



Complicated artificial urinary sphincter insertion using the transcorporal cuff: keys to the tunical flap technique

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Abstract: Urethral sphincter insufficiency following radical prostatectomy (RP) is a common cause of non-neurogenic stress urinary incontinence (SUI). Artificial urinary sphincter (AUS) insertion remains the standard of care for fit patients with SUI refractory to non-operative interventions. The proximal urethra is a common location for uncomplicated AUS placement. However, previous failed AUS, urethroplasty, or pelvic radiotherapy (RT) may compromise urethral tissue requiring technique modifications that optimise outcomes. In these situations, transcorporal cuff (TC) placement has been well described to facilitate continence restoration in men where there is no other feasible option other than urinary diversion or permanent incontinence. In the traditional TC approach, the procedure may be complicated by haematoma due to difficulty in completely closing the corporal defects behind the urethra. This narrated video demonstrates the tunical flap (TF) modification for transcorporal AUS implantation via a perineal and penoscrotal approach in patients with prior failed AUS placements secondary to urethral erosion. The TF technique for transcorporal AUS insertion provides circumferential reinforcement with tunica albuginea from the corpora cavernosa. Here, we show how this technique provides additional urethral support for compromised urethral tissue to help prevent cuff erosion. The TF preserves the corporal volume and does not limit candidacy for future penile prosthesis implantation. In our early results, there have been no postoperative haematoma formation with this technique.

Keywords: Artificial urinary sphincter (AUS); transcorporal cuff (TC); perineal

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Introduction

Urethral sphincter insufficiency following radical prostatectomy (RP) is a common cause of non-neurogenic stress urinary incontinence (SUI) (1). Artificial urinary sphincter (AUS) insertion remains the standard of care for fit patients with SUI refractory to non-operative interventions (2,3). Unfavourable outcomes associated with

AUS implantation include erosion, mechanical malfunction, and infection which often necessitate explantation (4). Moreover, earlier revision is often necessary due to a combination of urethral atrophy and silicon fatigue (5). In a retrospective study of 158 patients who underwent AUS insertion, a significant portion of patients, 8% and 6% respectively, faced complications such as hematoma and urinary retention within the first 6–8 weeks (6). The

proximal urethra is a common location for uncomplicated AUS placement, however, previous failed AUS insertion, urethroplasty or pelvic radiotherapy (RT) may compromise urethral tissue requiring technique modifications that optimise outcomes (4,7,8). In these situations, transcorporal cuff (TC) placement has been well described to facilitate continence restoration in men where there is no other feasible option other than urinary diversion or permanent incontinence (9). In the traditional TC approach, the procedure may be complicated by haematoma due to difficulty in completely closing the corporal defects behind the urethra (*Figure 1*). Although large-scale comprehensive studies specifically assessing hematoma formation rates post-AUS insertion are lacking, various reports suggest an incidence rate of approximately 2–3% (10,11).

The indications for the TC modification are failed AUS placements secondary to urethral erosion particularly in the setting of a compromised urethra where the proximal urethra is no longer available for use. Common causes of a compromised urethra include urethroplasty or pelvic RT which require procedural alterations.

Multiple studies have assessed various technique modifications to improve short- and long-term outcomes. In a retrospective review assessing TC and standard AUS in patients with a fragile urethra, TC cuff placement was associated with lower revision and erosion rates as compared to the standard AUS insertion (12). Interestingly, there was no significant difference in functional outcomes such as continence patient satisfaction or the 90-day complication rate (12).

The gullwing modification utilizes bilateral raised bracket-shaped flaps on the ventral aspect of the tunica albuginea which are closed over the ventral urethra (9). Additionally, a similarly sized allograft segment is used to cover the tunical defect of the ventral corpora cavernosa.

Functional outcomes secondary to closure of the tunica albuginea in the TC technique were also assessed in 39 patients. The study showed that pad usage was 1 per day while only one patient suffered from a postoperative hematoma while postoperative erectile rigidity was maintained (11).

In this narrated video, the tunical flap (TF) modification is demonstrated for the TC technique for AUS implantation. This is performed via a perineal and penoscrotal approach (*Figure 2*). The patients had previously failed AUS placements secondary to urethral erosion.

