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Surgery Illustrated – Surgical Atlas
T-shunt with or without tunnelling for prolonged ischaemic priapism

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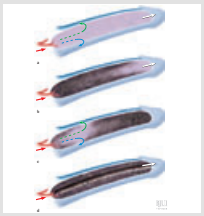

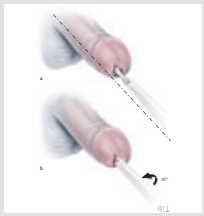
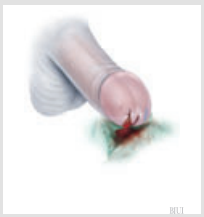
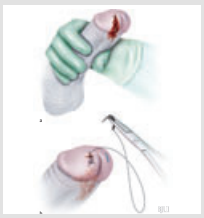


PATHOPHYSIOLOGY OF PROLONGED ISCHAEMIC PRIAPISM

Based on our clinical observations and findings from colour duplex ultrasonography before and after shunting procedures, we present an illustrated schematic of the pathophysiology of ischaemic priapism and the role of conventional proximal and distal shunts.

INDICATIONS

The T-shunt is indicated in cases of ischaemic priapism that are refractory to intracavernous injection of diluted α-adrenergic medications. In ischaemic priapism of >3 days' duration, tissue death and oedema can obstruct blood flow from the proximal to distal corpus cavernosum; in these cases a T-shunt alone might be insufficient to restore penile circulation and consideration must be given to placing a bilateral T-shunt with tunnelling of each corpus cavernosum, using a rigid straight 20–24 F urethral sound or dilator.

PLANNING AND PREPARATION

- It is helpful to ask the patient to describe the quality and location of pain before starting the procedure.
- The urologist should have a thorough discussion with the patient about the indications, risks and benefits of the procedure. It is essential to give a clear explanation to the patient that informs him that priapism of prolonged duration, alone, is a risk factor for erectile dysfunction, and the T-shunt procedure might not modify that risk. This discussion should be witnessed by a

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third party and clearly documented in the medical record, as priapism can be a litigious issue.
- Prophylactic antibiotics for a few days is recommended.
- A mild sedative is a useful adjunct.

RELATIVE CONTRAINDICATIONS

- Bleeding diathesis;
- Phimosis. A dorsal slit will be required to expose the glans.
- A narrow penis with a corporal diameter that will not accommodate a #10 blade.

NECESSARY EQUIPMENT AND INSTRUMENTS

- Sterile surgical drape.
- Local anaesthetics, e.g. 0.25% bupivacaine without adrenaline.
- Syringe with 25 G needle.
- #10-blade scalpel.
- 4–0 chromic suture.
- Topical antibiotic ointment.
- 20–24 F straight urethral sounds or dilators.

PATIENT POSITIONING

The patient is placed supine; the glans penis and penile shaft are prepared with antiseptic solutions. Preparation of the entire penis allows the surgeon to handle the penile shaft during surgery without causing contamination.

Figure 1

Figure 1a. In priapism of 1–2 days' duration, moderate oedema of the erectile tissue within the corpora cavernosa is expected. The key to successful restoration of corporal circulation is a large shunt that can drain the tremendous flow from 'post-ischaemic hyperaemia'. This lowers the intracavernous pressure and thus allows smooth muscle contraction and detumescence.

