

Temporary Use of Allium™ Ureteral Stent in Long-segment Urethral Strictures: Initial Clinical Experience

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Abstract

Background: Management of long-segment and panurethral strictures remains challenging, particularly in patients with recurrent disease or those unsuitable for urethroplasty. While the Allium™ Bulbar Urethral Stent is available up to 8 cm, no dedicated longer urethral stent exists. We hypothesized that the Allium™ ureteral stent, due to its fully covered, removable design, could serve as a minimally invasive alternative for long-segment urethral strictures when standard urethral stents are inadequate.

Case Presentations: We report two patients with long-segment urethral strictures (>12 cm). The first patient developed a 14 cm urethral defect following traumatic injury and reconstructive surgery, with multiple recurrences after urethroplasty and DVIU. Sequential placement of 12 cm and modified 20 cm Allium™ ureteral stents resulted in temporary restoration of urethral patency, although long-term follow-up revealed encrustation and recurrence requiring reintervention. The second patient, with recurrent panurethral stricture after repeated DVIU, underwent placement of a 12 cm Allium™ ureteral stent, achieving satisfactory short-term voiding and cystostomy removal. In both cases, stent placement was technically feasible, removable, and did not preclude future reconstructive options. Encrustation emerged as the principal long-term complication, while migration was not observed. Stent removal was endoscopically manageable.

Conclusions: The Allium™ ureteral stent may represent a temporary, minimally invasive alternative for selected patients with extensive urethral strictures who are unwilling or unsuitable for urethroplasty. These preliminary observations suggest the need for prospective studies with longer follow-up to evaluate durability, optimal indwelling time, repeat stenting strategies, and device modifications specifically tailored for long-segment urethral disease.

Introduction

Urethral strictures, characterized by the narrowing of the urethral lumen, pose significant clinical challenges, particularly when they are long-segment or recurrent. Traditional treatments like urethroplasty, while effective, may not be suitable for all patients due to various factors. In recent years, the Allium™ Bulbar Urethral Stent (BUS) has emerged as a minimally invasive alternative, designed to maintain urethral patency and reduce recurrence rates [1].

Long-segment strictures, particularly panurethral strictures that span extensive portions of the anterior urethra, are notably difficult to manage. Traditional endoscopic methods, such as dilation and direct vision internal urethrotomy (DVIU), have limited efficacy in these cases, often leading to high recurrence rates. Consequently, open surgical reconstruction, or urethroplasty, has become the preferred approach for durable treatment outcomes [2].

In the study by Kulkarni et al., in which they included patients with panurethral stricture, the mean stricture length was 14 cm (range 10–19 cm). Of 318 patients, 270 (84.90%) were successful and 48 (15.10%) were unsuccessful. In the group of 35 patients in whom treatment was unsuccessful and who

underwent repeat urethroplasty, successful results were obtained in 20 (57.85%) patients, while failure was achieved in 15 (42.15%) patients [3].

In a multicentric study of 143 patients, 76.9% of patients who underwent bulbar urethral stenting after failed endoscopic urethrotomy had successful results. However, if the stent was left in place for less than 6 months, the success rate dropped to 53.3% [4].

The Allium™ BUS is a self-expanding, fully covered nitinol stent with a co-polymer coating that prevents tissue ingrowth and encrustation. It is available in lengths of 5 cm, 6 cm, and 8 cm, all expanding to a 45 Fr caliber upon deployment. The ureteral stent is available in diameters of 24F and 30F and lengths of 10 cm, 12 cm and 20 cm.

In patients with panurethral or urethral strictures longer than 12 cm, and in those with long-segment strictures following failed urethroplasty and DVIU, we evaluated the outcomes of using Allium™ ureteral stents in two patients with long urethral strictures, due to the unavailability of urethral Allium™ stents longer than 8 cm. This study also presents data on the results of using ureteral stents in the urethra for the first time in the literature.

Case Presentation

Case 1

In September 2020, the patient underwent a left below-knee amputation due to a firearm injury. Additionally, scrotal and penile injuries necessitated the placement of a cystostomy, and primary repair of the scrotal and penile openings was performed in another clinic.

