

Surgery Illustrated – Surgical Atlas

Glans resection and plastic repair

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ILLUSTRATIONS by STEPHAN SPITZER, www.spitzer-illustration.com

PLANNING AND PREPARATION

INDICATIONS

In the UK this procedure has become an accepted primary treatment for early penile squamous carcinoma, when the lesion is still confined to the glans ($\pm$ adjacent skin) and has not yet penetrated through to the corpora cavernosa. It can also be used for secondary salvage surgery after local radio-recurrence of a glans tumour, or when the glans has been extensively destroyed or left in unstable condition by previous radiotherapy.

Other indications include extensive glans haemangioma, and mutilation of the glans by inflammatory conditions such as pyoderma gangrenosum or various forms of trauma. It also has a place in managing childhood iatrogenic injuries to the glans, acquired during circumcision or repair of congenital deformities such as hypospadias or epispadias.

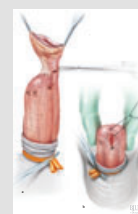
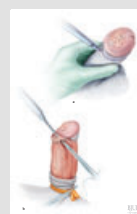
PATIENT SELECTION

The age group is determined by the cause of the glans lesion. Surgery can be done under general anaesthesia, or under regional or local anaesthesia in suitable adult patients.

If using local anaesthetic penile block $\pm$ i.v. sedation, apply EMLA topical anaesthetic cream to the skin graft donor site at least 1 h before surgery.

SPECIFIC EQUIPMENT/MATERIALS (ADULT)

- Penile tourniquet;
- Size 15 bladed scalpel;



- Pointed iris scissors;
- Adson's toothed forceps;
- 6/0 polyglactin 910 (Vicryl™) and 6/0 Vicryl Rapide (or equivalent sutures);
- Dermatome to harvest split skin graft;
- Calcium/sodium alginate dressing (Kaltostat™), gauze and Tegaderm™ donor site dressing (or preferred alternatives);
- Mefix™ (or similar) for catheter fixation;
- 12–14 F silicone Foley catheter;

SPECIFIC PATIENT POSITIONING AND PREPARATION

Start appropriate antibiotics before surgery, e.g. coamoxiclav. In elderly patients with cardiovascular problems, ensure that the patient is not taking or has discontinued taking low-dose aspirin. Ensure that the clotting ratio is acceptable if the patient is on oral anticoagulants.

The patient lies in a normal supine position, with the surgeon on the right and assistant/scrub nurse opposite on the left. After standard skin preparation, drape to leave the genitals and right thigh exposed. If the penile lesion is ulcerated/infected then initially cover the genital area with an additional drape to avoid risking contamination of the skin graft donor site.

SURGICAL STEPS

A T1 squamous cell carcinoma of the glans is used as an illustrative example. First, a rectangular piece of medium-thickness split-skin graft is harvested from the upper outer aspect of the right thigh using the dermatome of preference (enlist the help of a plastic surgeon if unfamiliar with skin grafting). Being a 'clean' procedure, the graft is ideally harvested before working on the more

contaminated genital area. The graft should be of adequate size to fully cover a reconstructed glans and is stored in a saline moistened gauze swab until required.

The donor site is dressed; the author's preference is to apply a haemostatic woven alginate such as Kaltostat, then topical bupivacaine local anaesthetic solution, then gauze, and finally seal the donor site area with an occlusive dressing such as Tegaderm. The thigh is then covered with a surgical drape and the genital area re-exposed.

In rare circumstances when the glansectomy is not for malignancy, and there is a healthy nondysplastic foreskin still present, then the inner layer of the foreskin can be dissected away and used as a free graft to resurface the neo-glans, as this can produce slightly better glans cosmesis than using a split skin graft from the thigh.

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Figure 1(a)

A subcoronal incision is marked on the penile shaft, proximal to any previous circumcision scar if present, ideally with a macroscopic peripheral tumour clearance margin of ≥ 0.5 cm. In an uncircumcised patient, that incision will be marked at a subcoronal level on the external aspect of the foreskin.

Figure 1(b)

A soft rubber tourniquet is placed around the base of the penile shaft. After making the subcoronal incision down to the deep fascia of the corporal bodies, sharp iris scissors are used to dissect under the glans cap, starting peripherally and gradually working distally over the corporal heads. Dorsal neurovascular structures will be divided in the process and transected blood vessels of significant size can be oversewn with 6/0 absorbable sutures. Dissection proceeds along the tunica albuginea, but it should be noted that this becomes a less easily demarcated plane as one proceeds distally. The natural error is for the dissection plane to stray superficially into the substance of the glans sponge, rather than dissecting too deep and entering the corporal heads.