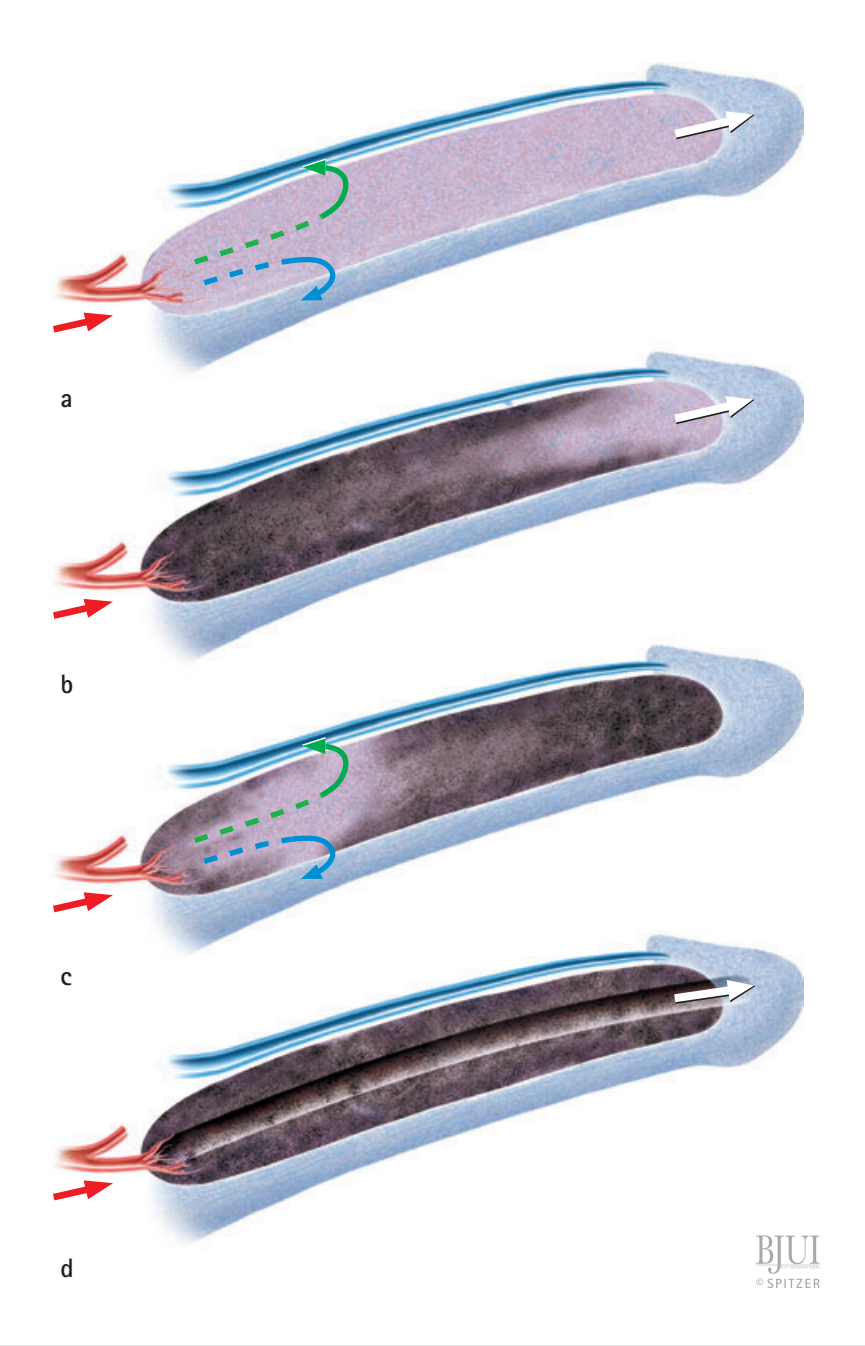
Figure 1b. In priapism of >3 days' duration there is severe oedema/tissue death within the corpora cavernosa (dark area). A cavernosum-glans shunt does not adequately drain the proximal corpora.

Figure 1c. Similarly, a proximal cavernosum-venous or cavernosum-spongiosum shunt does not adequately drain the distal corpora.

Figure 1d. A bilateral T-shunt with tunnelling of the corpora cavernosa establishes a channel for the blood to pass through the entire corpus cavernosum and exit to the glans to establish circulation.

Our three-step treatment recommendation based on the pathophysiology of prolonged ischaemic priapism comprises:

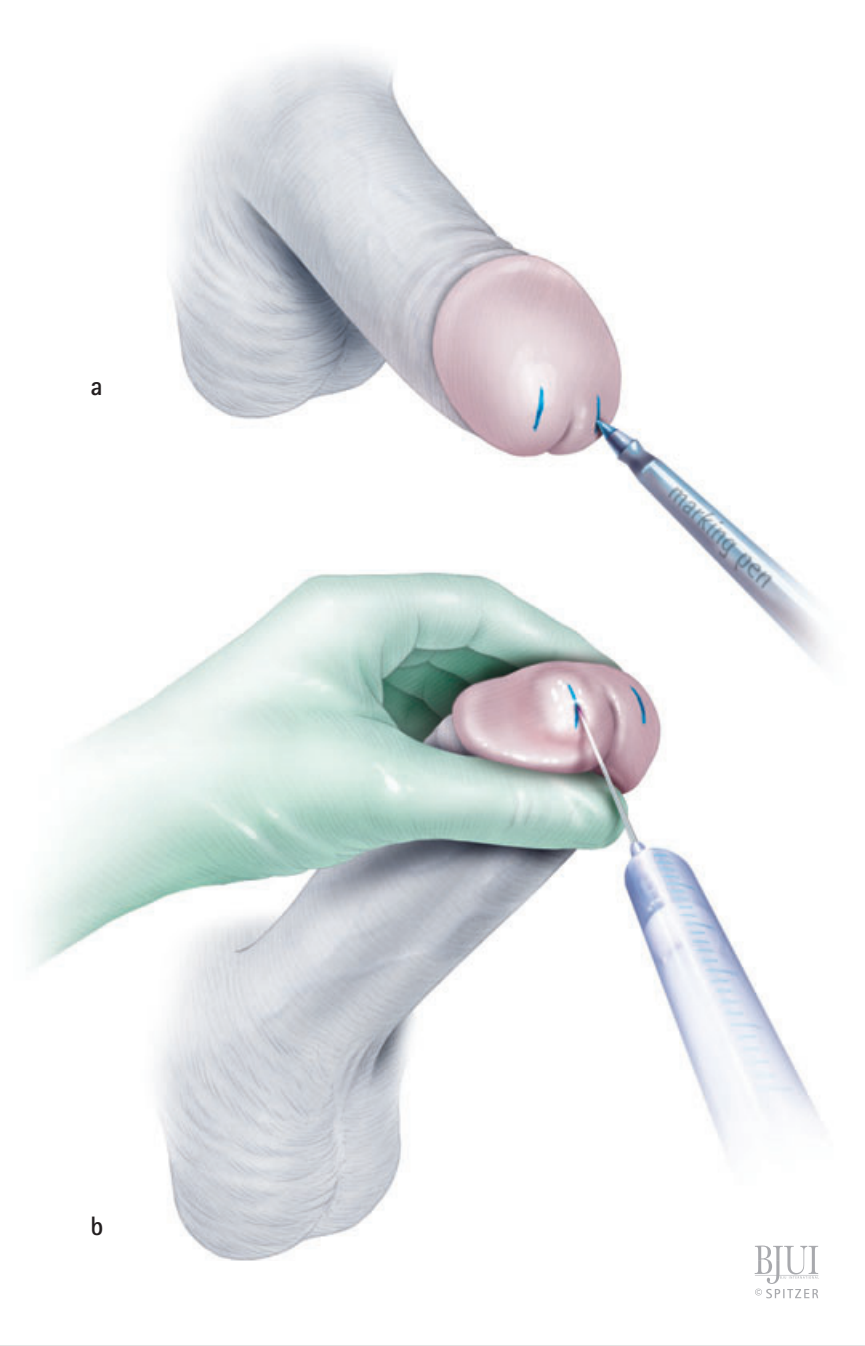
(i) if <1 day, evacuation of old blood + a diluted α-adrenergic;
(ii) if 1-3 days, a T shunt;
(iii) if >3 days, a T-shunt + tunnelling.