In March 2021, the patient was admitted to our clinic for urethral evaluation and planned urethroplasty. Urethroscopy revealed a normal urethra up to 6 cm distal from the meatus, beyond which continuity was not observed. Consequently, a perineal incision was made, and with a bougie, the proximal urethra was accessed, revealing an intact membranous urethra. Despite a scrotal incision to locate healthy urethral tissue, none was found. Furthermore, both testes were absent due to trauma. A 14 cm gap was observed between the distal healthy urethra and the proximal membranous urethra. Subsequently, a skin flap was harvested from the left thigh, tubularized, and anastomosed over a 16 Fr Foley catheter to both distal and proximal ends.

In May 2021, the catheter was removed. The patient reported difficulty urinating, but urethroscopy did not reveal any problem. In July 2021, the patient again presented with urinary difficulty. DVIU with holmium laser was performed on a strictures at from the 12 o'clock position of the proximal anastomosis site. The remainder of the neo-urethra appeared normal.

Later in July 2021, due to recurrent stricture formation, a cystostomy was placed. Anticipating frequent recurrence of the strictures, it was decided to place a stent. Given the maximum length of available

urethral stents was 8 cm and the cost implications of using two stents, an Allium™ ureteral stent was chosen. Under fluoroscopy, the locations of the sphincter and stricture were marked, and a 12 cm Allium™ ureteral stent was placed (Fig. 1). Meanwhile, the distal anastomosis of the neo-urethra was observed normal.

In September 2021, the patient returned with urinary difficulty. A stricture was observed distal to the stent, over the distal anastomosis, and DVIU with laser was performed. It was determined that a longer stent was necessary. The 12 cm stent was removed, and a 20 cm Allium™ ureteral stent was placed under fluoroscopy. The distal 6 cm of the stent was cut using a holmium laser. Post-placement urethrography showed good passage (Fig. 2).

In January 2024, the patient presented with urinary difficulty again and felt severe burning sensation in urine. Urethroscopy revealed encrustation within the stent. The stent was endoscopically removed (Fig. 3). Subsequent urethroscopy showed increased calibration of the neo-urethra. It was decided to proceed without catheter or stent placement.

The patient did not attend follow-up appointments and was managed with a Foley catheter. In May 2025, urethroscopy revealed recurrent strictures at all sites of neo-urethra. Holmium laser urethrotomy was performed on from the 12 o'clock position of the strictures. A 20 cm Allium™ ureteral stent was placed in the urethra (Fig. 4). The distal 6 cm portion was cut using a holmium laser. The patient reported satisfactory urination thereafter.

Case 2

A 32-year-old male patient presented to the urology clinic in April 2024. He had a history of two previous internal urethrotomy surgeries. Qmax was measured at 6 ml/s. Urethroscopy revealed a panurethral stricture extending from the meatus to the bulbar urethra. A direct vision internal urethrotomy (DVIU) was performed holmium laser incision to treat the strictures. Due to recurrence of voiding difficulty, another holmium laser DVIU was performed in September 2024.

In April 2025, the patient returned to the urology clinic again with complaints of voiding difficulty. Urethroscopy showed that the panurethral stricture persisted. The patient was informed that the success rate of repeat DVIU was low, and surgical options including buccal graft urethroplasty or skin flap urethroplasty were discussed. The effectiveness of urethral stents, along with potential complications and success rates of all procedures, were also explained. The patient accepted to initially proceed with urethral stent placement.

A percutaneous cystostomy was performed. We measurement length of the urethral stricture from proximal to distal by fluoroscopic and cystoscopic view guidance and a 12 cm long urethral stricture was observed from the external meatus to the bulbar urethra. A 12 cm Allium™ ureteral stent was placed

under fluoroscopy (Figs. 5 and 6). Two weeks later, the patient reported satisfactory voiding, and the cystostomy tube was removed.

Discussion

Iatrogenic causes represent the most common etiology of urethral strictures. These often result from traumatic catheterization or transurethral interventions. Among these, transurethral resection of the prostate (Electrocutary, Holmium Laser) is a notable example, with an estimated stricture incidence of approximately 3–5%. Other causes include urethral rupture secondary to pelvic fractures and infectious urethritis of bacterial origin. Additionally, around 30% of urethral strictures are considered idiopathic [5–7].