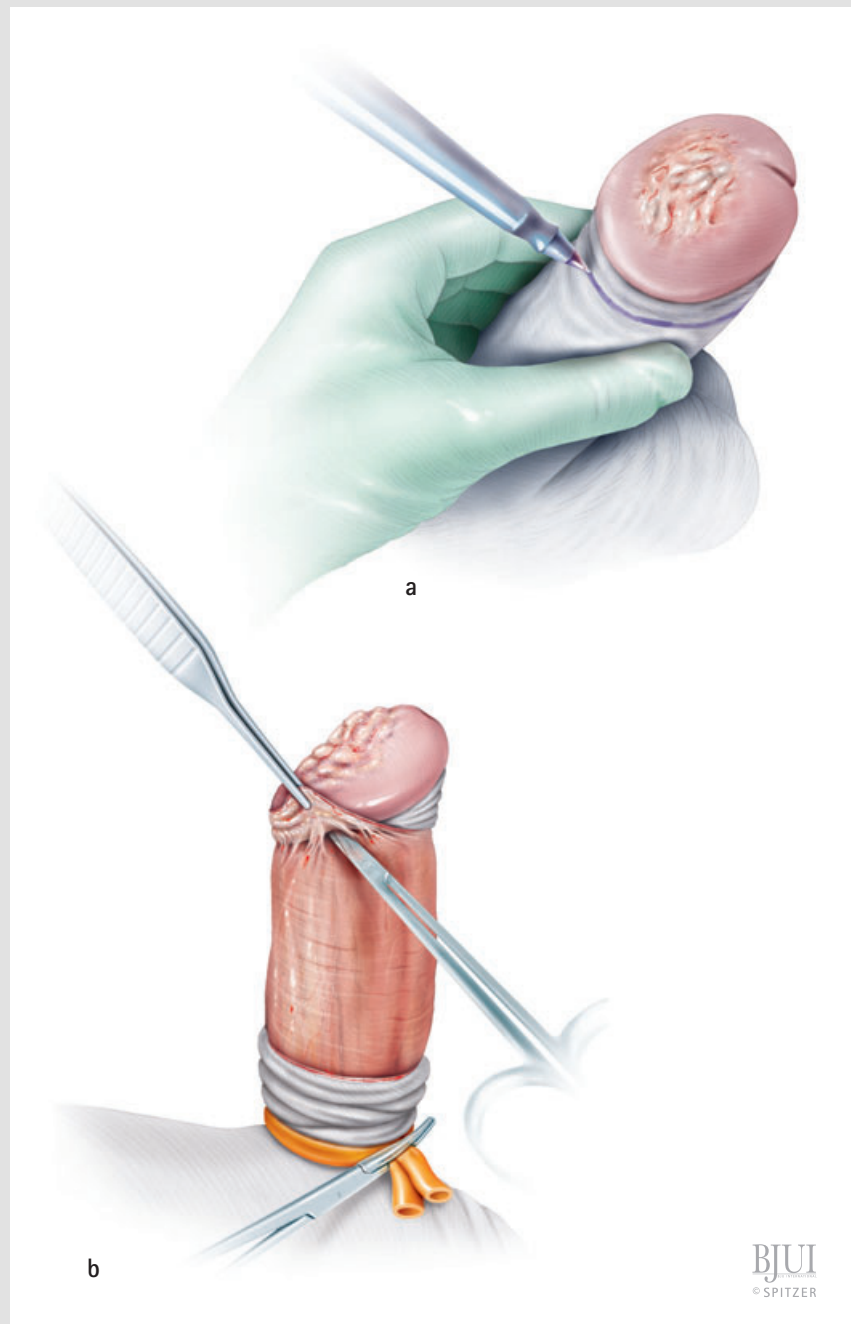
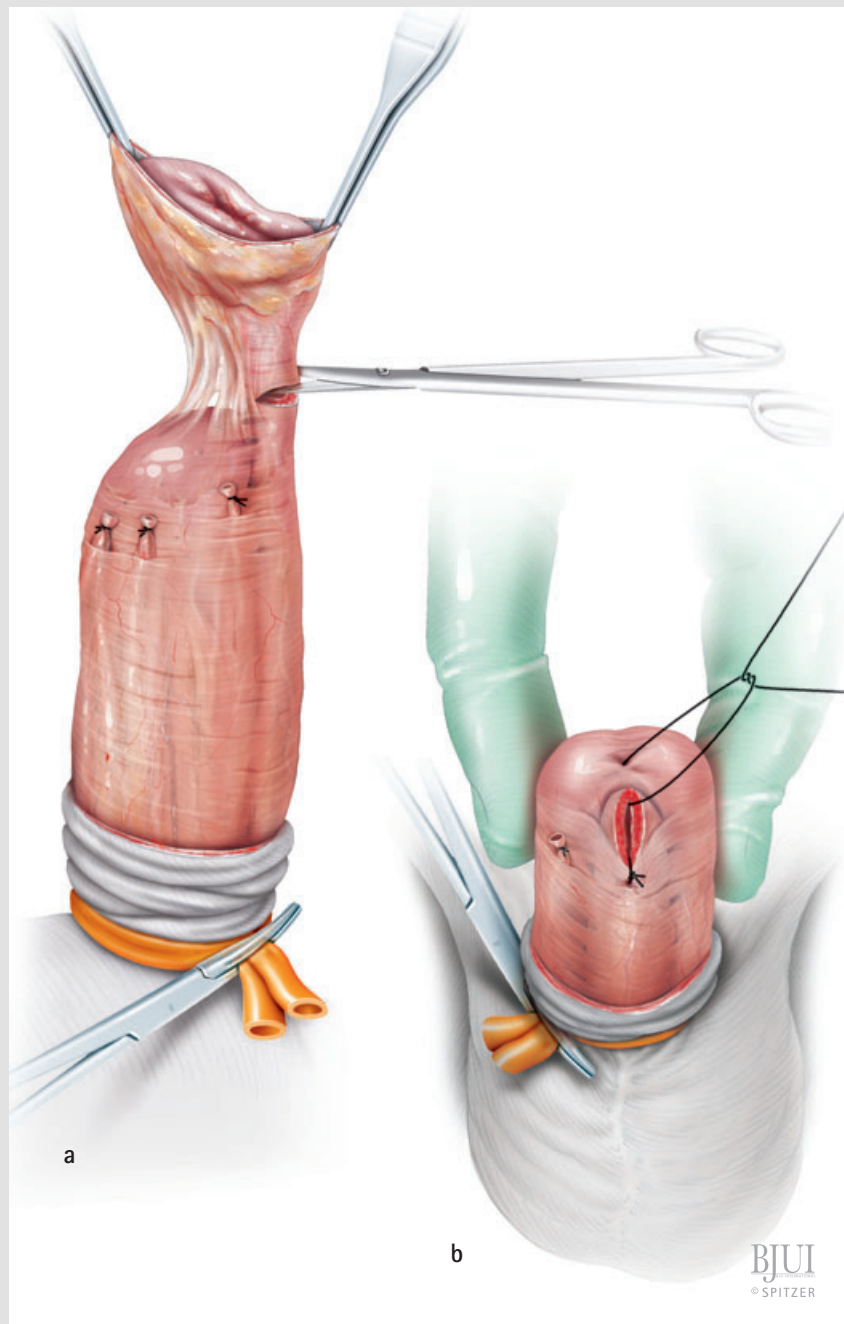


Figure 2(a)

If no pathological tissue is encountered at the resection plane, the glans cap is then separated (together with in continuity foreskin if the patient is uncircumcised), by dividing the urethra flush with the corporal heads. If in doubt about tumour clearance, then marginal tissue samples can be sent for frozen-section pathology, if this service is available.

Figure 2(b)

Leaving a circular meatus is not only visually unnatural, but on healing will create a meatal stenosis. The cut end of the urethra is therefore drawn into a vertical slit shape using 6/0 polyglactin sutures at the 6 o'clock and 12 o'clock positions. This creates a more natural looking pseudoglans/meatus configuration. A 12–14 F Foley catheter can be inserted into the bladder at this stage to facilitate manoeuvring of the penis, but equally distortion-free tailoring of the new skin might be a little easier if catheterization is deferred until suturing of the graft to the meatal margins has been completed.



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Figure 3

The penile skin envelope is re-draped and fixed down to the shaft with polyglactin sutures to create a new coronal margin, leaving an appropriate-sized stump of corporal heads exposed, from which to create the new glans.

Unless the circumcision is very radical, when the penis is flaccid the skin envelope will naturally roll up slightly over this fixed pseudo-corona, and therefore the absence of a true coronal ridge and groove are not that conspicuous. The author does not feel it is worth complicating the procedure to try and manufacture a coronal ridge for the pseudo-glans.

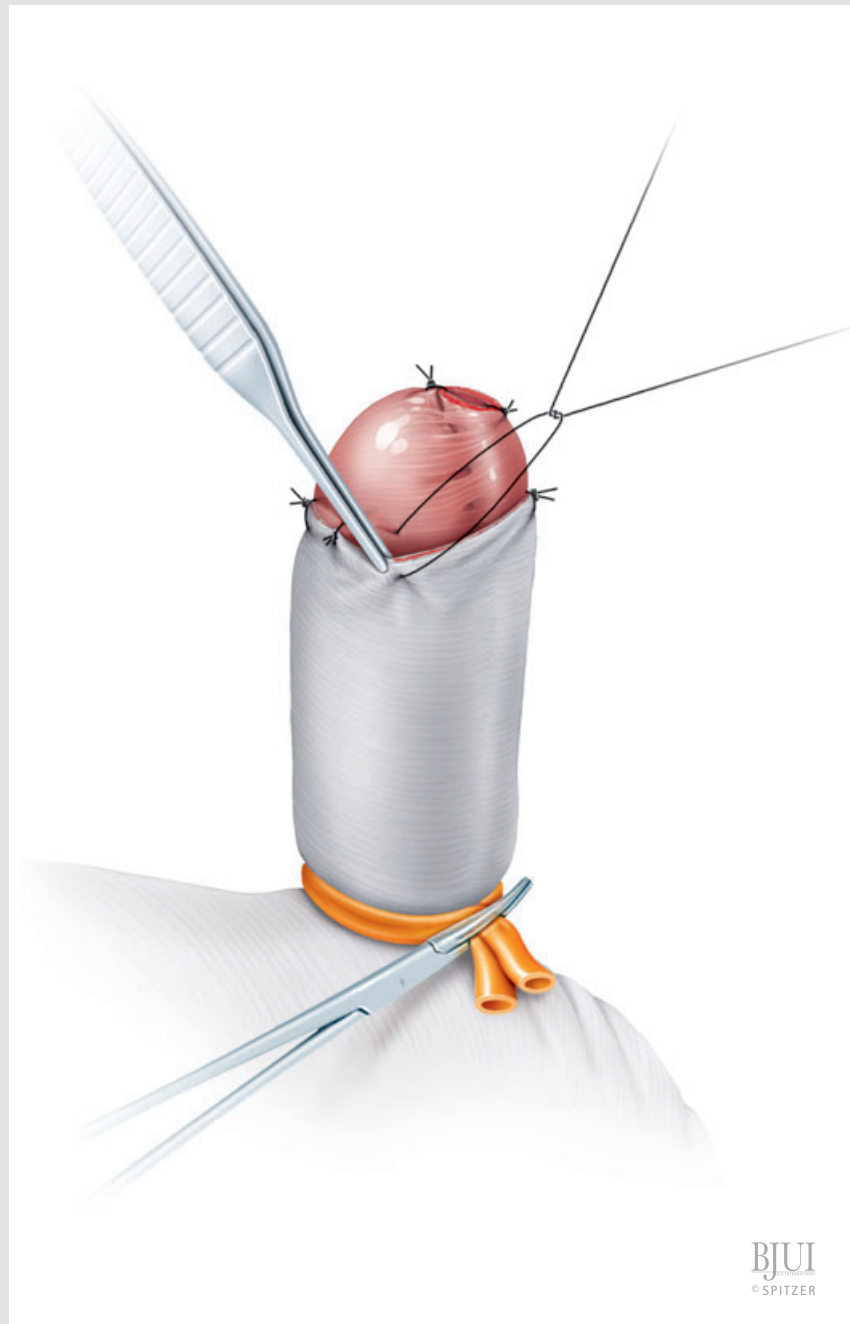
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Figure 4

The skin graft is draped over the neo-glans, the dorsal extremity trimmed to shape, and anchored to the coronal junction with a few 6/0 Vicryl Rapide sutures.



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Figure 5(a)

The free ventral margin of the graft is split back in the midline as far as the 12 o'clock position of the meatus, and anchored at this point with a 6/0 Vicryl Rapide suture. The graft is trimmed and tailored to the new glans and the meatus with further peripheral 6/0 Vicryl Rapide sutures.

Figure 5(b)

Configuring a rectangle or square of graft onto a dome-shaped wound bed will necessitate fashioning a ventral midline closure as illustrated. This ventral tailoring of graft excess is deferred until most of the peripheral graft fixation has been completed.

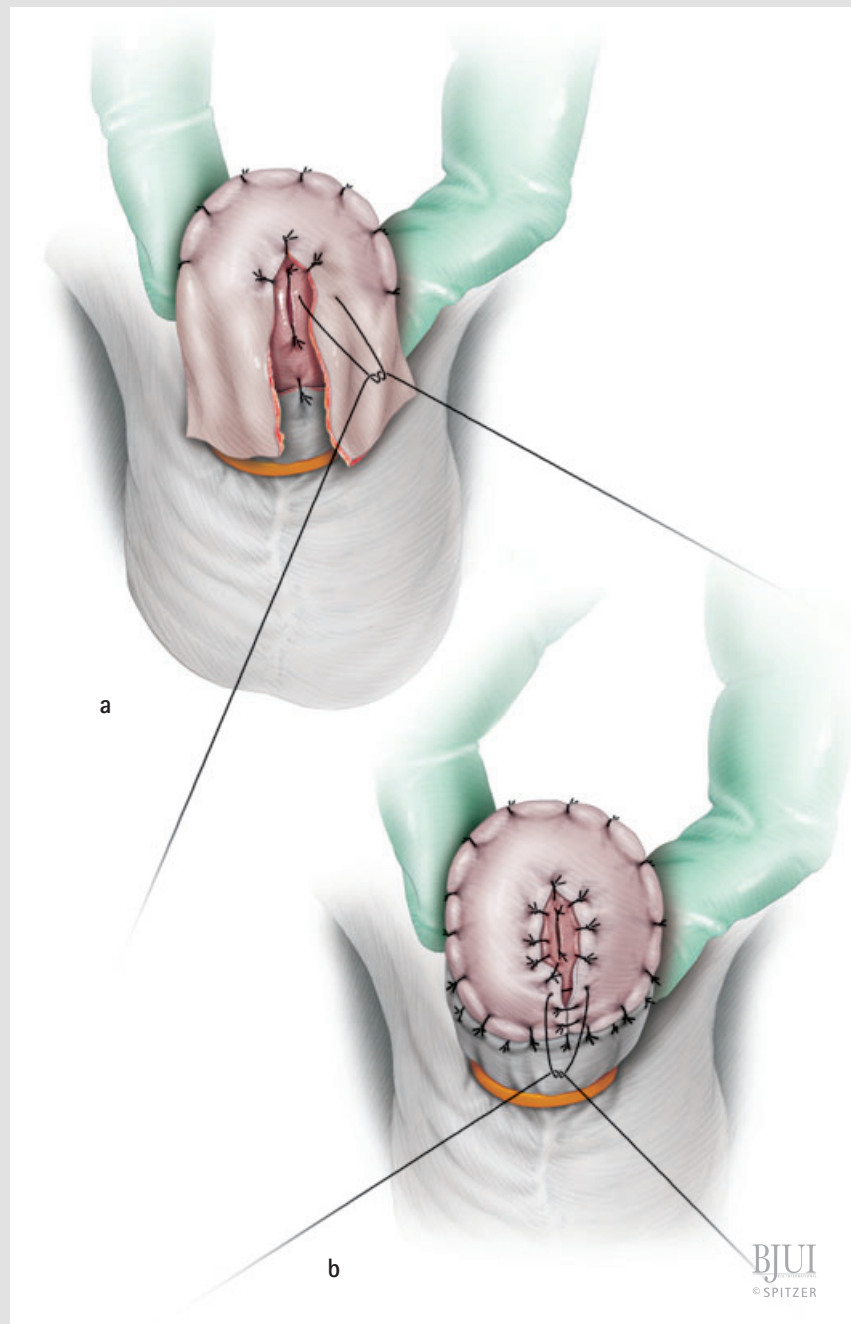
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Figure 6(a)

Because of the impracticality of applying an effective compression/immobilization dressing over the grafted neo-glans, reliance is placed on multiple quilting sutures. Their purpose is to provide regular points of fixed contact between the graft and wound bed, whilst avoiding any 'bunching' and strangulation of underlying tissue that could create ridges and suture marks, and therefore compromise the cosmetic result. Quilting at regular intervals limits any haematoma or seroma collections to a size small enough to reabsorb without compromising the 'take' of the graft. Good knotting technique is essential when tying quilting sutures.

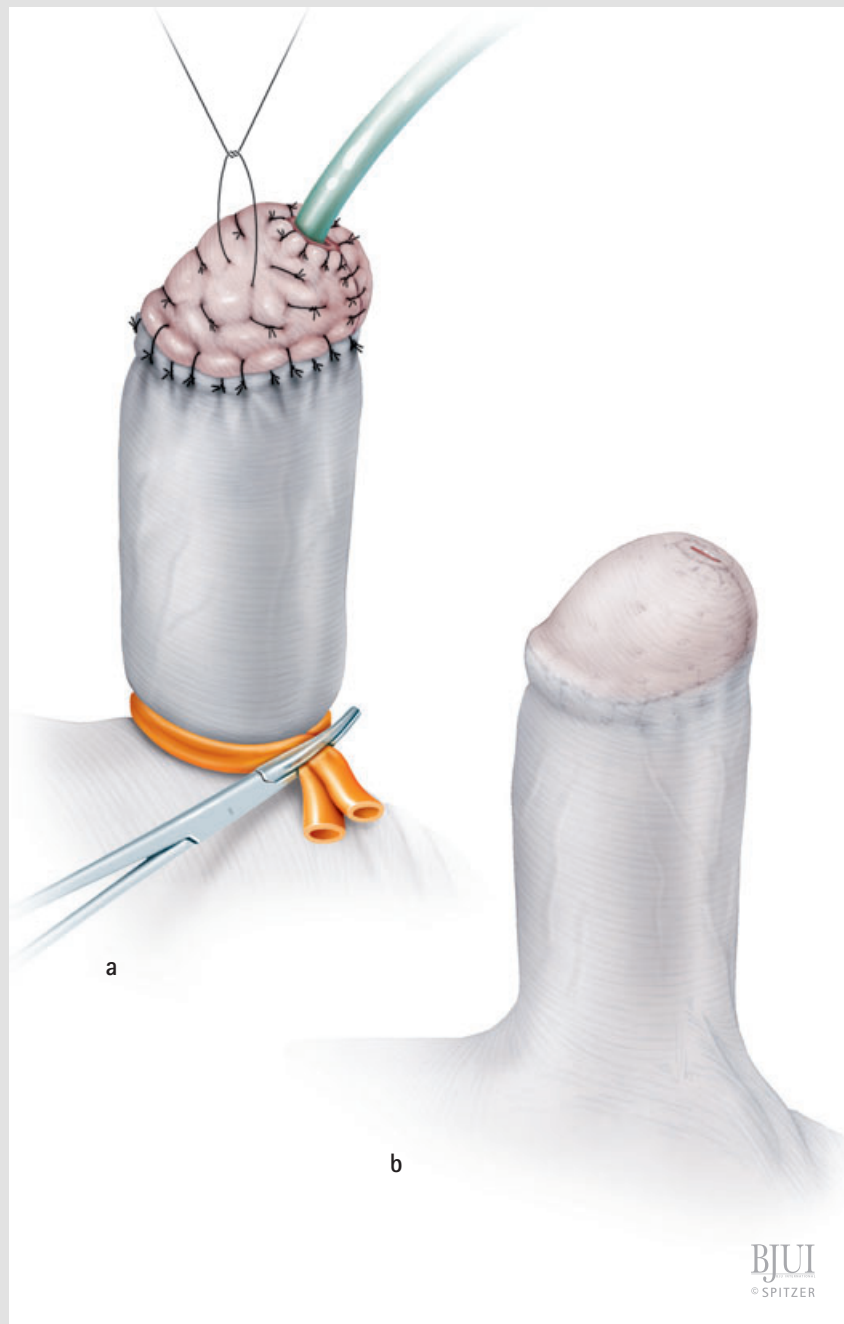
Initially 6/0 braided black silk was used on the basis that it would be easily seen for removal after 5–6 days, and because silk sutures are the easiest to tension precisely when tying knots. Monofilament sutures are inherently more prone to slippage during knotting, and therefore relatively difficult to tension accurately. Despite the potential advantages of silk, occasional sutures were sometimes overlooked during removal, so 6/0 Vicryl Rapide is now used in preference. Whilst more difficult to see for removal, it is likewise braided and easy to knot accurately, and any overlooked sutures cause relatively little problem due to their rapid subsequent degradation.