In reference to the penoscrotal approach, it is acknowledged that this is not a conventional method. Nonetheless, there are instances where the perineal region and anatomy present significant challenges, such as a history of multiple prior perineal continence procedures, complications from previous erosions, and the presence of perineal urinary fistulas. In these circumstances, opting for surgery through fresh tissue using a penoscrotal approach may prove to be a beneficial alternative.

The two patients featured in *Video 1* underwent a RP 15–20 years earlier. Following the development of biochemical recurrence, both also underwent salvage RT. The patients suffered from SUI leading to AUS implantation 10–12 years ago. Initially achieving complete continence, they experienced a decline over the past 6 months, marked by moderate to severe SUI during most daily activities and a significant reduction in quality of life, necessitating the use of 4–5 heavy pads daily. We present this article in accordance with the SUPER reporting checklist (available at <https://tau.amegroups.com/article/view/10.21037/tau-23-641/rc>).

Preoperative preparations and requirements

The procedures were performed at Cabrini Hospital, Melbourne, Australia by Urologist Professor D.M. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Informed consent was obtained from all patients for the use of information, images and accompanying video in this report. A copy of the written consent is available for review by the editorial office of this journal.

The procedure begins with the patient positioned in lithotomy and the AUS components prepared along with a Scott ring surgical retractor. The perineum is wet shaved followed by a 10-minute thorough chlorhexidine

Highlight box

Surgical highlights

- The tunical flap technique reinforces the urethra circumferentially using tunica albuginea from the corpora cavernosa.

What is conventional and what is novel/modified?

- This method provides extra urethral support, preventing cuff erosion, and preserves corporal volume.

What is the implication, and what should change now?

- Reliable haemostatic closure of the tunica albuginea after utilising the adjacent corporal tissue to place a transcorporal artificial urinary sphincter cuff.

wash of the perineum and suprapubic area followed by a chlorhexidine and alcohol sterile scrub. The drapes are placed *in situ* with staples to exclude the anus. A 12-Fr indwelling catheter (IDC) is placed per-urethrally.

Step-by-step description (Figures 2,3)

The perineal approach begins with a midline perineal

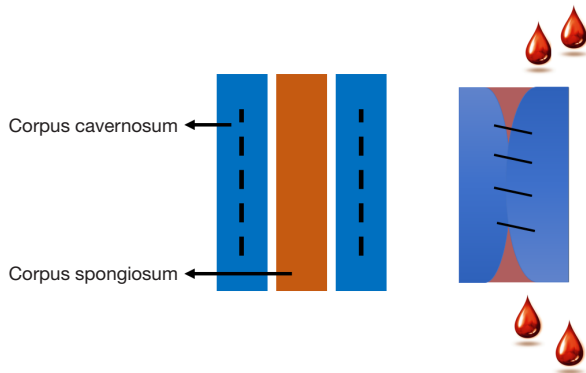


Figure 1 Haematoma formation post-AUS insertion using the traditional TC cuff approach. The TC method carries a potential for haematoma development, primarily due to the difficulty in achieving complete closure of the corporal defects located posterior to the urethra. AUS, artificial urinary sphincter; TC, transcorporal cuff.

incision and dissection of the subcutaneous tissues through Colle's fascia and careful traction to create a space at the base of the corpora. A self-retaining retractor is placed, the bulbocavernosus muscle is incised, and the ventral surface of the bulbar urethra is exposed with a combination of sharp and blunt dissection. After careful dissection of the subcutaneous fascia, the existing AUS is located and subsequently removed along with all its components. In our technique, the pump is removed via the perineal incision. Identification of the appropriate site for cuff placement which includes selecting the healthiest portion of urethra separate from the previous cuff site. The corporal bodies are exposed on either side and stay sutures are placed. Two cm bilateral corporotomies are carried out between the two stay sutures on either side. On one side, horizontal incisions are made at the superior and inferior extent of the corporotomy to mobilise and raise a rectangular TF. Dissection of the area underneath the flap is performed to help mobilise it. Furthermore, dissection sharply through the midline septum between the corporal bodies; a transcorporal space is created. The raised TF is passed behind the urethra and a running 2-0 vicryl suture used to close the corpora. The rectangular shape of the flap ensures that a haemostatic closure can be achieved. This is best carried out with the measuring tape secured around the mobilized urethra and corporal tissue to prevent compromising the space for the cuff.

