Central European Journal of Urology

SHORT COMMUNICATION

FUNCTIONAL UROLOGY

Urethral management after artificial urinary sphincter explantation due to cuff erosion

Łukasz Białek[1], Mikołaj Frankiewicz[2], Jan Adamowicz[3], Felix Campos-Juanatey[4], Andrea Cocci[5], Guglielmo Mantica[6], Clemens M. Rosenbaum[7], Wesley Verla[8], Marjan Waterloos[8,9], Malte W. Vetterlein[10]

On behalf of the Trauma and Reconstructive Urology Working Party of the European Association of Urology Young Academic Urologists

[1]*Department of Urology, Centre for Postgraduate Medical Education, Warsaw, Poland*
[2]*Department of Urology, Medical University of Gdańsk, Gdańsk, Poland*
[3]*Department of Regenerative Medicine, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland*
[4]*Andrology and Reconstructive Urology Unit, Marqués de Valdecilla University Hospital, School of Medicine, Cantabria University, IDIVAL, Santander, Spain*
[5]*Department of Urology and Andrology, Careggi Hospital, University of Florence, Florence, Italy*
[6]*Department of Surgical and Diagnostic Integrated Sciences (DISC), University of Genova, Genova, Italy*
[7]*Department of Urology, Asklepios Hospital Barmbek, Hamburg, Germany*
[8]*Department of Urology, Ghent University Hospital, Ghent, Belgium*
[9]*AZ Maria Middelares, Ghent, Belgium*
[10]*Department of Urology, University Medical Centre Hamburg-Eppendorf, Hamburg, Germany*

Citation: Białek Ł, Frankiewicz M, Adamowicz J et al. Urethral management after artificial urinary sphincter explantation due to cuff erosion. Cent European J Urol. 2023; 76: 322-324.

Article history
Submitted: Jul. 13, 2023
Accepted: Sept. 12, 2023
Published online: Nov. 8, 2023

Corresponding author
Łukasz Białek
Centre for Postgraduate Medical Education
Department of Urology
231 Czerniakowska Street
01-813 Warsaw, Poland
lukaszbtm@gmail.com

Introduction The artificial urethral sphincter (AUS) is the gold standard treatment in cases of moderate-to-severe stress urinary incontinence in males. Cuff erosions are one of the most important distant complications of AUS implantation. The optimal urethral management has still not been established.
Material and methods Search terms related to 'urethral stricture', 'artificial urinary sphincter', and 'cuff erosion' were used in the PubMed database to identify relevant articles.
Results In this mini review we identified 6 original articles that assessed the urethral management after AUS explantation due to cuff erosion and included urinary diversion by transurethral and/or suprapubic catheterization, urethrorrhaphy, and *in situ* urethroplasty. We summarized the results of different management methods and their efficacy in terms of preventing urethral stricture formation. We highlight the need for better-quality evidence on this topic.
Conclusions The available data do not provide a clear answer to the question of optimal urethral management during AUS explantation. There is a great need to provide higher-quality evidence on this topic.

Key Words: urethral stricture ‹› artificial urinary sphincter ‹› cuff erosion ‹› urinary incontinence

INTRODUCTION

The artificial urethral sphincter (AUS) has become the gold standard for restoring patients' quality of life in cases of moderate-to-severe stress urinary incontinence (SUI) in males. It is a relatively simple surgical procedure with a low early complication rate and a well-proven improvement of patients' satisfaction [1]. Nevertheless, complications after AUS do occur, especially in long-term observation, with cuff erosion being one of the most serious adverse events because it involves surgical intervention, removal of the entire device, and recurrence of SUI, and it affects roughly one in 10 patients undergoing AUS implantation [2]. Determining the optimal management of AUS complications is of particular importance in light of the increasing number of patients undergoing surgical treatment and radiotherapy for prostate cancer and endoscopic treatment for bladder outlet obstruction, which may be reflected in the increase in demand for AUS. Cuff erosion is associated with urethral injury, which can cause a number

of complications, most notably urethral stricture (US), as well as diverticulum and urethrocutaneous fistula [3]. The onset of these complications can a delay or in some cases disallow the continence restoration via redo AUS implantation. Despite the seriousness of the problem and the significant number of patients it affects, the optimal urethral management, which could potentially minimize the complication rate, has still not been established.
The aim of this review is to determine the status of knowledge about urethral management during AUS explantation due to cuff erosion.

