guided by light- can result in false passage creation or inadvertent injury to surrounding structures. In contrast, the technique described in our case employed controlled resection of scar tissue using the resectoscope loop, guided not only by the antegrade light but also by the intermittent bulging of the antegrade cystoscope, providing both visual and tactile confirmation of proximity to the true lumen. This allowed for gradual, layer-by-layer resection of the fibrotic segment under continuous visual control, thereby reducing the risk of false passage, minimising bleeding, and preserving surrounding healthy tissue. Consequently, our method offers enhanced precision and safety over conventional "cut-to-the-light" techniques, particularly in complex, completely obliterated strictures.

Fluoroscopy- and ultrasound-guided urethrotomies have also been described for managing obliterative strictures, particularly when endoscopic access is limited. However, they lack the direct visual guidance that endoscopic rendezvous techniques offer. The visual cues provided by the antegrade scope's light and bulging effect facilitated a precise, controlled approach in this case.

Post-operatively, self-calibration was instituted, a step known to reduce stricture recurrence following internal urethrotomy. Studies have shown that regular self-dilatation can significantly prolong stricture-free intervals after endoscopic management (7). At six-week follow-up, the patient had satisfactory voiding and no complications, indicating a successful outcome.

It is crucial to recognise that the bulbo-membranous segment of the urethra, where the stricture was located in our patient, represents the sphincteric region responsible for maintaining urinary continence. Surgical interventions in this zone carry a potential risk of compromising the external sphincter mechanism. In our technique, gradual scar tissue resection using a resectoscope loop inherently involves the application of electrical energy and heat, raising concerns about thermal injury to the sphincter complex. However, by employing a meticulous, layer-by-layer resection under direct dual endoscopic visualisation -facilitated by the antegrade bulge and transmitted light- thermal spread and collateral damage were minimised. Nevertheless, it is important to highlight that prolonged use of electrocautery or indiscriminate application of energy in this region could theoretically jeopardise sphincteric integrity, leading to postoperative incontinence. This underlines the importance of careful energy modulation, precise targeting, and minimal tissue trauma during endoscopic interventions in the sphincteric urethral segment. Future refinements, such as the use of cold instruments or laser technologies, may further mitigate this risk.

This case underscores the importance of individualised treatment planning in patients with complex urethral strictures who are unfit for open surgery. It also reinforces the potential of hybrid endoscopic techniques to provide safe, effective alternatives in challenging clinical scenarios. Future studies involving larger patient cohorts and longer follow-up are needed to validate the safety and efficacy of this approach further.

Conclusion

This case highlights the effective use of a novel, minimally invasive endoscopic technique in managing a complex, complete urethral stricture in an elderly patient unfit for open surgery. Iatrogenic urethral injuries during catheterisation remain a significant clinical challenge, particularly in frail patients with multiple comorbidities. While open urethroplasty is the standard of care for long-segment strictures, it may not be feasible in high-risk individuals. The combined antegrade-retrograde endoscopic approach, guided by visual cues such as light transmission and bulging from the antegrade scope, allowed for precise scar resection and re-establishment of urethral continuity. This technique avoided the morbidity associated with open surgery and provided a functionally satisfactory outcome. The success of this approach suggests that with appropriate expertise, such innovative endoscopic methods may serve as a valuable alternative in selected patients.

Ethics

Informed Consent: Proper informed consent was taken from the patient prior to writing this case report.

Footnotes

Authorship Contributions

Surgical and Medical Practices: G.S., P.N., Concept: G.S., P.N., Design: G.S., P.N., Data Collection or Processing: G.S., P.N., Analysis or Interpretation: G.S., P.N., Literature Search: G.S., P.N., Writing: G.S., P.N.

Conflict of Interest: No conflict of interest was declared by the authors.

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