In the penoscrotal approach, a horizontal incision is

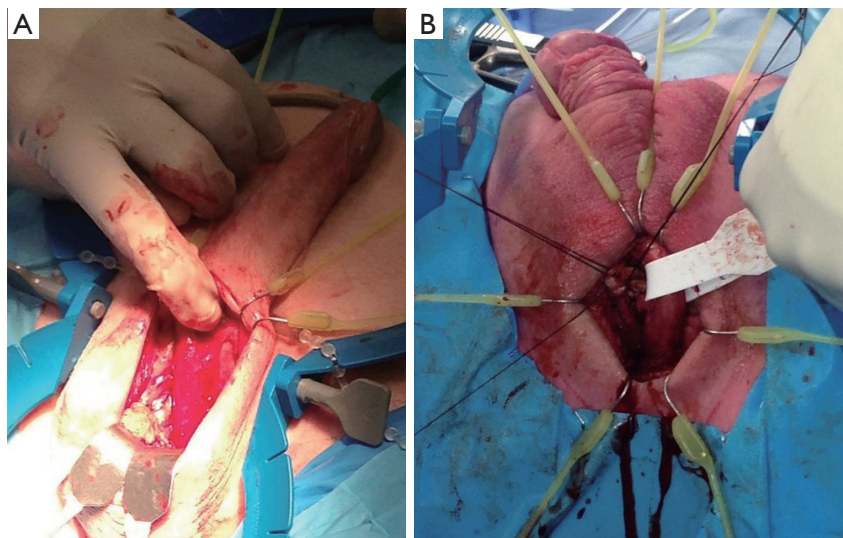
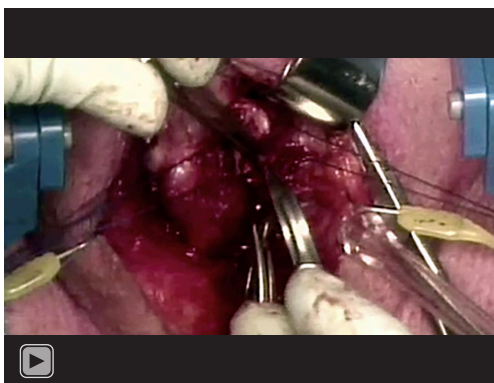


Figure 2 Surgical techniques for AUS insertion using the TF modification of the TC technique. (A) Penoscrotal approach. (B) Perineal approach. AUS, artificial urinary sphincter; TF, tunical flap; TC, transcorporal cuff.

made at the base of the penis. A space is created behind the urethra passing through the dorsal wall of the corpora cavernosa to minimise the risk of erosion. A corporal flap for advancement across the defect is created in the remaining tunica albuginea to permit tight closure.

After the AUS cuff has been placed around the



Video 1 Narrated video of the TF modification for the TC technique for AUS implantation performed via a perineal and penoscrotal approaches. TF, tunical flap; TC, transcorporal cuff; AUS, artificial urinary sphincter.

reinforced urethra, the additional AUS components are inserted in the standard fashion. A 5 cm midline transverse suprapubic incision is made to facilitate balloon placement. This is performed to deliberately avoid the inguinal rings. Cystoscopic device cycling is performed to ensure appropriate device function. After haemostasis is achieved, skin incisions are closed in multiple layers using absorbable suture material. The total procedure time is approximately 2 hours.

Postoperative considerations and tasks

A compression dressing is applied to minimise scrotal and perineal haematoma formation and remains *in situ* for 24 hours. The IDC is left *in situ* for overnight urine drainage.

Tips and pearls

The TF technique for TC AUS implantation is a suitable alternative method for patients with compromised urethral tissue. Moreover, the rectangular TF shape allows for haemostatic closure which is best achieved with measuring tape around the mobilized urethra.