MATERIAL AND METHODS

Search terms related to 'urethral stricture', 'artificial urinary sphincter', and 'cuff erosion' were used in the PubMed database to identify relevant articles. We identified 6 original articles [3–8] that assessed the urethral management of after AUS explantation due to cuff erosion.

RESULTS

Urethral management options

According to the literature, urethral management options during AUS explantation include urinary diversion by transurethral and/or suprapubic catheterization, urethrorrhaphy, and in situ urethroplasty. Given the lack of management guidelines, the available data are mostly based on retrospective studies, in which the management method is dependent on the institutional standardized surgical protocol or is at the surgeon's discretion. The various management options available in the literature are summarized in Table 1 [3–8]. It is worth mentioning that in most of the studies the type of AUS was not specified. Transurethral and/or suprapubic drainage was evaluated in 5 studies. The percentage of patients who developed US after such treatment ranges widely from 8% to 85%. All [3–7] but one [4] of the studies involved urinary drainage by transurethral catheter only. Kuhlencord et al. noted that their study was the first to propose additional drainage through a suprapubic catheter, and it may be one of the reasons for the very high success rate of conservative treatment without surgical intervention in the urethra [4]. Urethrorrhaphy, defined as repair of the urethra without mobilization and formal anastomosis, was evaluated in 2 studies, and US affected one-third of patients. Data on the percentage of US after simultaneous urethroplasty come from 4 studies – the risk of US was 14–38%. The authors suggest that the cause of urethroplasty failure may be related to the acuity of the repair with the presence of inflammation and possible infection at the time of surgery. Moreover, delayed urethroplasty allows scar and spongiofibrosis to completely mature. Conversely, immediate reconstruction at the time of urethral erosion goes along with the risk of anastomosing damaged, ischaemic urethral segments, which will increase the odds of stricture occurrence [6].

Is the extent of erosion important?

Ortiz et al. presented the results of a study in which they showed that the most common location

Table 1. *Summary of studies reporting urethral stricture rates after AUS explantation due to cuff erosion*

Study	Patients' age	Radiotherapy	AUS type	Management method	Number of patients	Postoperative management	Urethral stricture rate	Stricture assessment method	Follow-up time
Rozanski, 2014 [7]	73	14/26 (54%)	n/a	Foley Urethroplasty	13 13	pcRUG 3 weeks post--op + UCS 2 months post-op	11/13 (85%) 5/13 (38%)	16F Foley	24 months
Chertack, 2016 [8]	77	25/75 (33%)	n/a	Foley Urethrorraphy Urethroplasty	52 8 15	pcRUG 3-6 weeks post-op	6/35 (17%) 1/3 (33%) 2/8 (25%)	n/a	21 months
Agarwal, 2017 [5]	74	23/63 (37%)	AMS 800	Foley Urethroplasty	58 4	pcRUG 6 weeks post-op	3/36 (8%) n/a	n/a	n/a
Gross, 2017 [6]	74	34/80 (43%)	n/a	Foley Urethrorraphy Urethroplasty	21 43 14	n/a	6/21 (29%) 17/43 (40%) 2/14 (14%)	UCS or RUG	n/a
Kuhlencord, 2022 [4]	71	14/24 (58%)	AMS 800	SPC + Foley	24	pcRUG 3 weeks post-op (or every 3 weeks)	2/24 (8%)	UCS or RUG	19 months
Chertack, 2022 [3]	76	26/40 (65%)	n/a	Urethroplasty	40	n/a	9/40 (23%)	n/a	n/a

AUS – artificial urethral sphincter; RUG – retrograde urethrography, pcRUG – peri-catheter urethrography, UCS – urethrocystoscopy, SPC – suprapubic catheter

