SCIENCE SET
OPEN ACCESS PUBLISHERS

Research Article

Science Set Journal of Medical and Clinical Case Studies

Postauricular Skin Grafts in the Treatment of Bulbar Urethral Stricture Disease

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Submitted: 22 January 2025 **Accepted:** 27 January 2025 **Published:** 07 February 2025

Citation: *Chandra, S., Chandra, S., Nerli R. B., Ghagane, S. C., Dixit, N. S. (2025). Postauricular Skin Grafts in the Treatment of Bulbar Urethral Stricture Disease. Sci Set J of Med Cli Case Stu, 4(1), 01-05.*

Abstract

Introduction: *Chewing of tobacco or consumption of betel nut and pan masala results in several alterations in the oral cavity, making harvesting of healthy buccal mucosa next to impossible. In such patients with a long bulbar urethral stricture, the selection of the substitute material for urethral reconstruction is a challenge. The objective of our study was to assess the feasibility and efficacy of post-auricular skin in the repair of such strictures and also to assess the outcome of such repairs 12 months later.*

Materials and Methods: *All male patients with long segment bulbar urethral strictures were prospectively included in the study. Patients who were either circumcised or had unhealthy genital skin and whose oral mucosa was significantly damaged by the incessant use of tobacco and other substances were offered an option to undergo urethroplasty using post-auricular skin.*

Results: *During the study period a total of 22 patients with long segment bulbar urethral strictures underwent substitution urethroplasty using post-auricular skin grafts. The mean length of the stricturous segment was 5.84+1.29 cms. The mean operative time was 135.23+12,58 mins and the mean blood loss was 120 cc. Following catheter removal all patients voided with a good urinary stream (mean Q max was 22.41±2.63 ml/sec).*

Conclusion: *Post-auricular skin is an acceptable alternative material for urethral reconstruction in patients having a long-segment bulbar urethral stricture with neither a healthy buccal mucosa or genital skin for harvesting a graft.*

Keywords: Bulbar Urethral Stricture, Buccal Mucosa, Post-auricular Skin Grafts

Introduction

Urethral stricture is a frequent source of discomfort and lower urinary tract disorder in any adult male suffering from it [1, 2]. Perineal trauma, previous instrumentation or urethral catheterization, lichen sclerosis, and sexually transmitted diseases are the common causes of strictures [1, 2]. Surgery remains the treatment of choice and surgical management of stricture urethra is continuously evolving. The best method of reconstructing the urethra is not well defined as of now and the advantage of one method over another has also not been established [3]. Long segment bulbar urethral strictures that cannot be subjected to excision and end-to-end anastomosis, are best suited for substitu-

tion urethroplasty technique, in which the stricture is opened all along its length and a patch of appropriate tissue is inserted to re-establish the normal urethral caliber [3].

At present the most commonly used substitute material in the reconstruction of adult anterior urethra is oral mucosal graft, and the success of these grafts has been partly due to the tissue's biological properties [4, 5]. Studies have shown that the oral mucosa is well suited to the urethra and at times cannot be distinguished from the adjacent tissues [5]. Several changes have been noted within the oral cavity, including oral submucosal fibrosis in people habituated to chewing tobacco, betel nut or pan masala, which is common in India. Betel nuts contain alkaloids and tannin, which are accountable for fibrosis [6]. A positive association between betel nut and the onset of oral submucosal fibrosis was also confirmed by Shear et al and Caniff et al [7, 8]. In such individuals, it is challenging to decide on the optimal alternative material for urethral reconstruction. Biswas et al studied the role of post-auricular skin as an alternate material with optimal qualities for anterior urethroplasty in 35 subjects, to check their feasibility, safety, and efficacy [9]. This was used when both the oral mucosa and the genital skin was not possible. They concluded that the post-auricular skin was an acceptable alternative material which can be used for urethral reconstruction. Mundy first described the use of post-auricular skin grafts in 1992 for anterior urethral reconstruction [10]. In 1998, Venn and Mundy suggested the use of non-genital post-auricular skin for anterior urethral strictures caused by lichen sclerosis. The objective of our study was to evaluate the feasibility and efficacy of post-auricular skin in the management of bulbar urethral strictures and also to assess the outcome at 12 months following the repair.