Direct vision internal urethrotomy (DVIU) has long been the most commonly employed treatment method for urethral strictures. However, recurrence is expected in approximately 50% of cases following the procedure. DVIU is most effective in patients with strictures less than or equal to 1.5 in length and those undergoing their first urethral intervention. Even in these ideal cases, overall success rate is reported to be around 20%[8]. In recent years, graft and flap urethroplasty has been increasingly utilized, particularly for treatment of long bulbar strictures and all penile strictures. These flap techniques represent more extensive surgical procedures. Although prospective randomised studies have demonstrated comparable success rates between flap and graft-based techniques, flap urethroplasty is associated with longer operative times and higher complication rates. Notably, skin necrosis occurs in approximately 15% of the patients, and urethrocutaneous fistula formation in about 5% [9, 10].

The first permanent urethral stents were developed to improve the success of DVIU, which is technically less invasive than urethroplasty, and to provide a long-term solution. However, experience with these first-generation stents has shown that the devices are unreliable and have serious complications. Problems such as ingrowth, encrustation, stone formation and migration have led to the abandonment of their use. These drawbacks have led to the rejection of urethral stenting as a long-term solution [11–13].

In the last decade, new generation covered urethral stents have been designed to provide temporary support after DVIU. These stents are completely coated with a polymeric film on their metallic structures, aiming to reduce the risk of calcification, encrustation and ingrowth. Studies have shown that these new stents can be used safely with fewer complications and without the critical problems observed in previous devices. In particular, one of the most valuable features of these stents is that they can be easily removed even after long periods of time due to the absence of ingrowth of urethral tissue into the stent [14].

A multicenter retrospective analysis evaluated the outcomes of temporary bulbar urethral stent placement after DVIU in patients unfit for urethroplasty. The study found an overall success rate of 76.9% at a median follow-up of 38.2 months. However, nearly half of the patients experienced complications, including discomfort, stress incontinence, and stent dislocation. Notably, stent indwelling times shorter than six months were associated with lower success rates. Potential complications and limitations of

stent application should be considered and the treatment plan should be individualized with a multidisciplinary approach. It has been observed that in case of failure of new generation stent treatment, subsequent urethroplasty procedure does not become more complicated, indicating that stent use does not negatively affect surgical options. It also provides a solution to many controversies that arose with first generation urethral stents and reassures physicians about the safety of new generation devices [15].

Multiple studies have demonstrated the Allium™ stent's effectiveness in alleviating ureteral obstructions [16]. In a prospective cohort study involving 20 patients with ureteral strictures, the stent showed a low complication rate, with stent obstruction occurring in 15% and migration in 10% of cases. The mean follow-up period was 28 months, indicating sustained efficacy over time [17]. Another study focusing on benign ureteral strictures reported an overall success rate of 85.5% over a median follow-up of 18 months, with minimal perioperative complications [18].

Eisenberg et al. reported on the management of restenosis after urethral stent placement, including both endoscopic and open surgical treatments. Their findings indicated that anterior urethral strictures were more successfully managed with urethroplasty, while posterior strictures could often be addressed endoscopically. The overall success rates were 82% for anterior strictures and 67% for posterior strictures [19].

In a study evaluating Allium™ Bulbar Stents, the patient population consisted of individuals who had either failed previous treatment attempts or were deemed unsuitable for urethroplasty due to their underlying medical conditions. In this challenging cohort characterized by significant comorbidities, Bulbar Urethral Stent (BUS) placement demonstrated clinical improvement in some cases where urethroplasty was either unsuccessful or not feasible. These findings suggest that BUS may serve as a limited alternative treatment option for patients who are not candidates for urethroplasty or have experienced treatment failure. However, the high long-term failure rate of BUS significantly limits its effectiveness, and unless this issue is addressed, BUS will remain a second- or third-line treatment option [20]. Similarly, in our experience, the use of ureteral stents in patients with long-segment urethral strictures may provide short-term benefits, but we consider encrustation to be the most significant long-term complication.

One of the major challenges associated with urethral stents is stent migration. In a published study, migration rate of Allium™ urethral stent was reported to be approximately 16% [14]. To reduce the risk of migration, Allium™ urethral stents are designed with anchoring mechanism at the distal end. In contrast, ureteral stents exhibit a lower migration rate and do not incorporate an anchoring feature. In our clinical practice, when we consider stent placement in cases of long-segment urethral strictures, we prefer to perform a partial incision at the stricture site. We believe that this approach reduce the risk of stent migration.

Conclusion

Urethral stents are a gradually evolving treatment option for managing urethral strictures in patients who are either unfit for urethroplasty or have experienced failure following urethroplasty. With the development of new-generation urethral stents, complication and failure rates have decreased. Currently, temporary stent placement is considered a more effective approach. Due to the lack of appropriately designed urethral stents for long-segment strictures, the Allium™ ureteral stent may offer an alternative to self-catheterization, dilation, or internal urethrotomy in selected patients as an option other than urethroplasty.

Although existing evidence regarding the use of ureteral stents in long-segment urethral strictures remains mixed, we believe that this approach may have a role for urologists in selected patient populations. In patients who suffer from long segment urethral stricture have an alternative treatment modalities like Allium™ ureteral stent before giving urethroplasty desicion. To establish the Allium™ ureteral stent as a superior minimally invasive option for managing long-segment urethral strictures, further research is needed—particularly studies involving longer-term follow-up and repeated stent placement—as well as continued product development.

Abbreviations

BUS

Bulbar urethral stent

DVIU

Direct vision internal urethrotomy

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from the patients for participation and publication of this case report.

Consent for publication

Written informed consent for publication of clinical details and images was obtained from the patients.

Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed.

Competing interests

The authors declare that they have no competing interests.

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Figures

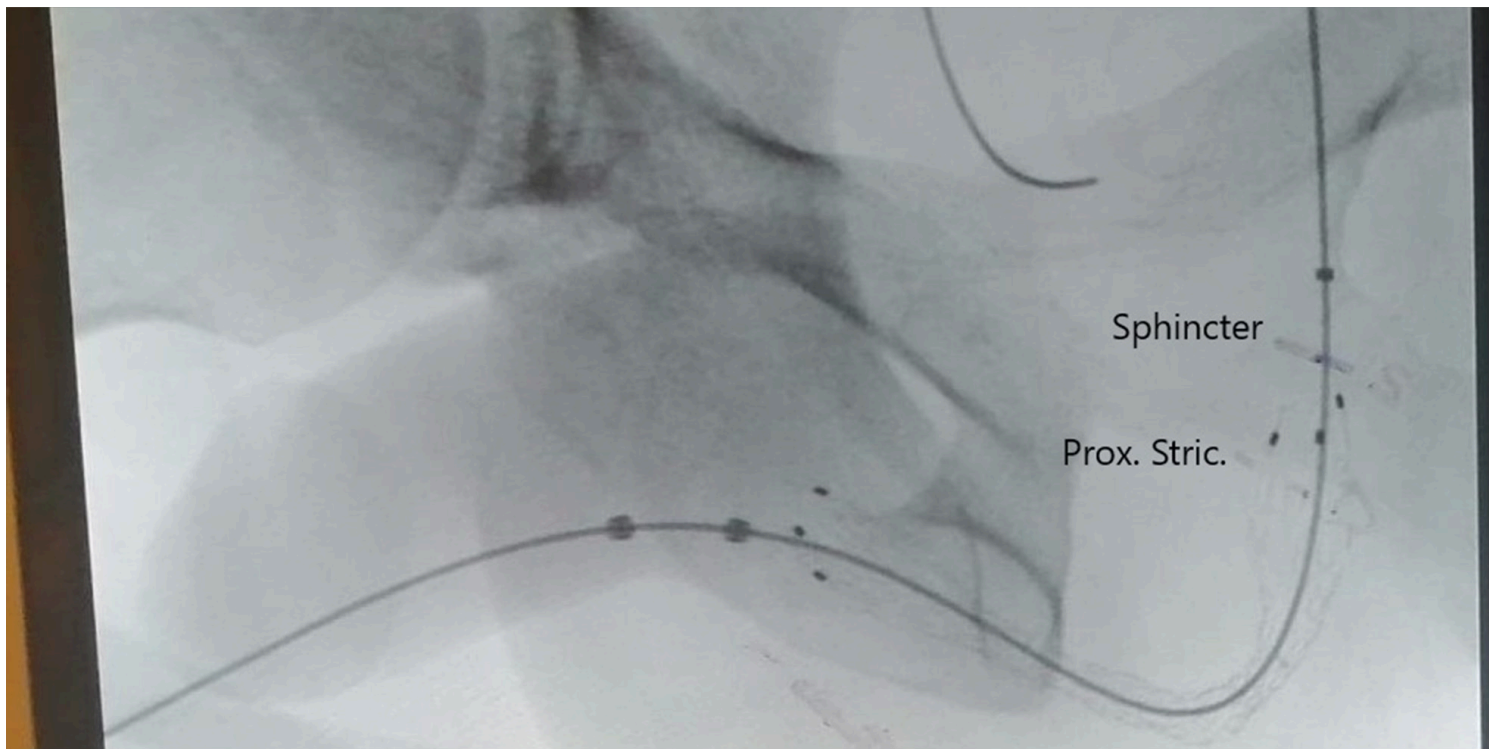


Figure 1

12 cm Allium™ ureteral stent image was seen under fluoroscopy, sphincter and proximal stricture are indicated on the figure.

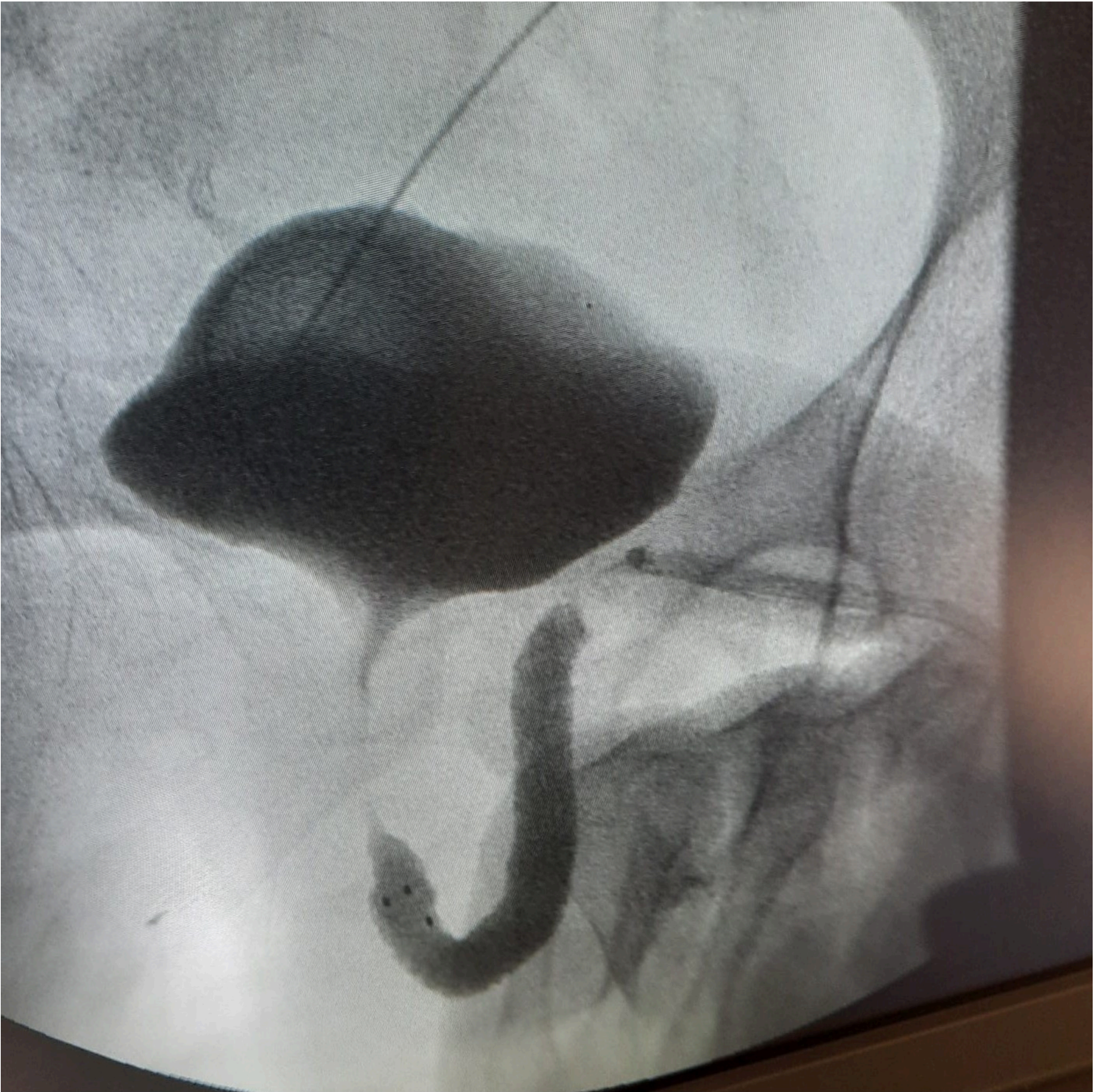


Figure 2

Urethrography image taken while a 14 cm Allium™ ureteral stent was present in the urethra.



Figure 3

Ureteral stent with stones inside that we removed from the urethra in the 3rd year.

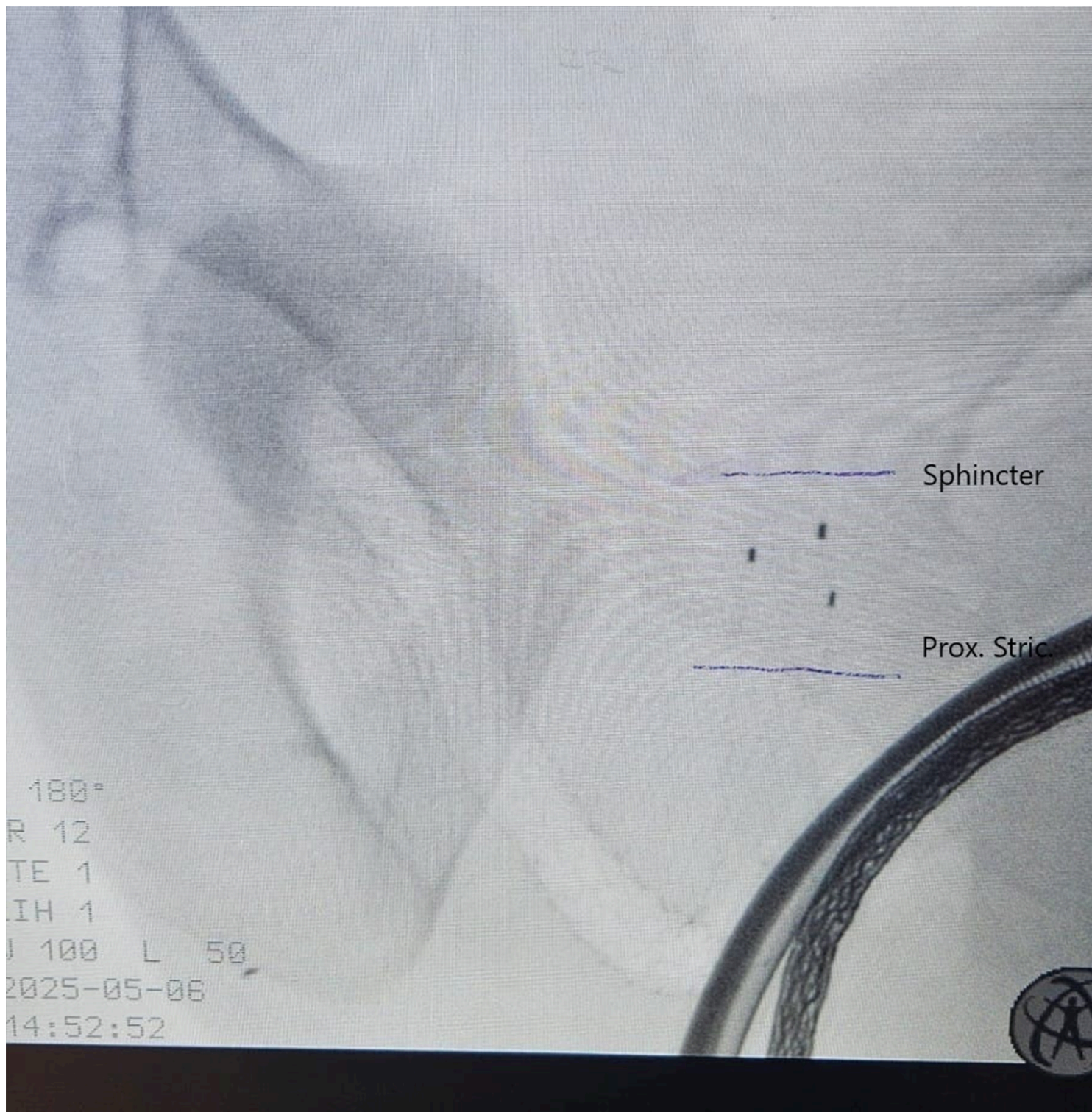


Figure 4

Under fluoroscopy, a 20 cm ureteral Allium stent is located in the urethra.