of erosion is ventral, followed by lateral, and the least common is dorsal for both transcorporal and standard AUS implantation [9]. The division of erosions according to their location has not been used or examined in any study assessing the percentage of US after AUS explantation. It was also noted that the extent of erosion significantly affects the outcome of patients and the incidence of lower urinary tract complications, including US. The extent of cuff erosion affects the surgeon's choice of management [8]. In a study by Chertack et al. in which all patients underwent in situ urethroplasty during AUS explantation patients with minor AUS cuff erosion defects (circumferential erosion <33%) were less likely to experience lower urinary tract complications compared to those with major cuff erosion defects (≥33% circumferential erosion) (27% vs 68%, respectively; p = 0.02) [3]. Other data by Gross et al. confirm that US occurs significantly more frequently among patients with complete cuff erosions (58%) than among patients with partial erosions (25%, p = 0.037), even if various urethral management strategies are applied [6]. There are also few data about the results of US treatment after AUS cuff erosion. Keihani et al. presented the results of a retrospective study that summarized the treatment results of 31 men who underwent delayed urethroplasty for urethral strictures arising from AUS erosion [10]. All the patients in the follow-up had patent urethra. Moreover, AUS replacement after urethroplasty was common (93%), but there was a high urethral complication rate (36%).

CONCLUSIONS

Providing patients with knowledge about potential complications of AUS implantation is of utmost importance, particularly in patients with initially higher risk of complex surgery. As shown by McKibben et al., the risk of AUS cuff erosion is roughly 4–5 times higher in patients with prior pelvic radiation, irrespective of cuff size [11].

It is worth mentioning that all the presented data come from referral centres with extensive experience. Hence, one should be very careful before extrapolating these results of the management to less experienced centres.

As outlined above, the available data do not provide a clear answer to the question of optimal urethral management during AUS explantation. These data come from small series of patients, and the studies are mostly observational and retrospective in nature. There is a great need to provide higher-quality evidence on this topic – first, multicentre studies that summarize selected management options in large groups of patients, and ultimately a randomized study that could unequivocally determine which management is most beneficial to the patient.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

References

1. Gacci M, Sakalis VI, Karavitakis M, et al. European Association of Urology Guidelines on Male Urinary Incontinence. Eur Urol. 2022; 82: 387-398.
2. Van der Aa F, Drake MJ, Kasyan GR, Petrolekas A, Cornu JN. The artificial urinary sphincter after a quarter of a century: a critical systematic review of its use in male non-neurogenic incontinence. Eur Urol. 2013; 63: 681-689.
3. Chertack NA, Caldwell KM, Joice GA, et al. Long-term lower urinary tract sequelae following AUS cuff erosion. Neurourol Urodyn. 2022; 41: 229-236.
4. Kuhlencord K, Dahlem R, Vetterlein MW, et al. Urethral Stricture Formation Following Cuff Erosion of AMS Artificial Urinary Sphincter Devices: Implication for a Less Invasive Explantation Approach. Front Surg. 2022; 9: 829517.
5. Agarwal DK, Linder BJ, Elliott DS. Artificial urinary sphincter urethral erosions: Temporal patterns, management, and incidence of preventable erosions. Indian J Urol. 2017; 33: 26-29.
6. Gross MS, Broghammer JA, Kaufman MR, et al. Urethral Stricture Outcomes After Artificial Urinary Sphincter Cuff Erosion: Results From a Multicenter Retrospective Analysis. Urology. 2017; 104: 198-203.
7. Rozanski AT, Tausch TJ, Ramirez D, Simhan J, Scott JF, Morey AF. Immediate urethral repair during explantation prevents stricture formation after artificial urinary sphincter cuff erosion. J Urol. 2014; 192: 442-446.
8. Chertack N, Chaparala H, Angermeier KW, Montague DK, Wood HM. Foley or Fix: A Comparative Analysis of Reparative Procedures at the Time of Explantation of Artificial Urinary Sphincter for Cuff Erosion. Urology. 2016;90: 173-178.
9. Ortiz NM, Wolfe AR, Baumgarten AS, et al. Artificial Urinary Sphincter Cuff Erosion Heat Map Shows Similar Anatomical Characteristics for Transcorporal and Standard Approach. J Urol. 2020; 204: 1027-1032.
10. Keihani S, Chandrapal JC, Peterson AC, et al. Outcomes of Urethroplasty to Treat Urethral Strictures Arising From Artificial Urinary Sphincter Erosions and Rates of Subsequent Device Replacement. Urology. 2017; 107:239-245.
11. McKibben MJ, Shakir N, Fuchs JS, Scott JM, Morey AF. Erosion rates of 3.5-cm artificial urinary sphincter cuffs are similar to larger cuffs. BJU Int. 2019; 123: 335-341.