Materials & Methods

We prospectively included all male patients with long bulbar urethral strictures for substitution urethroplasty. The study was conducted following permission obtained from the University/ institutional ethical committee. Preoperatively all patients underwent evaluation that included clinical history, physical examination, American Urological Association symptom score assessment, uroflowmetry, and retrograde and micturating cystourethrography. Patients who were either circumcised or had unhealthy genital skin and whose oral mucosa was considerably damaged by the continuous use of tobacco and other substances were offered an option to undergo urethroplasty using post-auricular skin.

Surgical Technique

Under general anesthesia, patient was put in lithotomy position. An inverted U-shaped perineal incision was made. Bulbo-spongiosus muscle was separated in the midline and the central tendon of the perineum was dissected in patients having proximal bulbar urethral stricture. Separation of the bulbar part of the urethra from the bulbo-spongiosum muscle was done and it was also dissected away from the corpora cavernosa. The bulbar urethra was exposed and mobilized away from the corporal bodies all through its length. In patients wherein a dorsal inlay of the graft was planned, the urethra was then rotated by 180° and a dorsal midline incision was made at the stricturous site between stay sutures. The stricturous area was refashioned along its dorsal aspect well into healthy urethra at either end. The post-auricular skin graft was quilted onto the tunica albuginea at the opening made in the urethra. The urethra was then sutured to the margins of the graft with either interrupted or continuous absorbable sutures. However, if a ventral onlay was planned, then the urethra was similarly incised ventrally at the stricturous site, the urethral margins were freshened and the skin graft was sutured to the freshened margins of the urethra (Figure 1 a, b, c & d). A Foley 14-18 Fr silicone catheter was inserted and kept in place for 3-6 weeks.

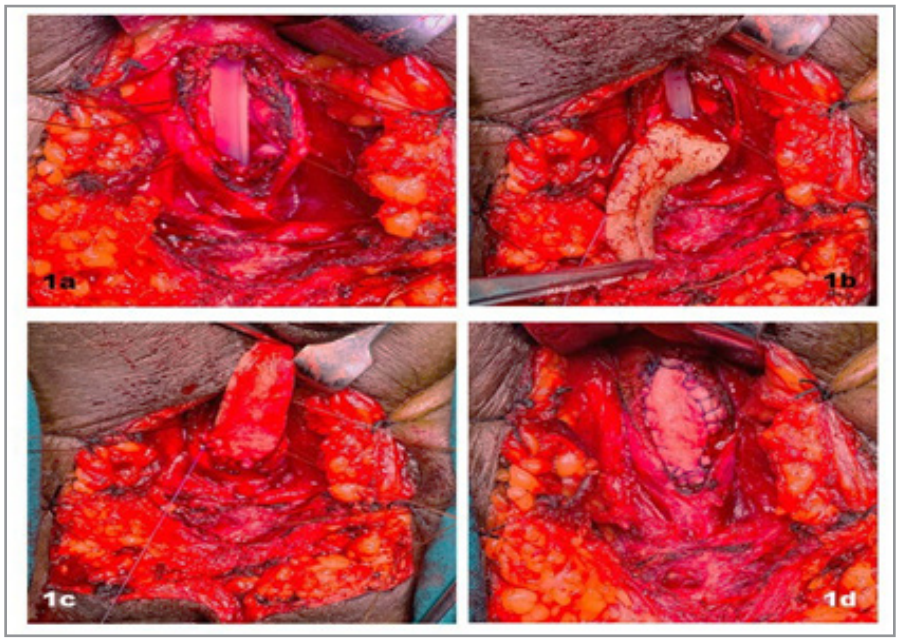

Figure 1: **a.** The stratum area of urethra opened ventrally, **b.** Skin graft placed ventrally, **c.** Clausum of the ventral urethra, **d.** Completed urethroplasty

Harvesting of the Postauricular Graft

The skin graft was fashioned from the lower part of the mastoid region as the skin is thinner in the upper part and very difficult to harvest. The lower limit of the skin graft should not cross beyond the lower end of tragus. A maximum length of 7-8 cm of skin could be harvested from one side, and for longer strictures repair, graft harvesting from both sides provided 14-16 cm of graft length (Figure 2 a, b, c).

