Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2023i1.427
*Biol. Clin. Sci. Res. J., Volume, **2023**: 427*
Original Research Article

OUTCOMES OF URETHRAL DILATION WITH AMPLATZ DILATORS IN THE MANAGEMENT OF URETHRAL STRICTURES

AHMAD T[1], AYAZ MM[*2], BACHA M[3], FARHAN M[3], MOHAMMAD F[4], GHAZANFAR S[5]

[1]*Department of Urology, Waseem Medical Centre Batkhaila, District Malakand, KPK, Pakistan*
[2]*D.H.Q Hospital Karak, KPK, Pakistan*
[3]*Department of Nephrology, Mercy Teaching Hospital Peshawar, KPK, Pakistan*
[4]*Department of Nephrology, Balochistan Institute of Nephro-Urology, Quetta, Pakistan*
[5]*Department of Surgery, Unit-1, Shaikh Zayed Hospital Lahore, Punjab, Pakistan*
**Correspondence author email address: mohsinayaz41@gmail.com*

(Received, 19th June 2023, Revised 19th August 2023, Published 30th September 2023)

Abstract: *This study aimed to determine the outcomes of urethral dilation with amplatz dilators in managing urethral strictures. We conducted this descriptive case series at multiple centers, including Waseem Medical Centre Batkhaila and Mercy Teaching Hospital Peshawar, from November 2022 to April 2023. A total of 30 male patients presented with urethral strictures were treated with urethral dilation using amplatz dilators. The outcomes assessed were maximum urinary flow and Post-void residual urine. Paired samples T-test was used for numerical variables. Mean age of patients was 64.87±11.96 years. Preoperative mean uroflowmetry flow (Qmax) was 8.6±2.97 mL/sec, while the PVR preoperatively was 198.4±59.19 mL. Qmax improved in 1st month at 18.87±2.64 mL/sec, in the 6th month at 17.50±2.99 mL/sec, and in the 12th month at 15.37±2.17 mL/sec (P = 0.0001). PVR improved in 1st month at 50.13±23.56 ml, 6th month at 64.47±23.31, and 12th month at 69.17±25.53 ml compared to the preoperative PVR (P = 0.0001). Urethral dilatation using amplatz renal dilators represents a technique that mitigates the inherent risks associated with blind dilatation methods. This approach is characterized by its safety, ease of application, high patient tolerance, and cost-effectiveness, rendering it a favorable alternative for treating urethral strictures.*

Keywords: Urethral Strictures, Amplatz Dilator, Adults

Introduction

Urethral strictures are a common urological condition characterized by the narrowing of the urethra, which can obstruct the flow of urine and cause various urinary symptoms. These strictures can result from a variety of causes, including trauma, infection, inflammation, or previous urological procedures (Beland et al., 2022). Managing urethral strictures is crucial to improving patients' quality of life and preventing complications such as urinary retention and kidney damage (Wessells et al., 2017). Over the years, several techniques and instruments have been developed for the treatment of urethral strictures, and one such tool that has gained prominence is the Amplatz renal dilator (Fuehner et al., 2019; Nomikos et al., 2017).

The Amplatz renal dilator is a medical instrument originally designed for use in interventional radiology for dilating the renal pelvis during procedures such as percutaneous nephrolithotomy. However, its applications have extended to urology, particularly for treating urethral strictures (Pakmanesh et al., 2019; Peng et al., 2020).

The primary goal of treating urethral strictures is to relieve the obstruction and restore normal urinary function while minimizing complications and recurrence (Campos-Juanatey et al., 2021). The Amplatz renal dilator has been utilized as a valuable tool in achieving these objectives, and its use has led to positive outcomes in many cases. One of the key advantages of the Amplatz renal dilator is its precision in dilation (Karsli et al., 2020). Another advantage of the Amplatz renal dilator is its minimal invasiveness. Unlike more aggressive treatments like urethrotomy or urethroplasty, which may require open surgery and prolonged recovery times, dilation with the Amplatz renal dilator is a minimally invasive procedure (Ozok et al., 2012).

The use of the Amplatz renal dilator in treating urethral strictures has demonstrated favorable outcomes regarding symptom relief and improvement in urinary flow (Peng et al., 2020). Many studies have reported significant increases in the peak urinary flow rate and reductions in post-void residual urine volume following the procedure. These improvements contribute to a better quality of life for patients, as they experience fewer urinary symptoms and a decreased risk of urinary tract infections and kidney damage (Akkoc et al., 2016; Khan et al., 2022).

