CASE REPORT

Skin resurfacing in a circumferential full thickness burn to the penis: lessons learnt

Shehab Jabir, Quentin Frew, Richard Thompson, Peter Dziewulski

St Andrews Centre for Plastic Surgery and Burns, Chelmsford, Essex, UK

Correspondence to

Dr Shehab Jabir,
shihab.jabir@googlegmail.com

SUMMARY

A circumferential full-thickness burn to the penis is a rarely encountered injury. However, when it does occur, it proves a management challenge to the plastic and burns surgeon in terms of reconstruction. This is due to the need of not only regaining adequate function of the organ, but also because of the need for a pleasing aesthetic outcome. Split-skin grafts have been utilised successfully to resurface full thickness burns of the penis and have given good results. Yet the success of split-skin grafts, especially those applied to an anatomically challenging region of the body such as the penis, depends on a number of carefully thought-out steps. We discuss the case of a circumferential full-thickness burn to the penis which was treated with split-skin grafting and highlight important pitfalls that the plastic and burns surgeon need to be aware of to ensure a successful outcome.

BACKGROUND

The reconstruction of penile skin loss via burns may prove a challenge for the plastic and burns surgeon. Penile burns are usually sustained as part of a larger burn involving the abdomen, thighs and perineum.¹ Less commonly, it may occur as an isolated injury involving purely the penile shaft. Although the surface area affected in a burn to the penis might be small, procedures to reconstruct the penis may have an enormous psychological and emotional impact on the patient. This is due to the need of regaining adequate function of the organ and also because of the need for a pleasing aesthetic outcome. This burden of emotional trauma may in turn be fed back to the clinician resulting in an apprehensive surgeon. Methods of conservative treatment are not adequate for full-thickness burns involving the penis due to the high probability of developing hypertrophic scarring and secondary contractures. Skin grafting has been utilised successfully to resurface full-thickness burns of the penis and have given good results.²⁻³ We discuss the case of a full thickness circumferential burn to the penis, which was treated with skin grafting and highlight important pitfalls that the plastic and burns surgeon need to be aware of to ensure a successful outcome.

CASE PRESENTATION

A 21-year-old man presented within 1 h of a flame burn following consumption of a large quantity of alcohol. On examination he had a total burn surface area of 15%, 12% of which were full-thickness burns, involving his abdomen, genital

area, perineum and the antero-lateral surface of his thighs. His entire penis had sustained a full-thickness circumferential burn and had a charred leathery appearance. He was admitted to our regional burns unit for fluid resuscitation and stabilisation of his injury. Owing to increasing clinical evidence of circulatory compromise to his penis, escharotomy was undertaken via a single incision on the dorsal surface of his penis soon after admission (see figure 1A). This was successful in re-establishing blood flow back to the segment of his penis distal to the region of constriction.

Four days post-admission, once the injury was well demarcated and the penis had become less oedematous, he underwent debridement of the full-thickness burns to his penis and the application of a split thickness sheet graft obtained from his left thigh. A tie over dressing was applied to ensure the graft made contact with its bed. A non-adherent clear dressing (Telfa) was then applied over the tie over dressing and a jock strap was used to keep the dressings in place. Intravenous antibiotics were instituted for 48 h and the patient remained catheterised. Over the next 5 days the graft appeared to take well and the initial dressings described above were taken down and one consisting of an inner core of soft putty elastomer shaped accordingly to fit the contours of the penis and immediately overlying the penis was used. Tubigrip was applied over the elastomer layer to hold it in place.

