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Trauma and reconstruction

Urethro-cutaneous fistula repair using a combination of buccal mucosal graft and pedicled gracilis muscular flap for high risk patients

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Introduction

Urethro-cutaneous fistulae pose a significant challenge in reconstructive urological surgery with high rates of complication. In the adult population the aetiology is varied and may be concomitant with penile trauma, or iatrogenic injury. Initial management is aimed at treating sepsis, followed by a period of optimisation and operative planning. The surgery itself may be single or multi-staged and involves excision of the fistulous tract and closure of the defect, which often requires a tissue graft. Chronic health conditions like diabetes, vascular disease, obesity and smoking are risk factors for graft failure as they impair the capacity of the micro-vasculature to oxygenate and provide nutrition to the reconstructive site. Previous treatments such as surgery and radiotherapy can further exacerbate the issue due to fibrosis of surrounding tissues.[1] Patients with one or more of these risk factors are deemed high-risk and modified surgical approaches should be considered to optimise conditions for successful success. Buccal mucosa grafts have become the preferred donor site for use in substitution urethroplasty, while muscular flaps can be used to provide extra tissue bulk and blood flow to the reconstructive site. Herein, we describe our surgical technique for complex urethro-cutaneous fistula repair using a combination of buccal graft and gracilis flap, based around a high-risk patient successfully managed with this approach.

Case presentation

A 39-year-old man with type 2 diabetes who smoked and weighed 133 kg presented with urinary incontinence and leakage of urine via the perineum due to urethra-cutaneous fistula. The fistula was created 6 months previously by an iatrogenic injury at the time of incision and drainage of a scrotal abscess. The patient had limited mobility due to his weight and had excessive skin in the lower abdomen and limbs. The fistula and adjacent soft tissues failed to heal following a three-month trial of urethral catheterisation and conservative management, so a combined urological and plastic surgical operation was planned.

An initial cysto-urethroscopy is performed to visualise the extent of the defect and identify concurrent urethral stricture or bladder stones that may have formed around a catheter. The patient is then cleaned, draped and positioned in a lithotomy position. The fistulous opening is identified, probed and dissected out via a vertical midline perineal incision (Fig. 1A and B). The fistulous tract along with any associated fibrous tissue is excised, leaving a defect in the urethra.

An elliptical buccal mucosa graft is harvested from the inner cheek and the defect closed with a continuous absorbable suture. Care is taken to avoid inadvertent damage to the parotid duct (Stenson's duct), located immediately opposite the second upper molar tooth (Fig. 1C and D). The buccal graft is de-fatted and soaked in warmed saline solution, then sutured into the ventral aspect of the bulbar urethra using 5/0 vicryl interrupted sutures.

The gracilis is identified as a long slender muscle on the medial aspect of the thigh. An incision is made on the medial thigh and dissection is made down through the subcutaneous tissues and deep fascia to expose the muscle. The main vascular pedicle is identified and preserved. The single nerve innervation (a branch of the obturator nerve) is identified and cut close to the muscle to prevent ongoing contraction. The muscle is then freed from all other attachments, by dividing the

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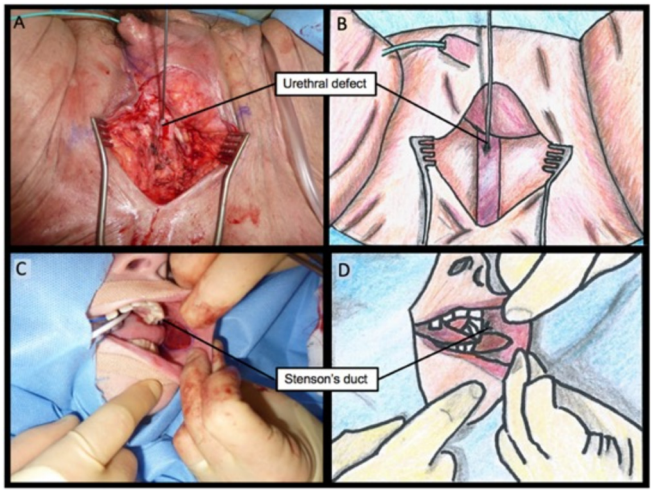

Figure 1. (A, B). Midline perineal incision with urethro-cutaneous fistula tract exposed probed down to level of the bulbar urethra. **(C, D)** An ellipse shaped buccal mucosal graft has been raised from the inner left cheek, and the defect closed primarily with a continuous absorbable suture. Care is taken to avoid injury to Stenson's duct.

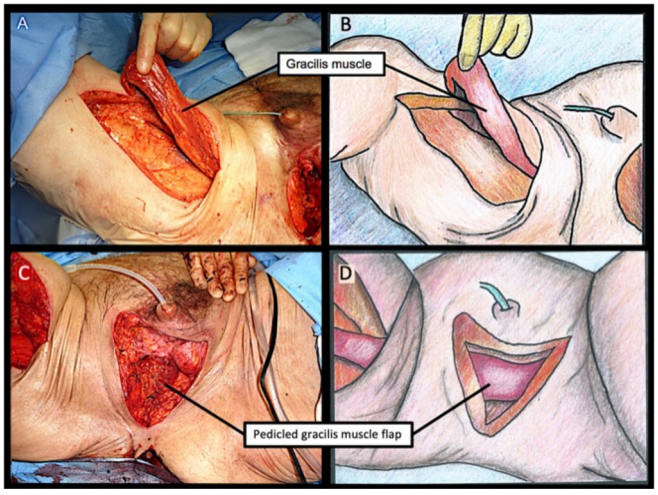

Fig. 2. (A, B) A pedicled gracilis muscle flap has been raised from the right leg. The distal part has been detached from its origin and its nerve supply cut to avoid further contractions of the muscle. **(C, D)** The pedicled gracilis flap has been tunnelled under the skin in the right groin and laid as an on-lay over the initial buccal mucosal graft urethral repair.

secondary pedicle and any other perforating vessels. The muscle is divided proximal to its tendinous attachment at the medial knee and tunnelled under the skin of the inner thigh (Fig. 2A and B).

The muscle flap is then sutured as an on-layover the urethral defect to provide support (Fig. 2C and D). This is followed by layered closure of the skin and subcutaneous tissues. Suction drains are left in the thigh and perineal wounds and a urethral catheter left in place for 1–2 weeks.

The patient was followed up at 6 months, 1 year and 2 years with clinical evaluation and urinary flow studies. In this time period he recovered well, had a satisfactory urinary flow rate and suffered no complication.

Discussion

Buccal mucosal grafts have replaced full thickness skin grafts as the preferred donor tissue when performing substitution urethroplasty for urethral strictures, but series have shown that when used in the context of urethro-cutaneous fistula repair they have a high rate of complications such as strictures and re-fistulation.[2,3] Our patient was at particularly high risk, as his obesity was so severe it had rendered him immobile and the reconstructed urethra would need to withstand prolonged periods of pressure through his perineum.

Muscular and musculo-cutaneous flaps provide extra tissue bulk and vascularity to the healing site, improving blood supply and increasing the chance of successful reconstruction. Pedicled gracilis flaps in particular are often cited for their lack of donor site morbidity, as the remaining adductor muscles compensate effectively for functional loss.[4] In one of the larger series reporting on reconstructive surgery using gracilis flaps, Vanni et al.[5] reported on 74 patients with recto-urethral fistulae. Successful outcomes were reported for 100% of those with non-irradiated fistulas and 84% of those with irradiated fistulas. There are no large series specifically reporting on the outcomes for urethro-cutaneous fistula repair in high risk individuals like this, however, positive data continue to emerge for both the buccal mucosal graft and pedicled gracilis flap, highlighting the potential utility for combination of the two techniques.

Conclusion

This paper describes the technique for complex urethro-cutaneous fistula repair for high risk individuals using a combination of buccal mucosal graft and pedicled gracilis muscular flap. The patient described had numerous pre-disposing factors for surgical failure yet had definitive success from a single operation. Patients with complex urethro-cutaneous fistulae should be risk assessed prior to surgery and those deemed at high risk considered for this technique, which may represent the current gold standard of care for complex cases.

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