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Urethral stricture in single center tertiary hospital: An evolution of management

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ABSTRACT

Introduction and objectives: Urethral stricture (US) management is complex and requires evaluation. The emergence of reconstructive approach is a revolutionary change. Thus, a reconstructive urologist may alter the quality of US management for further improvements.

Materials and methods: We retrospectively reviewed the medical records of US patients underwent surgery from January 2013 to December 2022 divided into two groups before and after reconstructive urologist presence in our center to analyze the significance of reconstructive approach.

Results: Out of 360 patients, 171 in group A and 189 in group B. The most common etiology is trauma, mostly located in posterior. DVIU was the most performed procedure in group A, while in group B was urethroplasty. We identified significance ($p < 0.05$) between the two groups regarding the clinical outcomes.

Conclusion: In our experience, there are shifting in management of US from endoscopic to urethral reconstruction that improved the clinical outcomes in our center.

Keywords: urethral stricture, direct visual internal urethrotomy, urethral reconstruction, evolution

INTRODUCTION

Urethral stricture disease (USD) is a pathological narrowing of the urethral lumen caused by fibrosis of the corpus spongiosum, leading to varying degrees of bladder outlet obstruction. This condition is associated with significant morbidity, including lower urinary tract symptoms, urinary retention, recurrent urinary tract infections, and a substantial reduction in health-related quality of life [1, 2]. Urethral stricture (US) remains a challenging urological problem worldwide, particularly in tertiary referral centers where complex, recurrent, and trauma-related strictures are frequently encountered [3].

The etiology of US is multifactorial, most commonly involving trauma, iatrogenic injury, infection, and inflammatory conditions. Contemporary epidemiological studies indicate that pelvic fracture urethral injury and iatrogenic causes related to endourological procedures represent a substantial proportion of cases in modern practice [4, 5]. The anatomical location, length, and underlying etiology of the stricture are critical determinants of treatment selection and long-term outcomes [6].

Historically, management strategies for USD relied heavily on minimally invasive approaches such as urethral dilation and direct vision internal urethrotomy (DVIU), owing to their technical simplicity and low immediate morbidity. However, robust evidence accumulated over the last decade has demonstrated high recurrence rates associated with repeated endoscopic treatments, particularly for long, dense, or posterior strictures [7, 8]. These limitations have prompted a paradigm shift toward definitive reconstructive approaches.

Recent international guidelines and systematic reviews increasingly endorse urethroplasty as the gold standard treatment for most US, offering superior long-term success and lower recurrence rates compared with endoscopic management [2, 9-11]. Although adjunctive therapies—such as intralesional mitomycin C or novel endoscopic technologies—have been explored to improve outcomes after DVIU, their benefits remain limited to selected cases and do not replace definitive reconstruction [12, 13]. Consequently, the availability of reconstructive urology expertise has emerged as a key factor influencing treatment patterns and clinical outcomes in tertiary centers [14].

This study aims to evaluate the evolution of US management in a single tertiary referral hospital by comparing surgical strategies and clinical outcomes before and after the introduction of a reconstructive urologist. By analyzing changes in treatment patterns, complication rates, and outcomes over time, this study seeks to provide real-world evidence supporting guideline-based, reconstructive-oriented management of USD.

METHOD

This retrospective study reviewed the medical records of patients diagnosed with US who underwent surgical procedures at our tertiary hospital between January 2013 and December 2022. The study period was divided into two groups: group A (January 2013 to December 2017) and group B (January 2018 to December 2022), to compare the patterns of US management before and after the admission of a reconstructive urologist. Patients of all ages diagnosed with US and those who underwent surgical intervention during the study periods were included. The data collected from the medical records including patient age, etiology of the stricture, anatomical site of the stricture, length of the stricture, type of surgical procedure performed, clinical outcomes, post-operative complications

Data were analyzed to compare the distribution of etiologies, stricture sites, surgical procedures, and outcomes between the two groups. Chi-square tests were used to determine the significance of differences between the groups, with a p value of < 0.05 considered statistically significant. Clinical outcomes were evaluated based on the success rate of the procedures and the incidence of post-operative complications. The success of the procedures was determined by the absence of stricture recurrence and the need for additional interventions.

