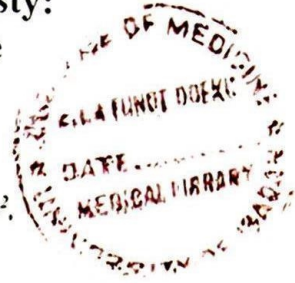


The transverse penile pedicled flap urethroplasty: description of a simplified technique for the dissection of the Fascio-cutaneous flap

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Abstract.

Introduction/Objective: Urethroplasty is often required for long urethral strictures or urethral strictures that have recurred after repeated urethral dilatations or urethrotomy. The transvers penile skin pedicled flap is very versatile for the reconstruction of long urethral stricture. However the meticulous sharp dissection required to develop it takes a long time to do and may be associated with button hole injuries to the vascular pedicle and the penile skin. We describe a simplified technique of raising the flap which does not require sharp dissection and is very quick to accomplish.

Method: Technique involves using a circumcising distal penile shaft skin incision to de-glove the penis by blunt dissection. The skin substitute, adequate to give appropriate urethra calibre is similarly dissected bluntly along with its vascular pedicle from the proximal penile skin. The techniques used to facilitate successful blunt dissection are described.

Result: In 9 adults with long, multiple urethral strictures, the average time to develop the flap was 15 minutes and complication have been limited to temporary urethro-cutaneous fistula at the ventral part of the circular skin closure. These fistulae closed on conservative treatment. No patient suffered button-hole injuries to either the vascular pedicle or the penile skin.

Conclusions: This modification to the standard sharp dissection is very quick to accomplish. It also avoids the creation of button-hole injuries to either the vascular pedicle or the penile skin. It should make the use of this versatile flap more attractive in the reconstruction of long urethral strictures in those who may wish to use this option for reconstruction of long urethral strictures.

Keywords: Urethral stricture, urethroplasty, penile pedicled flap, blunt dissection technique, button-holes.

Résumé

Background/Objectif: L'urétroplastie est souvent nécessaire pour les longs rétrécissements de l'urètre ou rétrécissements de l'urètre qui ont récidivé après dilatations urétrales répétées ou urétrostomie. Le revers pénien pédiculé de la peau Transverse est très polyvalent pour la reconstruction de longue sténose urétrale. Toutefois, la dissection affilée minutieuse nécessaire pour la développer prend beaucoup de temps pour faire et peut être associée à des blessures boutonnières au pédicule vasculaire et à la peau pénienne. Nous décrivons une technique simplifiée de soulever le revers qui ne nécessite pas de dissection et est très rapide à accomplir.

Méthode: La technique consiste à faire une incision de la peau pénienne à l'aide d'une flèche distale de circoncision pour dégainer le pénis par dissection obtus. Le substitut de la peau, adéquat pour donner le calibre approprié de l'urètre est similairement disséqué de manière obtuse tout le long avec son pédicule vasculaire de la peau pénienne proximale. Les techniques utilisées pour faciliter le succès de la dissection obtuse sont décrites.

Résultat: Dans 9 adultes avec longues, multiples rétrécissements de l'urètre, le temps moyen de développer le revers était de 15 minutes et les complications ont été limitées à la fistule de l'urètre-cutanée temporaire à la partie ventrale de la fermeture circulaire de la peau. Ces fistules se sont refermées sous traitement conservatrice. Aucun patient n'a subi de blessures boutonnière soit du pédicule vasculaire ou de la peau pénienne.

Conclusions: Cette modification à la dissection affilée standard est très rapide à accomplir. Elle permet également d'éviter la création de blessures boutonnière soit du pédicule vasculaire ou de la peau du pénis. Elle devrait rendre l'utilisation de ce revers polyvalent plus attrayant dans la reconstruction de longs rétrécissements de l'urètre chez ceux qui souhaiteront utiliser cette option pour la reconstruction de longs rétrécissements de l'urètre.

Mots-clés: sténose urétrale, urétroplastie, revers pédiculé pénien, technique de dissection obtuse, boutonnières.

Introduction

Urethroplasty is often necessary to treat long urethral strictures or short strictures that do not respond to

urethral dilatation or recur after urethrotomy. In our environment, urethral strictures can be quite long, having been caused by poorly treated infection, catheter induced injury, or poorly performed urethral dilatation [1,2]. Multiple attempts at different levels of expertise to resolve the difficulty of voiding often compound the problem, resulting in strictures, which are often long and complicated, as shown in fig. 1. We prefer to treat this category of strictures by using circular fascio-cutaneous penile flap [3]. Also, most experts agree that a flap should be used for urethroplasty when local conditions are not favourable for grafting, such as when the stricture is unusually long, when a flap of local genital skin, pedicled on the dartos layer of the penis is preferred [4,5].