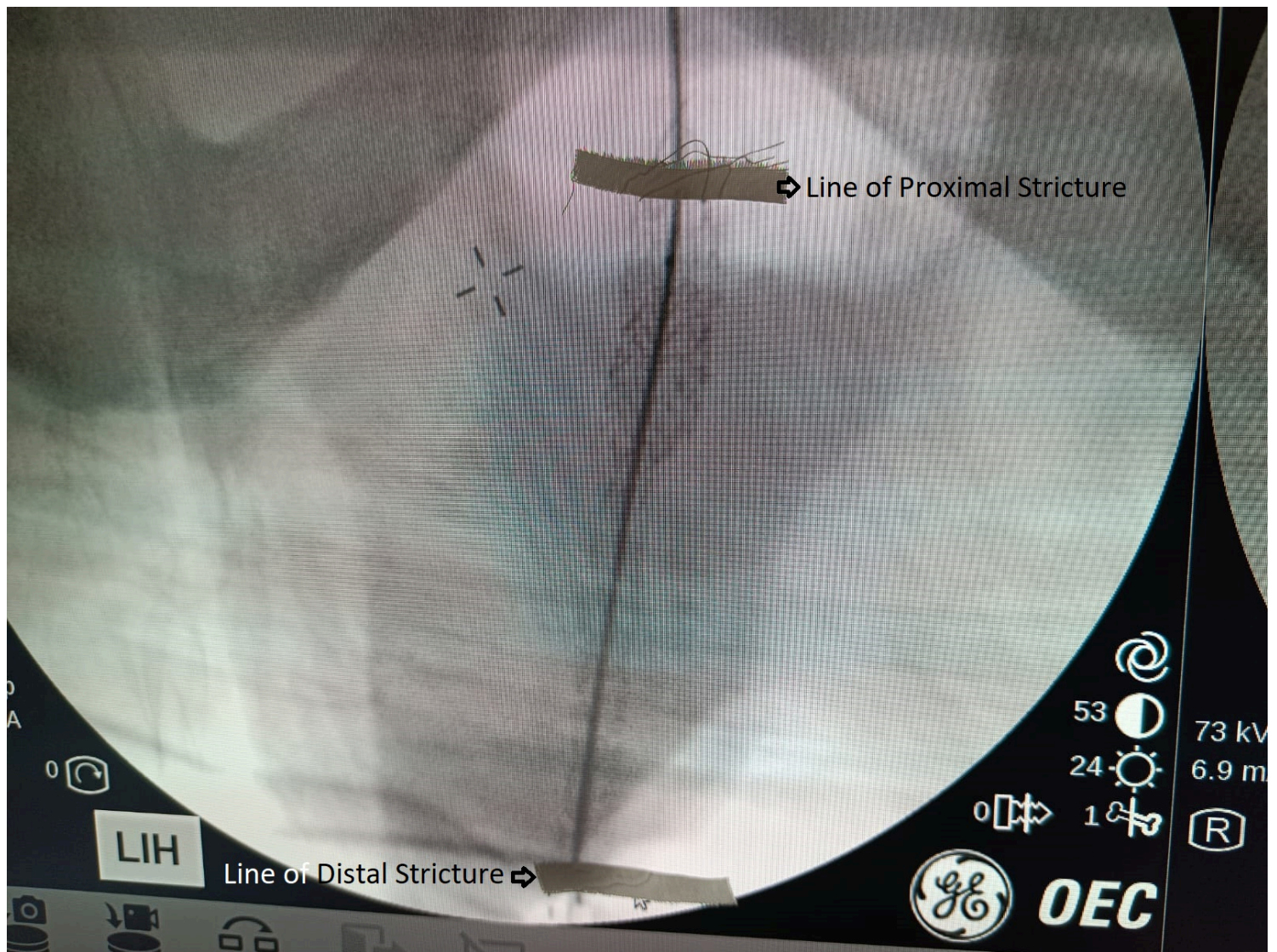


Figure 5

12 cm Allium ureteral stent was placed under fluoroscopy, Two lines were showed the proximal and distal strictures.