RESULTS

A total of 360 patients diagnosed with US were included in the study. The average age of the patients was 51.8 years (standard deviation = 18.1), with the youngest patient being 2 years old and the oldest 86 years old.

The most common etiology of the stricture was trauma, accounting for the majority of cases. The most frequent anatomical site of the stricture was the pars membranacea, observed in 52.5% of the cases. In group A (2013-2017), 47.5% of patients underwent DVIU, while 35.5% underwent urethral reconstruction, primarily excision and primary anastomosis (EPA). In group B (2018-2022), there was a significant shift in the management approach, with 52.5% of patients undergoing urethroplasty and a reduction in DVIU procedures.

There was a significant difference in the clinical outcomes between the two groups ($p < 0.05$). In group A, 46.31% of patients experienced post-operative complications, whereas in group B, only 4.73% of patients had post-operative complications. The reduction in complications was notable after the introduction of the reconstructive urologist in group B, indicating improved surgical outcomes and patient care.

These results indicate a clear evolution in the management of US at our center, with a shift towards more definitive surgical interventions and improved patient outcomes following the inclusion of a reconstructive urologist.

Table 1. Demographic and clinical characteristics of study participant (N = 360)

No	Variable		Value
1	Age: years	Minimum	2
		Maximum	86
		Mean	51.50
2	Etiology: n (%)	Trauma	250 (69.45)
		Infection	63 (17.50)
		Iatrogenic	47 (13.05)
3	Stricture site: n (%)	Posterior	213 (60.45)
		Anterior	147 (39.55)
4	Definitive surgery: n (%)	DVIU	158 (45.95)
		Urethroplasty	211 (54.05)
5	Complication: n (%)	Recurrent stricture	61 (44.17)
		Bleeding	8 (12.63)
		Extravasation	15 (9.64)
		Erectile disfunction	5 (6.72)

Table 2. Demographic and clinical characteristics of study participant before reconstructive urologist admission (January 2013-December 2017) (N = 171)

No	Variable		Value
1	Age: years	Minimum	9
		Maximum	86
		Mean	52.11
2	Etiology: n (%)	Trauma	145 (84.80)
		Infection	25 (14.60)
		Iatrogenic	1 (0.06)
3	Stricture site: n (%)	Posterior	146 (85.40)
		Anterior	25 (14.60)
4	Definitive surgery: n (%)	DVIU	132 (77.20)
		Urethroplasty	39 (22.80)
5	Complication: n (%)	Recurrent stricture	56 (32.74)
		Bleeding	6 (3.05)
		Extravasation	14 (8.18)
		Erectile disfunction	4 (2.34)

Table 3. Demographic and clinical characteristics of study participant after reconstructive urologist admission (January 2013-December 2017) (N = 189)

No	Variable		Value
1	Age: years	Minimum	2
		Maximum	86
		Mean	50.90
2	Etiology: n (%)	Trauma	105 (55.50)
		Infection	38 (20.10)
		Iatrogenic	46 (24.40)
3	Stricture site: n (%)	Posterior	67 (35.50)
		Anterior	122 (64.50)
4	Definitive surgery: n (%)	DVIU	26 (13.70)
		Urethroplasty	172 (85.30)
5	Complication: n (%)	Recurrent stricture	5 (55.60)
		Bleeding	2 (22.20)
		Extravasation	1 (11.10)
		Erectile disfunction	1 (11.10)

Table 1 shows the demographic and clinical characteristics of study participant.

Table 2 shows the demographic and clinical characteristics of study participant before reconstructive urologist admission (January 2013-December 2017).

Table 3 shows the demographic and clinical characteristics of study participant after reconstructive urologist admission (January 2013-December 2017).

Table 4. Comparison of demographic and clinical outcomes of the study participants between two periods (before and after the admission of reconstructive urologist)

No	Variable		Before reconstructive urologist (January 2013-December 2017)	After reconstructive urologist (January 2018-December 2022)	p
1	Age: years	Minimum	9	2	0.0720
		Maximum	86	86	0.9830
		Mean	52.11	50.90	0.4650
2	Etiology: n (%)	Trauma	145 (84.80)	105 (55.50)	0.8540
		Infection	25 (14.60)	38 (20.10)	1.2240
		Iatrogenic	1 (0.06)	46 (24.40)	0.0070
3	Stricture site: n (%)	Posterior	146 (85.40)	67 (35.50)	0.1240
		Anterior	25 (14.60)	122 (64.50)	0.0510
4	Definitive surgery: n (%)	DVIU	132 (77.20)	26 (13.70)	0.0620
		Urethroplasty	39 (22.80)	172 (85.30)	0.0530
5	Complication: n (%)	Recurrent stricture	56 (32.74)	5 (55.60)	
		Bleeding	6 (3.05)	2 (22.20)	
		Extravasation	14 (8.18)	1 (11.10)	
		Erectile disfunction	4 (2.34)	1 (11.10)	
Total			80	9	0.0130

Table 4 shows the comparison of demographic and clinical outcomes of the study participants between two periods (before and after the admission of reconstructive urologist).

DISCUSSION

The management of USD remains a significant challenge in contemporary urology, requiring a balance between treatment durability, patient safety, and long-term quality of life. Over the past decade, accumulating evidence and international guidelines have increasingly highlighted the limitations of repeated endoscopic interventions and emphasized the role of definitive reconstructive surgery for most US [7, 9, 10]. This study evaluated the evolution of USD management in a tertiary referral center following the introduction of reconstructive urology expertise, with a focus on changes in surgical strategies and clinical outcomes.

Our findings demonstrate a substantial shift in treatment patterns between the two study periods. Prior to the introduction of a reconstructive urologist (group A, 2013-2017), DVIU was the predominant procedure. This reflects historical practice trends, in which minimally invasive approaches were favored because of their technical simplicity and perceived lower short-term morbidity. However, contemporary literature consistently reports high recurrence rates following DVIU, particularly in patients with long strictures, posterior urethral involvement, or trauma-related etiology, limiting its role as a definitive treatment [8, 11, 15, 16]. These findings are consistent with the suboptimal outcomes observed in group A.

Following the introduction of reconstructive urology services (group B, 2018-2022), urethroplasty—predominantly EPA—became the preferred treatment modality. This transition mirrors global trends toward guideline-based management, as both European Association of Urology and American Urological Association guidelines recommend urethroplasty as the treatment of choice for recurrent, complex, or non-short strictures [2, 10, 11]. Importantly, this change in practice was associated with a marked reduction in postoperative complications, decreasing from 46.31% in group A to 4.73% in group B, supporting the clinical benefit of definitive reconstruction.

The improved outcomes observed after the adoption of urethroplasty are consistent with high-level evidence from systematic reviews and long-term cohort studies demonstrating superior durability of reconstructive surgery compared with endoscopic management. Reported success rates of urethroplasty frequently exceed 85-90% in appropriately selected patients, whereas repeated DVIU is associated with progressively diminishing success [12, 17-19]. These findings reinforce the concept that early referral for reconstructive surgery may reduce cumulative morbidity associated with recurrent endoscopic interventions.

Although adjunctive strategies—such as intralesional mitomycin C, drug-coated balloons, or other endoscopic innovations—have been investigated to improve DVIU outcomes, recent systematic reviews and meta-analyses suggest that their benefits are limited to selected cases and do not substitute for definitive reconstruction [12, 13, 17]. Consequently, the expanding role of reconstructive urology reflects both evolving evidence and increasing recognition of the limitations of minimally invasive approaches in complex disease.