Fig. 1: Retrograde urethrogram showing a very long urethral stricture induced by prolonged urethral catheterisation.

The penile skin as an island pedicled flap is very versatile for the construction of the urethra, having inherent characteristics such as the following: it is from an area of natural skin redundancy, the skin at the donor site is elastic and redundant enough to be closed, the skin island is thin and hairless, the island of skin can often be made long enough to bridge significant length of stricture, and the vascular pedicle to the skin island is reliable, long and robust [6]. The standard technique used to raise the penile cutaneous island flap for urethroplasty has been previously described [7,8]. However, this standard technique requires sharp dissection towards the base of the penis, the process is usually very prolonged, in order to avoid or limit damage to the vascular pedicle and the penile skin [7]. Experts of reconstructive surgery in this area also agree that,

though the vascular pedicle of this flap has a distinct advantage in the blood supply to the skin flap, but the extensive sharp dissection involved is very difficult and limits the popularity of its use [9,10]. The aim of this paper is to describe a simplified technique of raising the transverse penile pedicled flap by blunt dissection, which is very quick to accomplish and avoids damage to both the vascular pedicle and the penile skin.

The technique

This new technique requires de-gloving of the penis and subsequently isolating a transverse island of skin on a vascular pedicle flap of dartos fascia, without sharp dissection. As the technique described here does not require sharp tissue dissection, it is very quick and fast to accomplish, and does not damage either the vascular pedicle or the penile skin and therefore the possibility of 'button-holes' in the pedicle or the skin does not arise.



Fig 2: Penile skin has been dissected over the Buck's fascia to the base of the penis.

First, the sub-cutaneous tissue of the penis, along the intended line of transverse incision, just proximal to the coronal sulcus is infiltrated with a very dilute adrenaline saline solution (1: 100,000). This manoeuvre facilitates graft elevation and decrease capillary bleeding. A circular incision is now made to the level of the Buck's fascia. The glans penis is now held in one hand, and the other hand pulls the penile skin to the base of the shaft of the penis. (*'Hold glans and pull skin over Buck fascia'*) (Figs 2, 3). The penile skin is then pulled back over

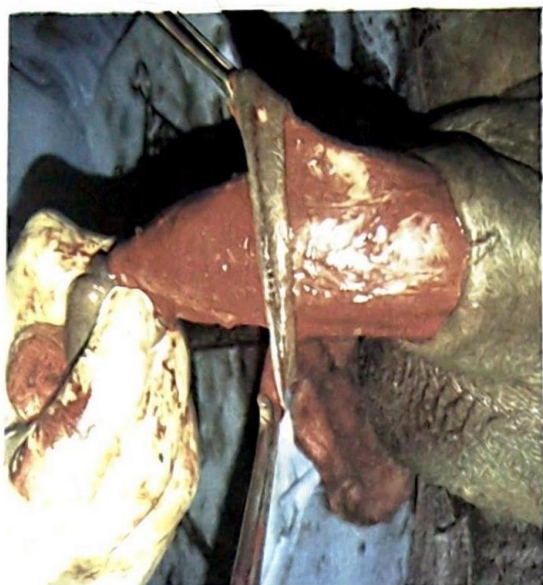


Fig 3: Raising the penile skin flap and a dartos pedicle.

the penile shaft temporarily to raise the island of penile skin flap. Having decided on the width of penile skin adequate for the substitution of the strictured segment to give an adequate urethral calibre, the proposed line of circular incision is again infiltrated with normal saline, but without adrenaline. This manoeuvre assists to demarcate tissue planes as before. A parallel incision is now made proximal to the initial incision. This incision is made just skin deep, and should avoid cutting into the underlying vascular pedicle. The saline solution, infiltrated earlier helps considerably in identifying this plane. This level of incision is established circumferentially.

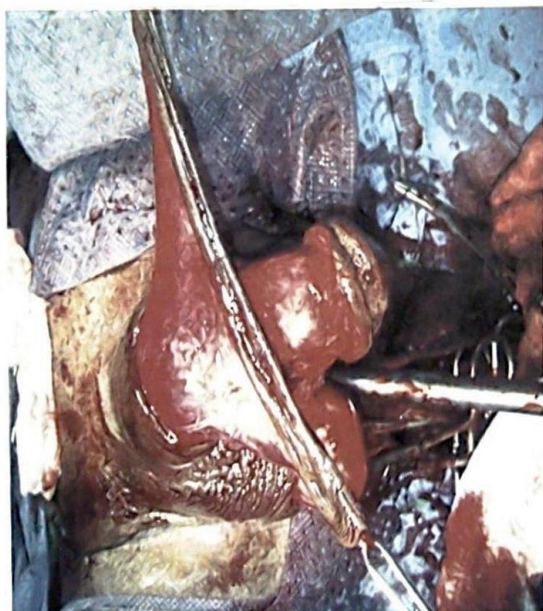


Fig 4: Penile skin has been dissected to base of penis and flap isolated

The penile skin flap along with the pedicle is held in one hand distally, and the rest of the penile skin is pulled back proximally with the other hand to the base of the penis over the vascular pedicle (Dartos fascia). 'Hold flap and pull skin over Dartos fascia.' This would leave a flap of skin with a robust and substantial vascular pedicle of Dartos fascia, devoid of 'button-holes' that often characterise 'blunt and sharp' dissection described by earlier authors of similar techniques [3,5,9,10], (Figs 4 and5).

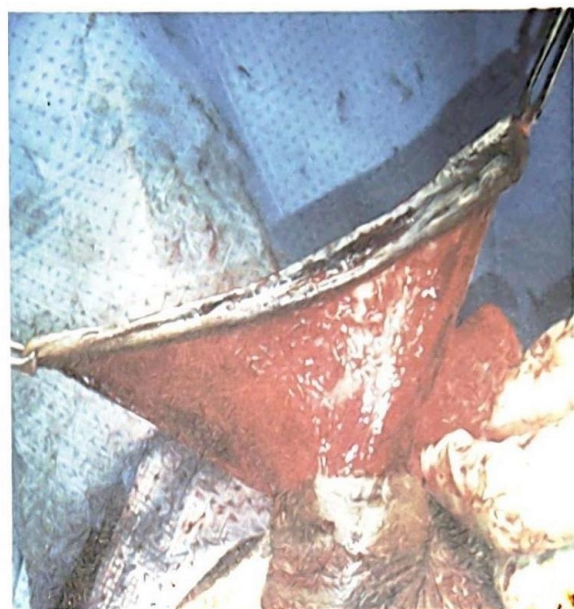


Fig 5: Robust vascular dartos pedicle without 'button-holes' of dissection

Results

We have used this technique in a total of nine patients so far. All the nine cases had regional block below the T10 level, providing enough anaesthesia and post-operative pain relief with continuous epidural catheter in the first two cases. 0.5% marcain served long enough for the analgesia for 4 – 6 hours after surgery, when a non-steroidal anti-inflammatory drug (NSAID) was then substituted.

Four patients had strictures involving the penile urethra only. Three others had strictures involving the penile and distal bulbar urethra while the remaining 2 patients had penile, distal and proximal bulbar urethra involved.

Six patients had catheter injury related urethral strictures, while the remaining three had post urethritis related strictures. The time between the circumcising incision and the time to complete elevation of the flap on its pedicle ranged between 12 and 25 minutes with an average of 15 minutes. The flaps have not been lost on any occasion and a

post-operative peri-catheter urethrogram is routinely performed 3 weeks post-operatively (Fig. 6).

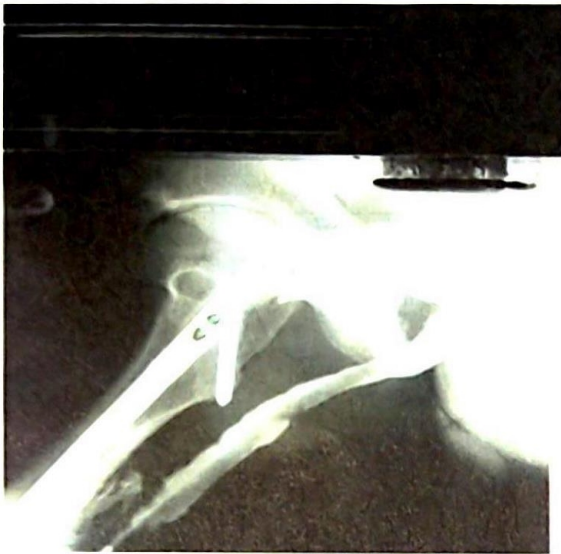


Fig. 6: A post-operative peri-catheter urethrogram.

There has been no button-hole injuries made in the vascular pedicle or the penile skin of any of the patients. The occasional complication has been in the form of urethra-cutaneous fistula at the ventral part of the distal circular line of skin closure (Fig. 7). This complication was encountered in 2 patients. These fistulae all closed on conservative treatment consisting of re-catheterisation for a few more days or left alone to close spontaneously.

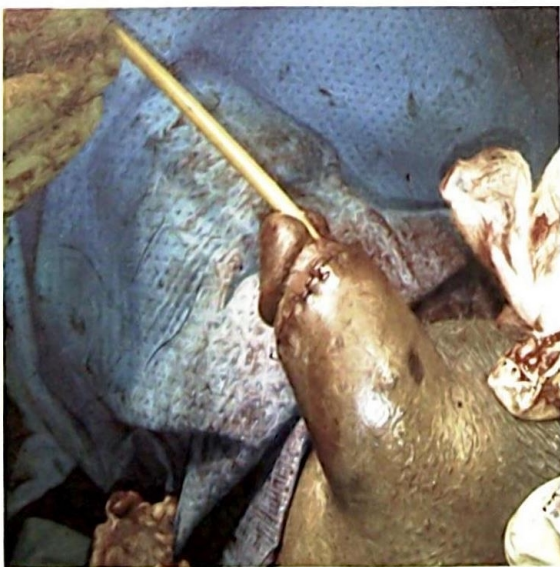


Fig. 7: The suture line at the end of surgery.

Discussion.

The skin of the penis, including the prepuce is supplied by the superficial external pudendal vessels as previously described [7]. This skin can be

dissected off the subcutaneous tissues which in turn may be dissected off the tunica albuginea of the corpora cavernosa and corpus spongiosum, thus creating a subcutaneous pedicle supplying axially an island of distal penile skin or prepuce [8,11]. The advantages of this blunt dissection technique, compared to earlier techniques of raising a similar flap are the following; the short period of time it takes to do it, often accomplished within an average of 15 minutes in our experience, compared to hours often used in other methods and avoidance of injury to both the vascular pedicle to the flap and the remaining skin of the penis. In the other techniques, because dissections at both the levels of skeletonising the penile skin over the Buck's fascia and separating the penile skin from the Dartos fascia involve sharp dissection, considerable time must be spent to do this meticulously to minimise 'button-holes' injuries on both the flap pedicle and the penile skin [9]. As this new technique does not require sharp dissection, the time to accomplish it is considerably shortened and 'button-hole' injuries are completely avoided. Very dilute solution of adrenaline is infiltrated subcutaneously in the line of the circumcising incision to assist in reducing capillary ooze and we have found that it also helps in the demarcation of tissue planes, both at initial incision and during blunt dissection. General principle in surgery and anaesthesia teach that adrenaline be avoided in structures with end-arteries, we have not encountered any case of penile tissue ischaemic damage with this technique. This may be due to the very dilute concentration of adrenaline used, (1:100,000), the very rich blood supply of the penis and the fact that the infiltration is only made into the subcutaneous tissue, along the line of circumcising incision only, or a combination of all these factors.

The long-term outcome of the use of this technique should be very good as the flap is very well vascularised and therefore would be able to withstand the rigors of tissue handling and adverse conditions at the site of reconstruction. Complications related to this technique have been mild and resolved on conservative management. We have observed the occasional post-operative urethro-cutaneous fistula formation, often at the distal end of the repair. These fistulas often heal, in our experience on conservative management, which may consist of a short period of re-catheterisation or without a need for re-catheterisation, as the fistula opening gradually narrows over time and closes on its own if there is no distal obstruction.

Regional anaesthesia is quite suitable for this operation. The advantages include the fact that it can also serve for the purposes of post-operative pain relief as well as being low cost.

Conclusion

This modified blunt technique of raising the transverse penile pedicle flap is very quick to do, and can be accomplished in an average time of fifteen minutes in experienced hands. A major advantage of this new technique is that, as it does not require significant sharp dissection, it avoids creation of button-hole injuries in both the vascular pedicle and the penile skin. This should improve the popularity of this versatile flap in the reconstruction of long urethral strictures.

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