SURGICAL STEPS

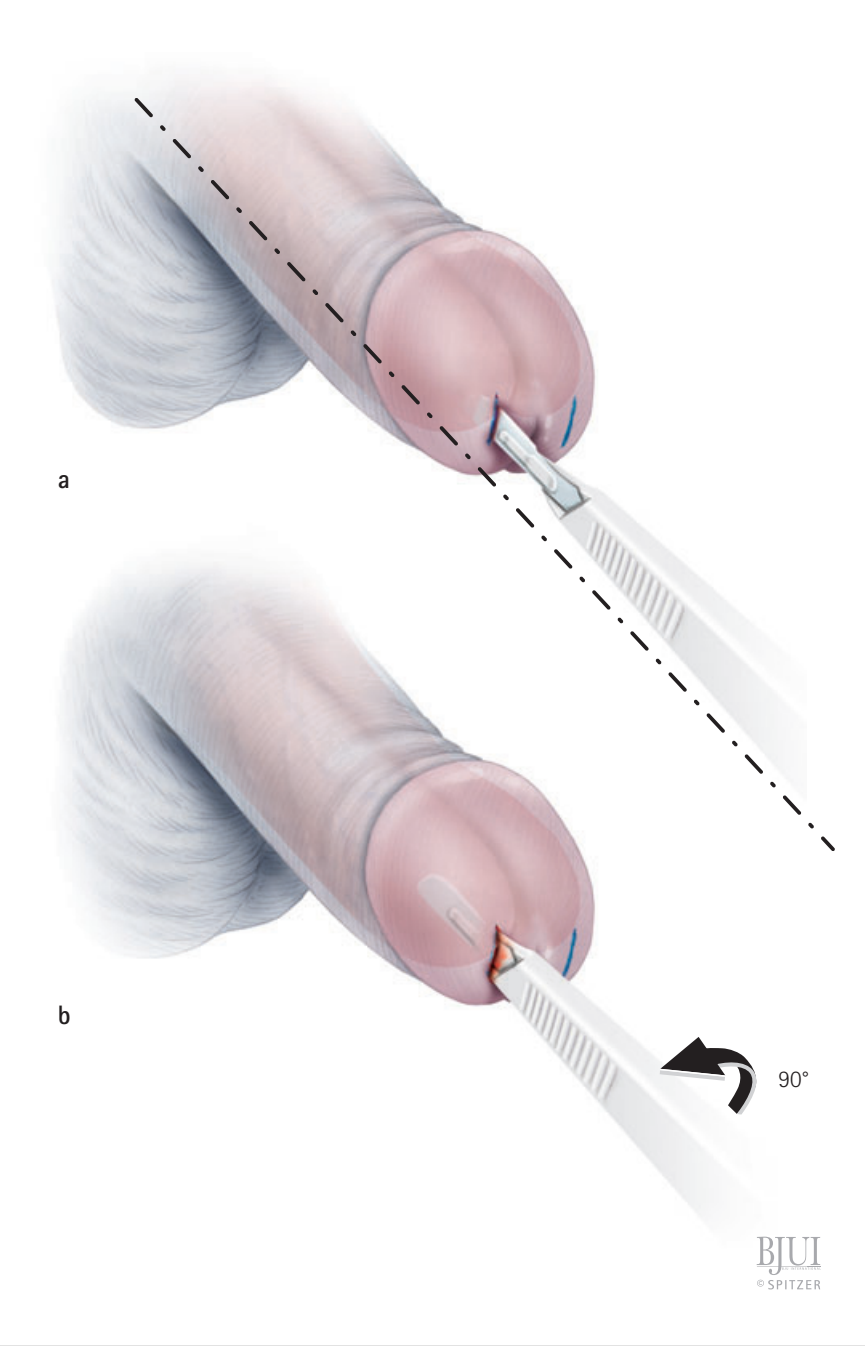
Figure 2

The glans, which typically remains soft in ischaemic priapism due to alternative venous drainage, is palpated to identify the tips of the corporal bodies. The planned incision sites are marked on the prepared glans penis using a surgical marking pen (Fig. 2a). It is preferable to inject both sides with anaesthetic at the start of the procedure. Bupivacaine 0.25%, 1–2 mL, is injected locally within the dermis of the glans overlying each of the two marked tips of the corpora cavernosa (Fig. 2b).



Figures 3 and 4

The #10-blade scalpel is positioned vertically and parallel to the urethral meatus over the marked glans incision site. The blade can be facing up or down, dependng on surgeon preference. The #10-blade scalpel is advanced into the glans to penetrate the tip of the ipsilateral corpus cavernosum until the hub is at the skin level. The scalpel blade is rotated 90° *laterally* (i.e. always away from the urethra). The scalpel is then withdrawn.



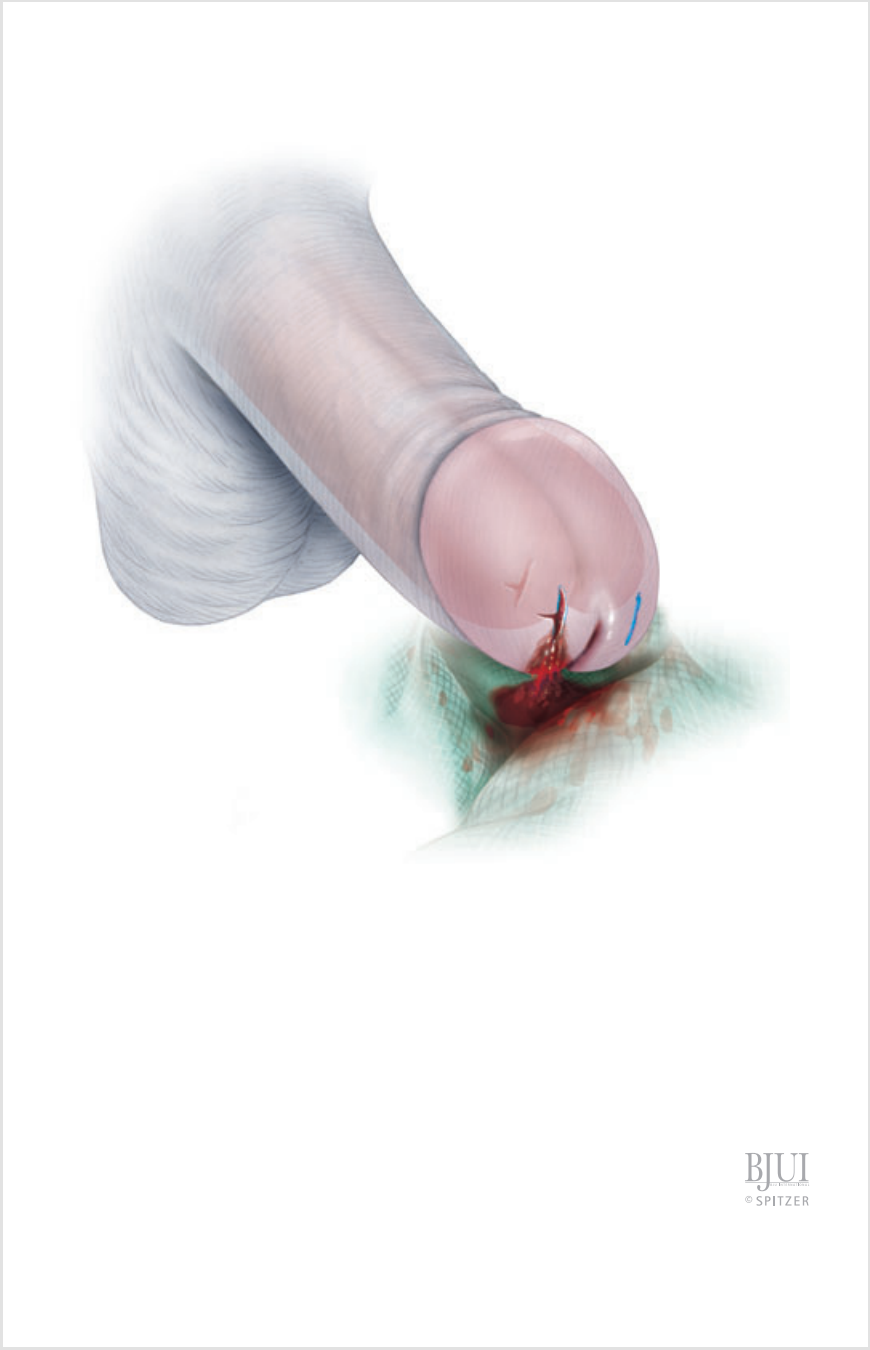


Figure 5

The base of the penile shaft is grasped firmly, and dark, deoxygenated blood is 'milked' out through the incision site. The superficial tissue edges of the glans incision site are closed with continuous 4–0 chromic sutures. Care is taken to avoid placing the sutures too deeply, as inclusion of deep glans tissue can impair blood circulation through the newly created shunt. The patient is observed for 15 min after skin closure to ensure that priapism does not recur.

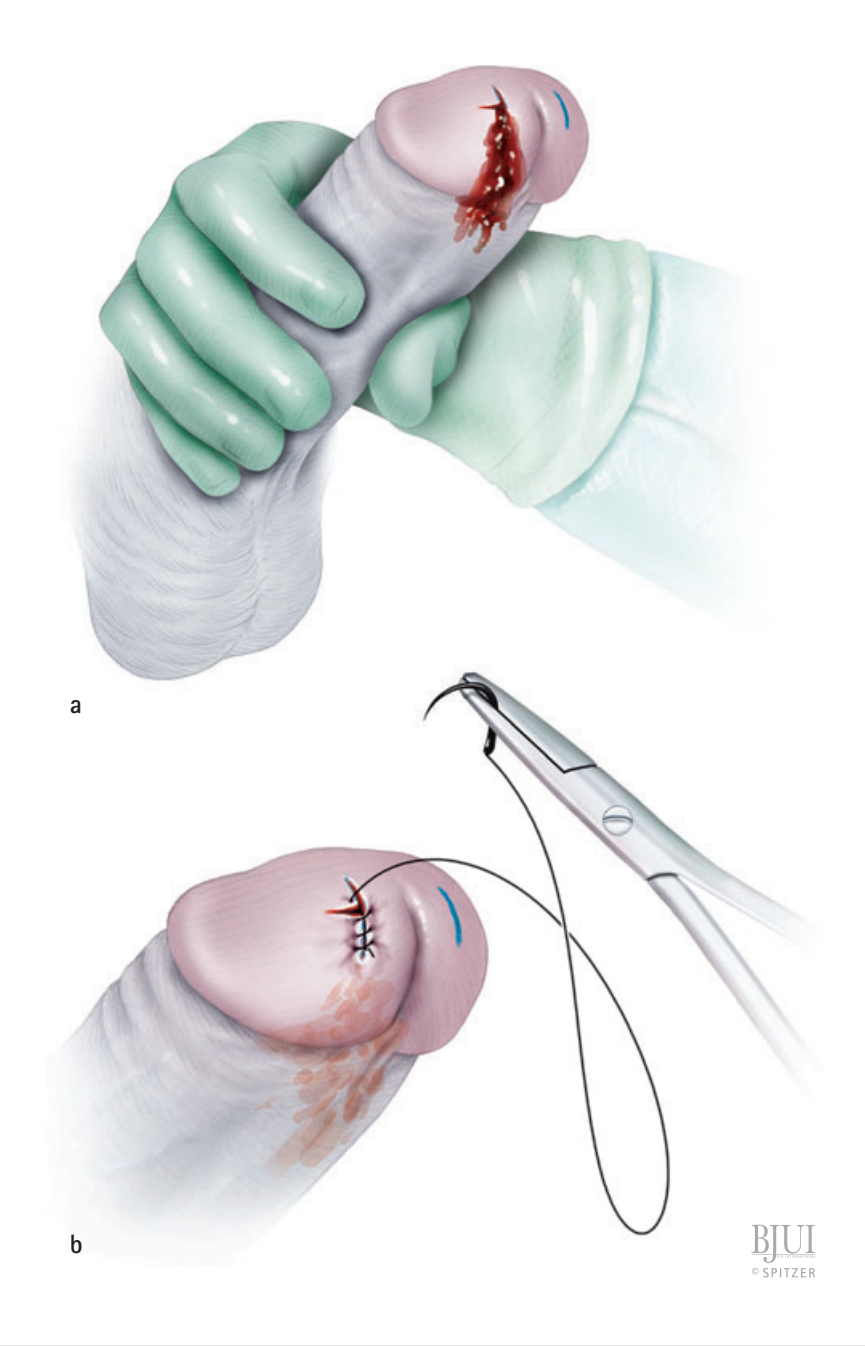


Figure 6

The rigidity of the penis is assessed by using the thumb and index fingers to 'squeeze' the corpora cavernosa together at the level of the penile mid-shaft. The procedure is considered successful *if* the patient reports relief of the dull ischaemic pain within the penile shaft, *and* if the penis is sufficiently soft that a 1.0–1.5 cm indentation can be made into the lateral aspect of each corporal body.

Topical antibiotic ointment is applied to dress the wound, and the patient is discharged after a period of observation. If the penis remains rigid, or if rigidity recurs within 15 min of creation of a *unilateral* T-shunt, the procedure is repeated on the *contralateral* side.

Figure 7

In ischaemic priapism of >3 days' duration and/or when the penis is quite firm after repeated 'milking', we would place bilateral T-shunts followed by intracavernous tunnelling using a straight urethral sound or dilator.

To create tunnelling of the corpora cavernosa, a straight 20–24 F straight urethral sound or dilator is inserted through each glans incision and advanced to the penile crura. To determine how far the sound will need to be advanced such that the tip of the sound reaches the crura of the corpora cavernosa, the sound is laid over the penile shaft and 3–5 cm is added to the distance from the glans to the peno-pubic junction.

After creating a T-shunt, the sound is inserted into the corpus cavernosum gently and orientated slightly laterally (≈10°) to ensure that the tip of the sound is never advanced toward, or through, the urethra.

Bilateral incision sites are closed with 4–0 chromic continuous sutures and the wound is cleaned, dried and dressed with only topical antibiotic ointment. Constrictive or circumferential dressings are avoided, as pressure from these can limit drainage through the shunt(s).

If the rigidity of the penis returns after the procedure, colour duplex ultrasonography is used to assess blood flow within the cavernous arteries. The presence of blood flow is indicative of an open shunt, while absence of blood suggests recurrent priapism. However, it is important to consider that in the great majority of cases of ischaemic priapism lasting ≥≈5 days, the cavernosal arteries might already be thrombosed and one might not be able to detect blood flow in the cavernous artery after a T-shunt and tunnelling.

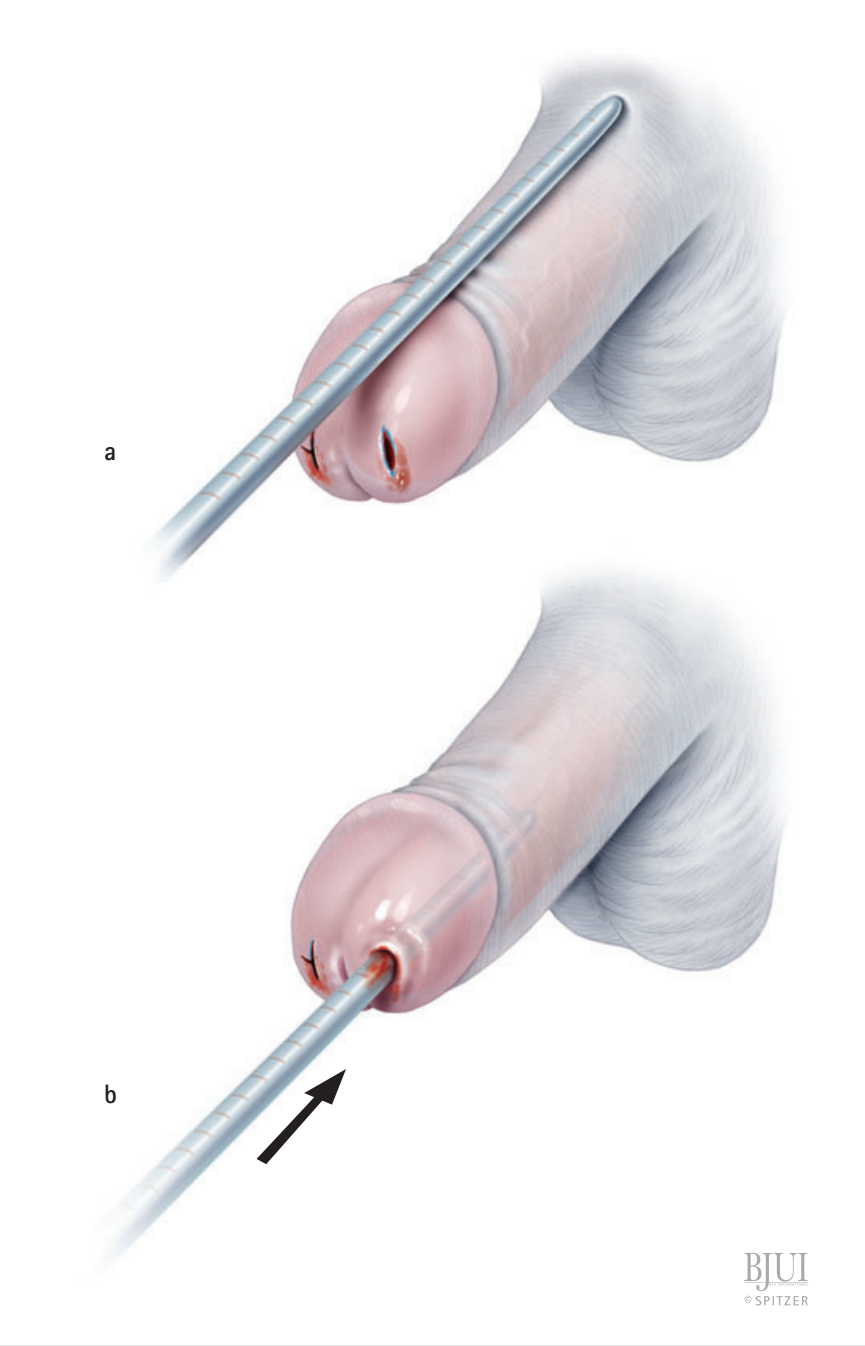
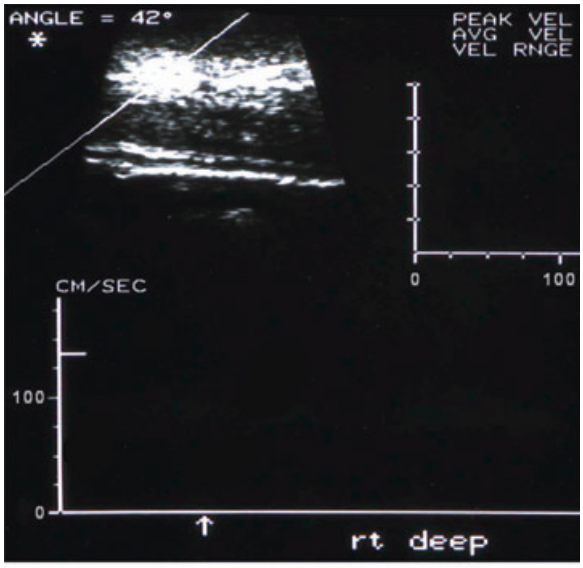