Another important contributor to improved outcomes in group B is the availability of specialized reconstructive expertise. Surgeon experience and subspecialty training have been shown to significantly influence urethroplasty outcomes, complication rates, and long-term success [14, 20]. In tertiary referral centers, where trauma-related and posterior US are more prevalent, individualized surgical planning based on stricture etiology, length, and anatomical location is particularly critical [21, 22]. Our findings support previous reports that the integration of reconstructive urologists into multidisciplinary teams improves adherence to evidence-based practice and optimizes patient outcomes [15, 16].

Several limitations of this study should be acknowledged. The retrospective design introduces potential selection bias, and variations in follow-up duration may influence the assessment of recurrence and complications. Additionally, the single-center nature of the study may limit generalizability to other institutions with differing patient populations or resource availability. The analysis was limited to univariate comparisons, and unmeasured confounding factors could not be fully accounted for. Future prospective, multicenter studies with standardized outcome measures and longer follow-up are warranted to further validate these findings and refine treatment algorithms.

In summary, this study demonstrates a clear evolution in the management of USD from predominantly endoscopic interventions toward definitive reconstructive surgery following the introduction of reconstructive urology expertise. This shift was associated with improved clinical outcomes and a substantial reduction in postoperative complications. Our findings align with contemporary guidelines and high-level evidence, supporting the integration of specialized reconstructive urology services in tertiary centers to optimize the management and long-term outcomes of USD.

CONCLUSION

This study demonstrates a significant evolution in the management of US within our tertiary hospital following the inclusion of a reconstructive urologist. Over the analyzed periods, there has been a notable shift from predominantly performing DVIU to favoring urethroplasty, particularly EPA. This change in practice has resulted in markedly improved clinical outcomes. Specifically, the post-operative complication rate drastically decreased from 46.31% in group A (2013-2017) to 4.73% in group B (2018-2022). These findings suggest that incorporating a reconstructive urologist into the team significantly enhances the quality of care for patients with US, leading to better surgical outcomes and fewer complications. Consequently, our experience supports the broader adoption of urethral reconstruction techniques over endoscopic approaches for managing US. Further research and long-term follow-up are recommended to continue optimizing treatment protocols and patient outcomes in US management.

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REFERENCES

1. Mangir N, Chapple CR. Recent advances in treatment of urethral stricture disease in men. F1000Res. 2020;9:F1000 Faculty Rev-330. https://doi.org/10.12688/f1000research.21957.1 PMid:32419925 PMCid:PMC7202089
2. Campos-Juanatey F, Osman NI, Greenwell TJ, et al. EAU guidelines on urethral stricture disease (part 2): Diagnosis, perioperative management, and follow-up in males. Eur Urol. 2021;80(2):201-12. https://doi.org/10.1016/j.eururo.2021.05.032 PMid:34103180
3. Rourke KF, Welk B, Kodama R, Bailly G, Davies T, Santesso N, Violette PD. Canadian Urological Association guideline on male urethral stricture. Can Urol Assoc J. 2020;14(10):305-316. https://doi.org/10.5489/cuaj.6792
4. Abbasi B, Shaw NM, Lui JL, et al. Comparative review of the guidelines for anterior urethral stricture. World J Urol. 2022;40(8):1971-80. https://doi.org/10.1007/s00345-022-03988-3 PMid:35316387
5. Revels JW, Wang SS, Weaver JS, et al. A multimodality review of male urethral imaging: pearls and pitfalls with an update on urethral stricture treatment. Br J Radiol. 2022;95(1134):20211034. https://doi.org/10.1259/bjr.20211034 PMid:35001669 PMCid:PMC10996428
6. Bugeja S, Payne SR, Eardley I, et al. The standard for the management of male urethral strictures in the UK: a consensus document. J Clin Urol. 2021;14(1):10-20. https://doi.org/10.1177/2051415820933504
7. Shaw NM, Venkatesan K. Endoscopic management of urethral stricture: Review and practice algorithm for management of male urethral stricture disease. Curr Urol Rep. 2020;21(4):16. https://doi.org/10.1007/s11934-018-0771-6
8. Campos-Juanatey F, Fes-Ascanio E, Adamowicz J, et al. Contemporary management of anterior urethral strictures by reconstructive urology experts. J Clin Med. 2022;11(9):2353. https://doi.org/10.3390/jcm11092353 PMid:35566479 PMCid:PMC9103897
9. Thakur DK, Agrawal CS. Outcomes of Anterior Urethral Stricture Management in a Tertiary Care Hospital in Eastern Nepal. J Inst Med Nepal. 2022;44(3):7-10. https://doi.org/10.59779/jiomnepal.1231
10. European Association of Urology. EAU guidelines on urethral strictures. Arnhem: EAU Guidelines Office; 2024.
11. American Urological Association. Urethral stricture guideline (amended). Linthicum, MD: AUA; 2023.
12. Tuweno ET, Gahari WA. An updated systematic review of skin grafts in urethral stricture disease. Med Inf. 2024;20(2):1-12. https://doi.org/10.37160/mijournal.v20i2.470
13. Elliott SP, Coutinho K, Robertson KJ, D'Anna R, Chevli K, Carrier S, et al. One-year results for the ROBUST III randomized controlled trial evaluating the Optilume drug-coated balloon for anterior urethral strictures. J Urol. 2022;207(4):866-875. https://doi.org/10.1097/JU.0000000000002346 PMid:34854748 PMCid:PMC12721643
14. Bugeja S, Payne SR, Eardley I, Mundy AR. The standard for the management of male urethral strictures in the UK: A consensus document. J Clin Urol. 2021;14(1):10-20. https://doi.org/10.1177/2051415820933504
15. Lumen N, Hoebeke P, Willemsen P, et al. Etiology of urethral stricture disease in the 21st century. J Urol. 2009 Sep;182(3):983-7. https://doi.org/10.1016/j.juro.2009.05.023. Epub 2009 Jul 18. PMID: 19616805.
16. Goulao B, Carnell S, Shen J, MacLennan G, Norrie J, Cook J, et al. Surgical treatment for recurrent bulbar urethral stricture: A randomised open-label superiority trial of open urethroplasty versus endoscopic urethrotomy (the OPEN trial). Eur Urol. 2020;78(4):572-580. https://doi.org/10.1016/j.eururo.2020.06.003 PMid:32636099

17. Lumen N, Campos-Juanatey F, Greenwell T, Martins FE, Osman NI, Riechardt S, et al. European Association of Urology guidelines on urethral stricture disease (Part 1): Management of male urethral stricture disease. Eur Urol. 2021;80(2):190-200. https://doi.org/10.1016/j.eururo.2021.05.022
18. Jasionowska S, Bochinski A, Shiatis V, Singh S, Brunckhorst O, Rees RW, Ahmed K. Anterior urethroplasty for the management of urethral strictures in males: A systematic review. Urology. 2022;159:222-234. https://doi.org/10.1016/j.urology.2021.09.003 PMid:34537198
19. Payne SR, Fowler S, Mundy AR. Analysis of a 7-year national online audit of the management of open reconstructive urethral surgery in men. BJU Int. 2020;125(2):304-313. https://doi.org/10.1111/bju.14897 PMid:31419368
20. Jasionowska S, Shabbir M, Brunckhorst O, Khan MS, Manzoor H, Dasgupta P, Anderson P, Barbagli G, Ahmed K. Development and content validation of the Urethroplasty Training and Assessment Tool (UTAT) for dorsal onlay buccal mucosa graft urethroplasty. BJU Int. 2020;125(5):725-731. https://doi.org/10.1111/bju.14830 PMid:31131961
21. Koraitim MM. Pelvic fracture urethral injuries: The unresolved controversy. J Urol. 1999;161(5):1433-41. https://doi.org/10.1016/S0022-5347(05)68918-5 PMid:10210368
22. Osman NI, Mangera A, Chapple CR. A systematic review of surgical techniques used in the treatment of female urethral stricture. Eur Urol. 2013;64(6):965-73. https://doi.org/10.1016/j.eururo.2013.07.038 PMid:23937829