Figure 2: a. Post auricular skin marking, **b.** Skin graft , **c.** Closure of the donor area

Post-operatively the patients were followed up with catheter removal 3-6 weeks later (Figure 3 a & b). An uroflowmetry was carried out on removal of catheter. Uroflowmetry, urine routine examination and culture sensitivity were repeated at 3-, 6- and 12-months following catheter removal. Failure was defined as any postoperative requirement of instrumentation, including dilation. All patients were routinely evaluated for sexual function.

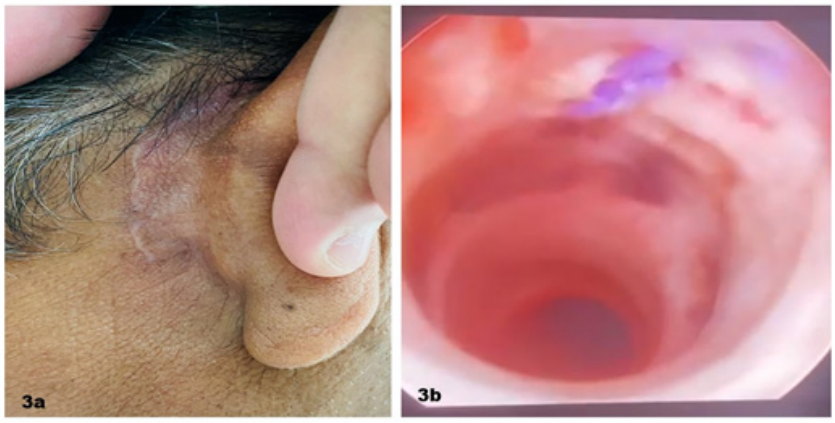

Figure 3: a. Donor site 12 weeks later**, b.** Urethroscopic view of the graft site.

Results

The study duration was from Jan 2014 till Dec 2023. Twenty-two patients with stricture of the bulbar part of the urethra undergoing substitution urethroplasty with post-auricular skin grafts were included in the study. The average age was 33.14 ± 7.5 years. The etiology of the stricture disease was iatrogenic in 5 (22.72%), traumatic in 14 (63.63%) and idiopathic in the remaining 3 (13.63%). The average length of the stricture was 5.84 ± 1.29 cm. Eight (36.36%) patients who were in retention, had a suprapubic catheter [11].

All these 22 patients had a habit of chewing tobacco with or without betel nuts and lime. The mean preoperative maximum flow rate (Q max) in the patients who could void was 3.54 ± 1.32 ml/sec. The mean operative time was 135.23 ± 12.58 mins. The mean blood loss was 120 ml and none of the patients required blood transfusions. The perineal dressing was removed on the 3rd post-operative day, the drain removed after the drain collection had stopped and Sitz bath was initiated twice daily for two weeks. All patients received broad spectrum antibiotics peri-operatively. Postoperatively the per-urethral catheter was removed after 3 weeks in 14 (63.63%) patients and after 6 weeks in the remaining 8 (36.36%). All patients voided with a good urinary stream (mean Q-max was 22.41 ± 2.63 ml/sec). Post-operative period was uneventful in all. The post-auricular graft donor site healed well and none of the patients developed perineal wound complications. Uroflowmetry repeated after 12 months showed good flow with a mean Q-max of 20.82 ± 2.26 ml/sec (Figure 4 a, b).