However, it is essential to acknowledge that the efficacy of the Amplatz renal dilator may vary depending on the type and location of the stricture. Short-segment strictures, particularly those located in the bulbar urethra, tend to respond better to dilation compared to longer-segment or complex strictures. Therefore, patient selection and careful preoperative evaluation are crucial to achieving the best outcomes. This study aims to determine the outcomes of urethral dilation with Amplatz dilators in the management of urethral strictures. However, its effectiveness may vary based on the specific characteristics of the stricture. Further research and clinical experience will continue to refine our understanding of the optimal use of the Amplatz renal dilator in managing urethral strictures, ensuring that patients receive the most appropriate and effective treatment for their condition.

[Citation Ahmad, T., Ayaz, M.M., Bacha, M., Farhan, M., Mohammad, F., Ghazanfar, S. (2023). Outcomes of urethral dilation with amplatz dilators in the management of urethral strictures. *Biol. Clin. Sci. Res. J.*, **2023***: 427*. doi: https://doi.org/10.54112/bcsrj.v2023i1.427]

Methodology

We conducted this descriptive case series at multiple centers, including Waseem Medical Centre Batkhaila and Mercy Teaching Hospital Peshawar, from November 2022 to April 2023, all of whom presented with urethral strictures and were aged between 40 and 80 years. The diagnosis of urethral stricture (US) was established through a comprehensive evaluation process that included clinical history assessment, uroflowmetry, and urethrography. The patient's medical records, physical examinations, complete blood counts, serum biochemical analyses, urine analyses, and urine cultures were retrospectively scrutinized. Patients displaying active urinary infections were administered appropriate antibiotic treatment before surgery. Stricture lengths were assessed preoperatively through urethrography, and exclusion criteria for this study encompassed strictures longer than 2 cm, meatal stenosis, posterior urethral strictures, and a history of prior US treatments.

Patients were introduced to a novel dilatation technique and, if they consented to this approach, underwent amplatz dilation. The procedure was successful when patients reported no voiding difficulties and their maximum urinary flow rate (Qmax) exceeded 12 mL/sec. The primary endpoint of this study was defined as an increase in Qmax.

For amplatz dilation, all patients were subjected to cystoscopy while in the lithotomy position, either under spinal or general anesthesia. After identifying the location of the stenosis with the cystoscope, a 0.038-inch hydrophilic guidewire was introduced into the working channel. The cystoscope was removed, and amplatz renal dilators ranging from 10F to 22F were progressively introduced into the bladder over the guidewire. Following the dilation procedure, cystoscopy was employed to assess the condition of the urethra, and the procedure was concluded by affixing a 20F foley urethral catheter, which was removed on the 7th postoperative day.

Data analysis was conducted using IBM SPSS 20 software. Paired samples T-tests were employed to compare preoperative and postoperative numerical values, with statistical significance defined as a p-value less than 0.05.

Results

We conducted this study on 30 male patients presenting with urethral strictures. The patients' mean age recorded was 64.87±11.96 years. The distribution of age groups shown in figure 1. Regarding the comorbidity, we observed that 63.3% of patients were hypertensive while 26.7% were diabetic. The preoperative mean uroflowmetry flow (Qmax) was 8.6±2.97 mL/sec, while the PVR preoperatively was 198.4±59.19 mL. We observed a significant improvement in Qmax in 1st month, 18.87±2.64 mL/sec, in 6th month, 17.50±2.99 mL/sec, and in 12th month, 15.37±2.17 mL/sec compared to the preoperative Qmax (P = 0.0001). Similarly, a significant improvement was observed in PVR in 1st month at 50.13±23.56 ml, in 6th month at 64.47±23.31 and 12th month at 69.17±25.53 ml compared to the preoperative PVR (P = 0.0001). Our study's mean procedure duration was 22.5±4.91 minutes, while the mean hospital stay was 1.87±0.77 days. No complications were developed postoperatively in our patients.

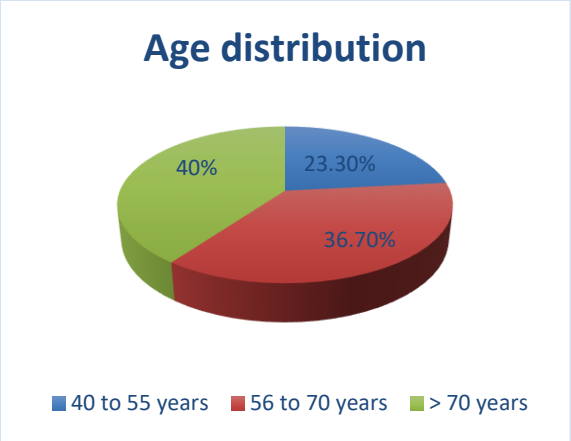

Figure 1 Age Distribution

Table 1: Comparison of preoperative and postoperative uroflowmetry flow (Qmax)

Q_{max}	Mean	N	Std. Deviation	P value
Q_{max} preoperative (mL/sec)	8.60	30	2.978	0.0001
Q_{max} (mL/sec) at 1 month	18.87	30	2.649	
Q_{max} (mL/sec) at 6 months	17.50	30	2.991	
Q_{max} (mL/sec) at 12 months	15.37	30	2.173	

Table 2: Comparison of preoperative and postoperative PVR

PVR	Mean	N	Std. Deviation	P value
PVR (mL) preoperative	198.40	30	59.195	0.0001
PVR (mL) at 1 months	50.13	30	23.569	
PVR (mL) at 6 months	64.47	30	23.316	
PVR (mL) at 12 months	69.17	30	25.538	

Discussion

Urethral stricture presents a longstanding and intricate challenge within the field of urology, with historical roots extending to the dawn of human civilization (Cooperberg et al., 2007). Many therapeutic modalities have been delineated, contingent upon factors such as the stricture's anatomical location, length, fibrous tissue density, patient selection, and the surgeon's proficiency. Among these approaches, internal urethrotomy is an initial choice for many cases due to its simplicity, cost-effectiveness, and repeatability. Nevertheless, empirical evidence has revealed

[Citation Ahmad, T., Ayaz, M.M., Bacha, M., Farhan, M., Mohammad, F., Ghazanfar, S. (2023). Outcomes of urethral dilation with amplatz dilators in the management of urethral strictures. *Biol. Clin. Sci. Res. J.*, **2023***: 427*. doi: https://doi.org/10.54112/bcsrj.v2023i1.427]

success rates from 32% to 90% and recurrence rates ranging from 38% to 75% post-intervention (Naudé and Heyns, 2005).

Further investigations have illuminated comparable outcomes for dilatation and laser urethrotomy, with reported success rates of approximately 60% and 70%, respectively (Hizli et al., 2005). However, discerning the most efficacious and cost-effective surgical method for treating male urethral strictures remains an ongoing pursuit, hampered by a paucity of comprehensive clinical data. Randomized, prospective trials comparing dilatation versus internal urethrotomy as initial therapeutic modalities for urethral strictures have provided some insight, suggesting equivalence in their outcomes. Nonetheless, it should be noted that their efficacy diminishes as stricture length increases. Consequently, these methods are recommended primarily for strictures shorter than 2cm and those measuring 2 to 4cm, with strictures exceeding 4cm, warranting consideration for primary urethroplasty. Notably, while no concrete evidence establishes the superiority of internal urethrotomy over dilatation, the perception of many urologists tends to favor the former (Steenkamp et al., 1997).

The practice of urethral dilatation traces its roots back to the 6th century BC, offering an advantage by obviating the necessity for general, spinal, or intravenous anesthesia. This approach represents a less invasive, potentially office-based procedure that demands a lower degree of surgical expertise and equipment (Matsuoka et al., 2002). Blind urethral dilators are widely employed for dilatation, albeit associated with a notable risk of complications. Guidewire-assisted urethral dilatation emerges as a safer alternative, circumventing the hazards associated with blind dilatation techniques. Although previously described with Cosbie Ross and Lister bougies, comprehensive data regarding the outcomes were lacking. Over time, amplatz renal dilators have gained acceptance for tract dilatation in percutaneous renal surgery; however, their routine use in dilating urethral strictures has not been widely adopted (Wong et al., 2012).

Our results showed that amplatz dilation significantly improved the uroflowmetry flow (Q_{max}) and Post-void residual urine (PVR) at 1, 6, and 12 months compared to the preoperative Q_{max} and PVR. Our results agree with several studies that reported significant improvement in Post-void residual urine and Q_{max} at 1, 6, and 12 months (Akkoc et al., 2016; Nomikos et al., 2017).

The outcomes yielded by the current technique surpass those achieved through blind dilatation, rendering it a promising substitute for both blind dilatation and internal urethrotomy. Notably, this approach demonstrates cost-effectiveness as a distinguishing feature of its utility. While the cold knife employed in this procedure is reusable, its efficacy becomes limited after approximately 10 to 12 operations. In contrast, percutaneous renal dilators, though disposable, offer the advantage of facilitating 8 to 10 operations with a single renal dilator set. This factor contributes significantly to the cost reduction associated with the procedures, further enhancing the economic appeal of the technique.

Conclusion

Urethral dilatation utilizing amplatz renal dilators represents a notable departure from the inherent risks associated with blind dilatation methodologies. This approach offers the advantage of not necessitating specialized materials, rendering it accessible for implementation in any urological operating room. Furthermore, it demonstrates a compelling amalgamation of safety, practicality, and cost-effectiveness. Of particular significance, this technique can be safely executed under local anesthesia, enabling it to be conducted as a day-care procedure. Given these attributes, we assume this method presents a promising alternative to internal urethrotomy and other conventional dilatation techniques in managing urethral strictures.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

References

Akkoc, A., Aydin, C., Kartalmis, M., Topaktas, R., Altin, S., and Yilmaz, Y. (2016). Use and outcomes of amplatz renal dilator for treatment of urethral strictures. *International braz j urol* **42**, 356-364.

Beland, L., Martin, C., and Han, J. S. (2022). Lower urinary tract symptoms in young men—causes and management. *Current Urology Reports* **23**, 29-37.

Campos-Juanatey, F., Osman, N. I., Greenwell, T., Martins, F. E., Riechardt, S., Waterloos, M., Barratt, R., Chan, G., Esperto, F., and Ploumidis, A. (2021). European Association of Urology guidelines on urethral stricture disease (part 2): diagnosis, perioperative management, and follow-up in males. *European Urology* **80**, 201-212.

Cooperberg, M. R., McAninch, J. W., Alsikafi, N. F., and Elliott, S. P. (2007). Urethral reconstruction for traumatic posterior urethral disruption: outcomes of a 25-year experience. *The Journal of urology* **178**, 2006-2010.

Fuehner, C., Dahlem, R., Fisch, M., and Vetterlein, M. W. (2019). Update on managing anterior urethral strictures. *Indian Journal of Urology: IJU: Journal of the Urological Society of India* **35**, 94.

Hizli, F., Berkmen, F., Güneş, M., and Yürür, H. (2005). Outcomes of internal urethrotomy after transurethral resection related urethral strictures and literature review. *Turkish J Urol* **31**, 417-22.

Karsli, O., Ustuner, M., Memik, O., and Ulukaradag, E. (2020). Comparison of urethral dilation with Amplatz Dilators and internal urethrotomy techniques for the treatment of urethral strictures. *Urology Journal* **17**, 68.

Khan, M. K., Hassan, A., Hanif, M., Alam, G., Ali, L., Naveed, M., and Ullah, I. (2022). The Efficacy and Safety of Percutaneous Cystolithotripsy for Vesical Calculus in Children: A Single-Center Study. *American Journal of Health, Medicine and Nursing Practice* **7**, 1-7.

Matsuoka, K., Inoue, M., Iida, S., Tomiyasu, K., and Noda, S. (2002). Endoscopic antegrade laser incision in the treatment of urethral stricture. *Urology* **60**, 968-972.

Naudé, A. M., and Heyns, C. F. (2005). What is the place of internal urethrotomy in the treatment of urethral stricture disease? *Nature clinical practice Urology* **2**, 538-545.

Nomikos, M., Papanikolaou, S., Athanasopoulos, G., and Papatsoris, A. (2017). The use of Amplatz renal dilators in the minimally invasive management of complex urethral strictures. *Central European Journal of Urology* **70**, 301.

Ozok, H. U., Sagnak, L., Senturk, A. B., Karakoyunlu, N., Topaloglu, H., and Ersoy, H. (2012). A comparison of metal telescopic dilators and Amplatz dilators for nephrostomy tract dilation in percutaneous nephrolithotomy. *Journal of endourology* **26**, 630-634.

Pakmanesh, H., Daneshpajooh, A., Mirzaei, M., Shahesmaeili, A., Hashemian, M., Alinejad, M., Ketabchi, A. A., Tavoosian, A., and Ebadzadeh, M. R. (2019). Amplatz versus balloon for tract dilation in ultrasonographically guided percutaneous nephrolithotomy: a randomized clinical trial. *BioMed research international* **2019**.

Peng, P.-x., Lai, S.-c., Seery, S., He, Y.-h., Zhao, H., Wang, X.-m., and Zhang, G. (2020). Balloon versus Amplatz for tract dilation in fluoroscopically guided percutaneous nephrolithotomy: a systematic review and meta-analysis. *BMJ open* **10**, e035943.

Steenkamp, J., Heyns, C., and De Kock, M. (1997). Internal urethrotomy versus dilation as treatment for male urethral strictures: a prospective, randomized comparison. *The journal of Urology* **157**, 98-101.

Wessells, H., Angermeier, K. W., Elliott, S., Gonzalez, C. M., Kodama, R., Peterson, A. C., Reston, J., Rourke, K., Stoffel, J. T., and Vanni, A. J. (2017). Male urethral stricture: American urological association guideline. *The Journal of urology* **197**, 182-190.

Wong, S. S., Aboumarzouk, O. M., Narahari, R., O'Riordan, A., and Pickard, R. (2012). Simple urethral dilatation, endoscopic urethrotomy, and urethroplasty for urethral stricture disease in adult men. *Cochrane Database of Systematic Reviews*.

[Citation Ahmad, T., Ayaz, M.M., Bacha, M., Farhan, M., Mohammad, F., Ghazanfar, S. (2023). Outcomes of urethral dilation with amplatz dilators in the management of urethral strictures. *Biol. Clin. Sci. Res. J.*, **2023***: 427*. doi: https://doi.org/10.54112/bcsrj.v2023i1.427]