Figure 8

Figure 8a shows a colour duplex ultrasonogram when ischaemic priapism recurs; there is no detectable arterial flow within the corpora.

Figure 8b shows a colour duplex ultrasonogram after a successful T-shunt procedure; note the presence of high arterial flow within the cavernous artery.



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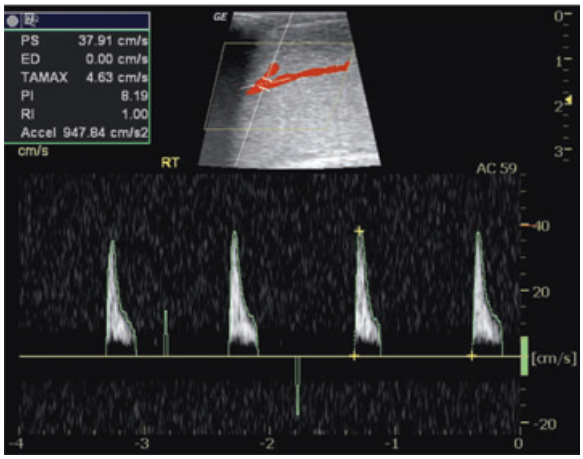

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POSTOPERATIVE WOUND CARE

- The patient should be counselled to abstain from sexual activity involving the penis until the absorbable sutures have completely disappeared (usually 2–3 weeks), and the incision site is well healed.
- Antibiotic ointment should be applied to the incision site(s) two or three times per day.
- Application of circumferential and/or constrictive dressings to the penis should be avoided.

POSTOPERATIVE EVALUATION

When in doubt, colour duplex ultrasonography can be used to differentiate recurrent ischaemic priapism (no flow in the cavernous arteries) from post-ischaemic hyperaemia (high flow in the cavernous arteries).

Assessment of oxygen and carbon dioxide tension in a blood sample obtained from the corpora can also be helpful. It might take 4–6 h for cavernous blood gas values to become acidotic and ischaemic.

The available option if the T-shunt fails, is tunnelling with a larger sound or dilator through a large Al Ghorab type incision.

SURGEON TO SURGEON

With priapism of extended duration (>36 h), only partial detumescence can be expected after successful shunting. This is due to tissue death, oedema and post-ischaemic hyperaemia. It is common to doubt the success of the shunt procedure in the light of such a scenario afterward. Clues that the shunt has been successful include:

- The patient reports relief of pain within the penile shaft (although pain at the glans incision sites is to be expected).
- The penile shaft can be squeezed and deformed using the thumb and index fingers.

If there is any doubt about the success of T-shunt with or without corporal tunnelling, penile colour duplex ultrasonography can be used to confirm the restoration of arterial blood flow to the corpora.

In priapism of extended duration, re-establishment of cavernosal blood circulation requires a large shunt as well as an intracavernous tunnel, to allow blood flow from proximal to distal portion of the corpus cavernosum before its exit via the cavernosum-glans shunt.

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