However, despite regular dressing changes and wound review, the graft began to show evidence of failure at approximately 2 weeks. Hence, 20 days following the initial grafting procedure the patient underwent a second debridement and application of a split-skin graft. This time, however, versajet debridement was used over scalpel dissection. The graft was secured onto the bed by means of 4.0 vicryl rapide. An inert neutral wound contact dressing material with minimum adherence and friction to the skin graft (SurfaSoft) was then placed directly over the graft (see figure 2A). A silver-based antimicrobial dressing (Acticoat) was then applied over the SurfaSoft (see figure 2B). This was then secured with a layer of black foam (the type used in vacuum-assisted closure) applied over the layer of Acticoat as shown in figure 2C. Hypafix (hypoallergic porous adhesive tape) and staples were used to secure the black foam onto the penis (see figure 2C) and a final "sling" of Hypafix was used to displace the penis in an upward direction (see figure 2D,E). This helps to prevent build up of fluid at the tip of the penis (ie, reduces oedema formation) and also reduces shearing at the graft/dressing

To cite: Jabir S, Frew Q, Thompson R, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-009547

(a)

(b)

Figure 1 (A) Escharotomy incision on the dorsal surface of the penis soon after admission. Note the black, non-compliant eschar over the dorsal surface of the penis. If not addressed via escharotomy in a timely manner it could potentially lead to penile ischaemia and infraction. (B) Months post-burn the second graft applied to the penis has matured well to give a pleasing aesthetic outcome. Note the excess skin around the corona of the glans penis which is to be further neaten up via a hemi-circumcision.

interface if the patient were to have an erection. Again a catheter was inserted and intravenous antibiotics were administered for 48 h. This second debridement and grafting proved to be successful.

In addition to surgical treatment, the patient also had input from our in-house psychotherapy and counselling services. All patients in our burns unit are routinely examined by a psychotherapist and a counsellor while as an inpatient and arrangements are made for the patient to be seen as an outpatient on discharge if necessary. Furthermore, if required, the patient may receive psychiatric input for post-traumatic stress (PTSD) disorder or depression type symptoms. In this case the patient received four sessions of psychotherapy involving discussion of the patient's injury and feelings towards what had happened. The patient did not have significant PTSD or depressive symptoms and opted to only have a limited engagement with our psychotherapy services.

OUTCOME AND FOLLOW-UP

At 6 months follow-up he had a good functional outcome and was coping well. His injuries had completely healed with no real problems apart from some scarring and excess tissue on his ventral foreskin (see figure 1B). He is currently awaiting surgery to have this scar revised and the excess tissue removed via a

hemi-circumcision. Overall, the patient was extremely satisfied with both the functional and aesthetic outcome of the treatment of his injuries.

DISCUSSION

This case highlights the challenges faced in the treatment of full-thickness burns to the penis. Although early debridement and skin grafting has been advocated, its success cannot always be guaranteed. This is secondary to a number of specific factors associated with this region of the body. First, the skin around the penis and scrotum is highly mobile making it difficult to apply a stable dressing to this region. The underlying tissue laxity enables movement of, and eventual loosening of, the overlying dressing which may result in shearing between the skin graft and its bed leading to graft failure. Second, the cylindrical shape of the penis makes it difficult to tailor a dressing that fits suitably. This again contributes to the former point regarding shearing and graft loss. Apart from this, the erectile capability of the penis means its girth and length could vary significantly from moment to moment. Erection of the penis may lead to the dressing dislodging, as well as again creating shearing between the graft and its bed. Furthermore, an opening in the dressing needs to be maintained to enable the patient to pass water which may again impinge on the structural integrity and hence the stability of the dressing.

With hindsight, we believe a tie-over dressing is not the ideal choice in this case. It is time consuming to apply in this circumstance and may not offer adequate compression over the cylindrically shaped penis. It may also prove to be uncomfortable to the patient. The ideal dressing should support the entire length of the penis, fit well around it and reduce the likelihood of shearing between the graft and its bed. We found these aims were achieved with our second dressing which was composed of a layer of SurfaSoft, Acticoat and black foam. SurfaSoft has been shown to be a strong yet flexible dressing, especially suited for use in dressing skin grafts applied to anatomically challenging areas.⁴