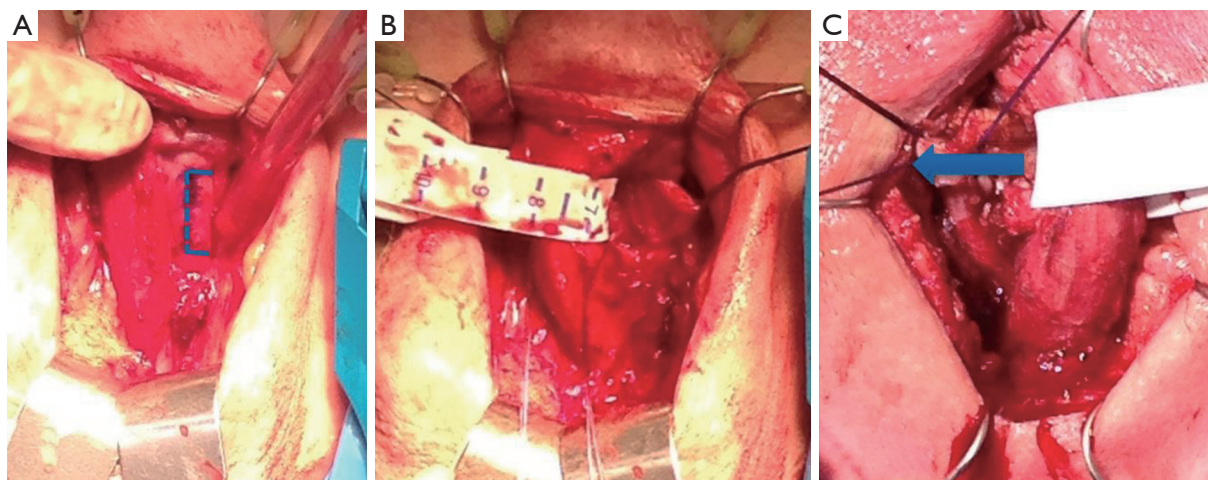


Figure 3 The TF technique for AUS insertion. (A) Following the mobilization of the urethra, bilateral corporotomies of 2 cm are executed. Subsequently, on one side, horizontal incisions are made at both the superior and inferior extents of the corporotomy which is used to mobilise and elevate a rectangular tunica flap. (B) Dissection beneath the flap facilitates its mobilization. Additionally, precise dissection through the midline septum between the corporal bodies establishes a transcorporal space. (C) The elevated TF is maneuvered posterior to the urethra, and a continuous 2-0 vicryl suture is used for corporal closure. The flap's rectangular configuration facilitates a haemostatic seal. Optimal closure is achieved by securing a measuring tape around the mobilized urethra and corporal tissue, ensuring the cuff space is not compromised. Blue arrow indicates direction of movement of the TF across the transcorporal space. AUS, artificial urinary sphincter; TF, tunical flap.

Discussion

Urethral sphincter insufficiency after RP commonly causes SUI. Inserting an AUS is the standard treatment for patients unresponsive to other methods with the TC placement being an alternative option for men with compromised urethral tissue (1). This manuscript and associated video (*Video 1*) provide a step-by-step demonstration of the TF modification of the TC technique through a perineal and penoscrotal approach. The TF modification provides circumferential urethral reinforcement with tunica albuginea from the corpora cavernosa. In cases of prior erosion, it is essential to reposition the cuff either proximally or distally as well as the incorporation of peri-urethral corporal tissue. This provides additional support over prior techniques to further prevent subsequent haematoma formation and cuff erosion. Both patients are pad-free. In our early findings, we have not observed any postoperative hematoma associated with this technique. Moreover, this technique preserves the corporal volume necessary for ease of subsequent penile prosthesis implantation.

Limitations of the study include lack of long-term follow-up data, including efficacy, durability, and long-term complications. Additionally, the findings are yet to be generalized and externally validated in diverse clinical settings. Recognizing these limitations, we are dedicated to further research and validation in future studies.

Conclusions

The TF technique for the transcorporal AUS insertion provides a method for reliable haemostatic closure of the tunica albuginea after utilising the adjacent corporal tissue to place a transcorporal AUS cuff. In this series of videos, we demonstrate this simple technique to provide additional urethral support in men with compromised urethral tissue who otherwise may not be able to undergo AUS insertion.

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Footnote

Reporting Checklist: The authors have completed the SUPER

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://tau.amegroups.com/article/view/10.21037/tau-23-641/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Informed consent was obtained from all patients for the use of information, images and accompanying video in this report. A copy of the written consent is available for review by the editorial office of this journal.

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