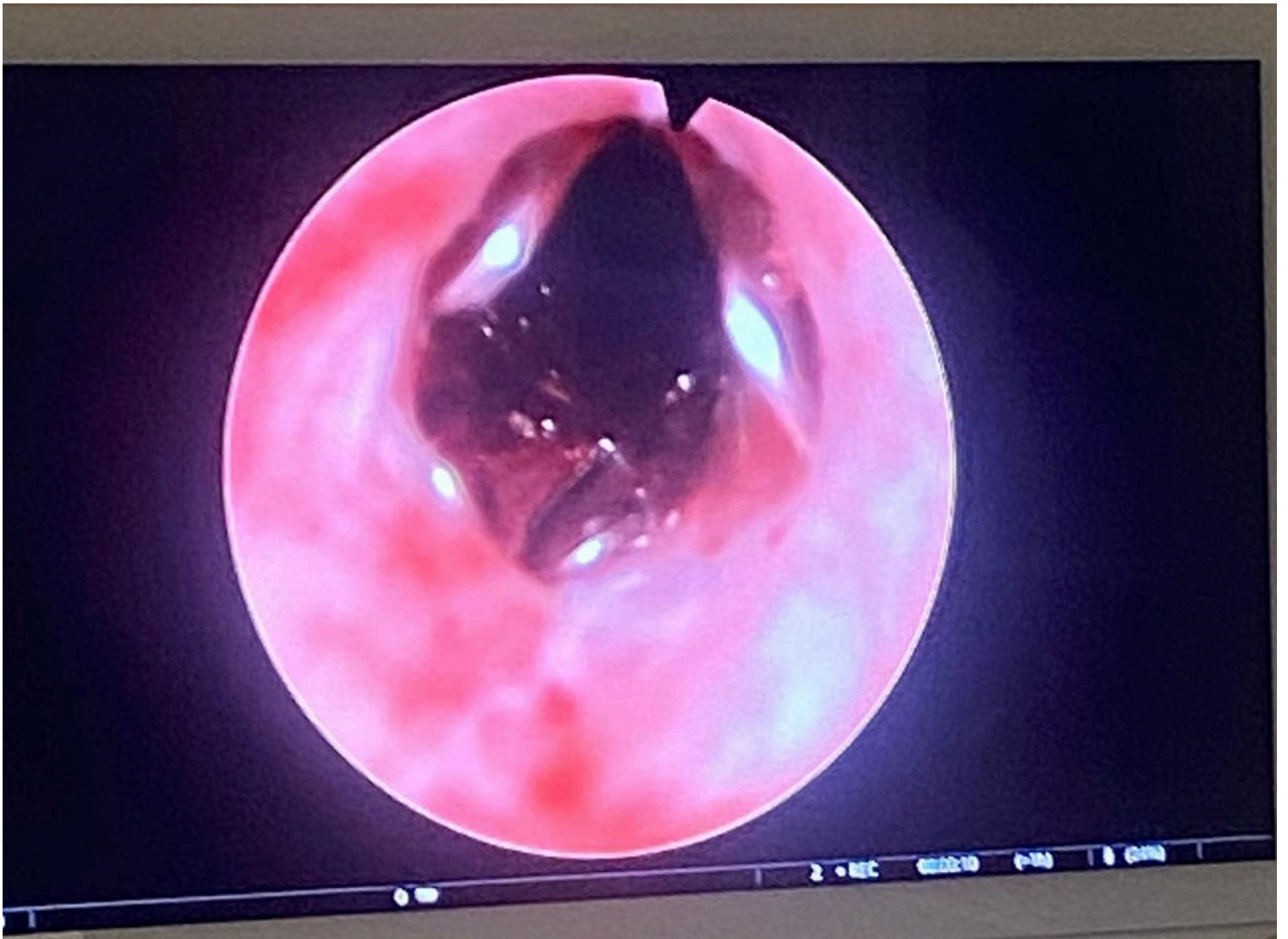


Figure 6

Cystoscopic view of ureteral stent was seen.