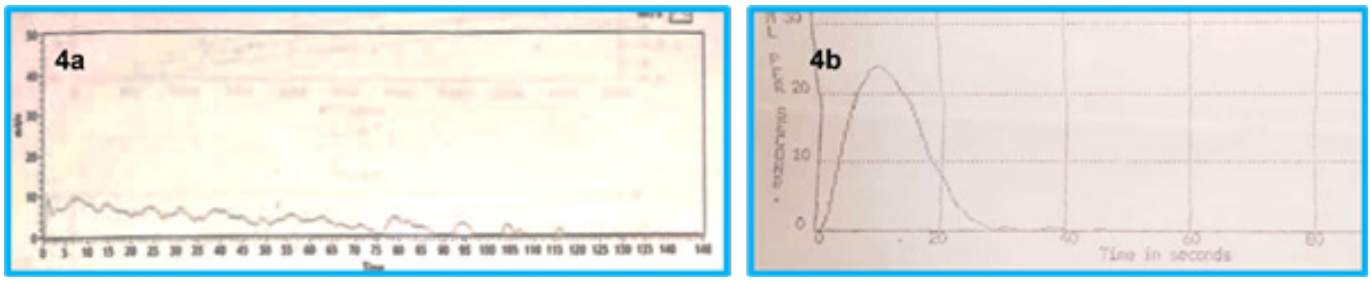

Figure 4: a. Pre-operative Uroflowmetry, **b.** Post-operative Uroflowmetry

Discussion

Humby introduced substitution urethroplasty in the 1940s, using full- thickness skin grafts for urethral reconstruction, hypospadias, and stricture diseases. He also described the first instance of buccal mucosal graft urethroplasty [12]. Grafts were commonly used for urethral reconstruction, including for hypospadias and strictures. They are relatively quick and easy to harvest and position, but they are less reliable — in theory — since they must be re-vascularized. Each phase of graft "take" lasts approximately 2 days. Imbibition occurs during the first phase, in which the plasma absorbed by the graft bed provides nutrients to the graft. Inosculation occurs when the microvasculature of the graft bed is linked up to the microvasculature exposed on the underside of the graft. Inosculation begins during the imbibition phase but these two phases are distinct in terms of graft viability [13]. The graft will either take or slough off by the 5th day post-grafting. It must be closely approximated to the recipient area and free of infection for it to be accepted. The steps involved in successfully reconstructing with a graft are: preparation of the recipient site, harvesting followed by placement of the graft at the recipient site. Graft harvesting and preparation of the recipient site can be done simultaneously.

There's a possibility of graft contraction, therefore a graft should be significantly larger than the recipient site [14]. As a full thickness free graft, post-auricular skin is as satisfactory as oral mucosa. This is because a full-thickness graft of skin taken from behind the ear is thin and has a dense subdermal plexus; as a result, graft take and functional results are much better than with other skin grafting methods [13-15]. In their study, Biswas et al retrospectively reviewed the charts of 35 patients who underwent urethroplasty for anterior urethral strictures using post-auricular skin grafts. Of 35 patients, 31(89%) had successful results and 4(11%) did not. In 5 patients, wound infections developed, which were treated according to culture sensitivity report [9]. No diverticulum, fistula, sacculation or protrusion of the graft were observed.

The results of our study demonstrates that it is possible to harvest post-auricular skin graft of adequate length for substitution bulbar urethroplasty. Both dorsal and ventral onlay technique can be used to create a wide diameter urethra. The graft contracts, hence a wider graft needs to be harvested. Post-operative uroflowmetry shows good urine flow after catheter removal and within the first year after surgery. Complications are rare if the correct steps are taken. Use of post-auricular skin grafts must not be abandoned as these grafts can be an alternative to buccal mucosal grafts in appropriate situations.

Conclusion

In patients having submucosal fibrosis affecting the buccal mucosa, and in whom healthy genital skin is not available, post-auricular skin presents an alternative tissue graft for urethral reconstruction. It can also be used with good outcome in salvage urethroplasties for previously failed long-segment urethral stricture, with limited donor-site morbidity.

Conflict of Interest

The authors declare a conflict of interest as none. Compliance with ethical standards

Funding

No Financial support taken from any funding agency

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