Quilting of the graft is completed before release of the penile tourniquet. Light pressure is applied over the glans with gauze swabs for a few minutes until reactionary bleeding has stopped.

A bupivacaine penile block is applied if this has not already been deployed at the beginning of the operation.

Figure 6(b)

This shows the results at 3 months after surgery.



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POSTOPERATIVE CARE

If bleeding persists beyond the first few minutes and any significant haematomas accumulate in the new glans, additional quilting and peripheral sutures can be inserted where needed.

Compressive penile dressings are not used, so as to avoid venous congestion and consequently prolonged bleeding. A simple nonadherent dressing such as Vaseline gauze can be loosely wrapped around the penis, leaving the new glans exposed for monitoring.

The catheter is fixed up onto the abdominal wall with 10 cm wide Mefix tape or similar adhesive dressing. Bed rest is advisable for the first 4–5 days until the graft becomes pink and well vascularized. An emollient antiseptic ointment is applied regularly to the glans to soften any crusting around the meatus and sutures. Should any significant haematoma or seroma become evident soon after surgery, this can be drained using the point of a size 11 scalpel blade. Usually around the fifth day the urinary catheter is taken out and mobilization commenced. In those patients who desire optimum cosmesis, visible quilting sutures are removed from the dome of the new glans to minimize suture marks. Antibiotics are discontinued after catheter removal.

The thigh skin-graft donor site can be re-dressed at this stage if moist or uncomfortable, otherwise it can be left undisturbed for ≈10 days, by which time it should be healed. The freshly epithelialized donor site and the new glans should be

protected from friction for a further few weeks.

Intercourse is not allowed for 6 weeks, because the surface of the new glans would be initially insensate and vulnerable to shearing friction forces. It requires several months before protective sensation returns to the graft, although ultimately this should become adequate for social purposes.

FROM SURGEON TO SURGEON

Compared with traditional partial penile amputation techniques, this is a more sophisticated surgical procedure and therefore previous experience with soft-tissue sculpting and deployment of skin grafts is desirable. Although to achieve optimum cosmesis this operation is best suited to a surgeon with some plastic surgery background, a reconstructive urologist can nevertheless acquire the necessary skills.

Despite a sometimes worrying appearance during the first couple of days after surgery, with the neo-glans looking transiently like a blackberry, unless there has been previous heavy irradiation, then significant problems with the healing of the graft or the graft donor site are very uncommon. The only extensive graft failure in over 200 cases has been when the distal end of the penis was heavily fibrotic from previous radiotherapy, and the wound bed therefore insufficiently vascular to support a graft. In such situations it might be advisable to remove tunica albuginea from the tips of the corpora so that the skin graft can be fixed directly onto vascular sponge.

If during the glansectomy dissection it becomes evident that the tumour has penetrated through to the corporal heads, the operation can be modified to include a distal amputation through the corporal heads. The resulting penile stump can then be oversewn and refashioned into a glans shape with 5/0 absorbable sutures. Having achieved this, one can then proceed as for glansectomy.

Glansectomy with immediate plastic reconstruction, as described here, creates a surprisingly natural appearance with few complications. This is achieved: (i) through designing a slit-shaped meatus and; (ii) because the skin graft cover of the new glans is fixed and immobile, whereas the penile shaft skin is freely mobile and can partially roll up over the corona and thereby conceal the new coronal margin.

Twenty years of using this procedure in the UK has determined its inherent safety, hence it is now widely used in UK penile cancer centres for primary surgical treatment of glans tumours. Although 2-cm tumour clearance margins have been the traditional norm, several studies now confirm that even with microscopic clearance margins down to as little as a millimetre or so, there is no greater incidence of local recurrence or indeed death, compared with conventional therapies. Compared with traditional surgery for glans squamous carcinoma, this procedure minimizes loss of penile length, offers better functional and cosmetic results, and results in a greatly improved quality of life.

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