Furthermore, although we did not use it at any stage in our patient, antierecile agents should be considered during the initial period following skin grafting. These could be considered for up to 2 weeks after graft check confirms adequate graft take.⁵

The Versajet hydrosurgery system was used during the second debridement. It uses a high power parallel water jet that ensures precise removal of tissue with minimal damage to the underlying graft bed (see figure 3A,B). In situations such as debridement of full-thickness burns to the penis and skin grafting, where precise debridement and adequate preparation of the bed is vital to graft success, we would recommend using the Versajet system. Other reports have also confirmed its usefulness in this area.⁶

In conclusion, resurfacing of full thickness penile burns is a challenge. The surgeon needs to ensure adequate tactile, erectile and sexual function, as well as a pleasing aesthetic outcome. Split thickness skin grafts have been shown to give an acceptable outcome in these cases, but the surgeon needs to be aware of the pitfalls present in this anatomical region. Graft success depends upon adequate debridement and preparation of the graft bed, as well as dressings that have been adapted to ensure stability of the graft and minimise shearing forces. Antierecile agents may then be used in addition to these methods as an adjunct to ensure graft uptake. Finally, the patient's psychological needs in such situations cannot be overemphasised. Appropriate psychological/psychiatric input should be sought to help the patient recover from a cognitive perspective as well.

Figure 2 (A) SurfaSoft—an inert neutral wound contact dressing material with minimum adherence. (B) Acticoat—a silver-based antimicrobial dressing. (C) Black foam (from vacuum-assisted closure pack) wrapped around penis with an inner layer of SurfaSoft followed by Acticoat which forms a bridging layer between the two. Note how the Hypafix is then used to hold the dressing in place. (D) A 'sling' of Hypafix used to hold the penis in an upward direction. (E) A side view showing how the 'sling' of Hypafix holds the penis in an upward direction.

Figure 3 (A) The Versajet hydrosurgery system power console. (B) The jet nozzle which is connected to the power console. A high-powered jet of saline through the nozzle is used to precisely debride tissue.

Learning points

- ▶ Owing to its cylindrical shape, mobile skin and function (both its erectile capability and as an organ for voiding), it is a challenge to apply stable dressings to this region of the body. Following application of the graft, we recommend using SurfaSoft followed by a layer of Acticoat and black foam (that used with vacuum-assisted closure) as a dressing. This combination appears to provide a stable dressing for securing the graft to its bed.
- ▶ Versajet debridement ensures precise removal of tissue with minimal damage to the graft bed which contributes to a more successful take of the graft.
- ▶ Appropriate psychiatric/psychological referral should also be made to enable the patient to deal with the enormous psychological and emotional burden of such an injury.

Contributors SJ was responsible for writing the entire manuscript and photography. QF edited the manuscript. RT was also responsible for editing the manuscript and help with images. PD was responsible for case conception and editing of the final manuscript prior to submission.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Abel NJ, Klaassen Z, Mansour EH, *et al.* Clinical outcome analysis of male and female genital burn injuries: a 15 year experience at a level-1 burn center. *Int J Urol* 2012;19:351–8.

- 2 Laitung JK, Luthra PK. Isolated penile burns: a plea for early excision. *Br J Plast Surg* 1988;41:644–8.
- 3 Horton CE, Dean JA. Reconstruction of traumatically acquired defects of the phallus. *World J Surg* 1990;14:757–62.
- 4 Cullen KW, Timperley AJ, Clarke JA, et al. Surfasoft, a new graft dressing. *Burns Incl Therm Inj* 1988;14:71–6.
- 5 Abela C, Lucas N, McLeod I, et al. Protection of skin grafts to the penile shaft using a novel manipulation of Allevyn dressing—case report of an alkali burn. *Burns* 2006;32:925–6.
- 6 Yeh CC, Lin YS, Huang KF. Resurfacing of total penile full-thickness burn managed with the Versajet hydrosurgery system. *J Burn Care Res* 2010;31:361–4.

Copyright 2013 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow