

ORIGINAL RESEARCH—SURGERY

Restoration of the Penis Following Amputation at Circumcision: Shaeer's A-Y Plasty

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ABSTRACT

Introduction. Male circumcision is one of the most commonly performed procedures worldwide. It has an estimated complication rate ranging from 0.1% to 35%. Amputation of the shaft is one of the most devastating complications reported, resulting from entrapment of the phallus between the blades of the clamp or from thermal injury due to the application of unipolar diathermy.

Aim. In this work, I describe the guidelines I adopted in the management of 32 male patients afflicted with amputation of the shaft of the penis upon circumcision.

Methods. "Shaeer's A-Y plasty" was performed for all patients, whereby the proximal corpora and crura were released from their attachment to the pubis and were advanced forward by inseting a specially configured fat flap into the resultant cavity. Skin grafts were used to cover the released penis.

Results. In all 32 cases, the released penis was within the normal range of penile length, and was cosmetically and functionally acceptable.

Conclusions. "Shaeer's A-Y plasty" is capable of restoring the native phallus following amputation, with preservation of both gender identity and physiological characteristics of the penis to a large extent. **Shaeer O. Restoration of the penis following amputation at circumcision: Shaeer's A-Y plasty. J Sex Med 2008;5:1013–1021.**

Key Words. Amputation; Lengthening; Elongation; Circumcision; Penis; Injury

Introduction

Male circumcision is a religious ritual widely performed among the Muslim and Jewish populations. In some regions such as Northern Africa and the Arabian Peninsula, almost every male child undergoes circumcision. Because of possible health benefits, such as enhanced hygiene and reduced incidence of penile cancer, it is considered by diverse ethnic, religious, and cultural groups, irrespective of the religious background. In 1995, male circumcision in the United States reached a prevalence of 65%, escalating from 35% in the year 1930 [1].

Male circumcision is medically indicated in some conditions such as true pathological phimosis [2], and recurrent urinary tract infection among children younger than 6 months of age [3].

Nevertheless, male circumcision is a point of controversy; its health benefits being debatable and its possible complications being devastating at times. Its current prevalence in the United Kingdom is as low as 6%, declining from 30% in the year 1940 [4].

It is the opinion of the American Academy of Family Physicians that male circumcision should be performed only upon request, rather than routinely, after counseling of the parents as to the risks and benefits [5].

On the other hand, the British Medical Association (BMA) and the British General Medical Council recommend that circumcision should be performed only for medical reasons. The BMA guidelines allow for conscientious objection on the part of a doctor who does not wish to perform a nontherapeutic circumcision. These guidelines

still allow for religious circumcision and suggest that a religious representative is invited to be present to ensure religious requirements are met [6].

Male circumcision has an estimated complication rate ranging from 0.1% to 35%. The vast majority of complications comprise infection, bleeding of the frenular or superficial dorsal vessels, and failure to remove enough foreskin [7]. Less common are meatitis and meatal stenosis [8]. More aggressive complications, such as necrotizing fasciitis, urethral fistula, partial penile amputation, penile necrosis, and concealed penis, have been reported [9,10]. Amputation commonly results from entrapment of the phallus between the blades of the clamp (bone-cutting forceps). It may also result from thermal injury due to the application of unipolar diathermy, or ischemic necrosis if epinephrine is injected. Death is rare, and mortality risk has been estimated to be 1/500,000 procedures [11].

In this work, I describe the guidelines we adopted in the management of 32 male patients afflicted with amputation of the shaft of the penis upon circumcision, presenting to a tertiary referral center through a period of 1 year.

Methods

The age range was 2 months–6 years. Most patients were between 6 months and 2 years of age. In 25 patients, injury was on account of circumcision with a clamp (bone-cutting forceps). The remaining seven cases suffered thermal injury by monopolar diathermy. In all patients, the tip of the remnant of the penis was flushed with the suprapubic skin (Figure 1). Twenty-three patients presented within 24 hours following an injury. Eight patients (seven of whom suffered a diathermy injury) presented later, mostly within 1 week. One patient had a trial at restoration and coverage with local groin skin flaps performed by a third party, ending up in a buried penis and mutilated groin.

Protocol of Management

Upon presentation, stabilization of the vital functions should be attended to. A written informed consent was obtained from the parents. Thorough counseling as to the realistic expectations for surgical restoration was offered.

Urinary diversion was established by catheterization or suprapubic cystostomy. A trial at catheterization was performed using a silicon catheter slightly less than the urethra can accommodate so

as not to impede vascularity. Suprapubic cystostomy should be placed as high as possible to clear the area for the intended repair technique: A-Y plasty. The wound was cleansed, necrotic tissues were debrided, and hemostasis was ensured without resorting to diathermy ablation.

The tips of the remaining corpora cavernosa buried within the suprapubic fat were assessed following debridement. If not ischemic and sepsis-free, surgical reconstruction could be commenced immediately (14 cases). Otherwise, surgical repair must be postponed until tissues are healthy, especially in cases of diathermy injuries and burns (18 cases).

Expectant Waiting

A time interval is necessary before full correction if the area is infected or the remaining corporeal tissues show signs of ischemia. Expectant waiting is also indicated if the patient is unfit for surgery. I generally recommend postponing the surgical repair till the sixth month of age, as tissues are of sufficient size by then, and the general condition is more favorable. Nevertheless, I did operate on a patient two months of age with no compromise of results.

Expectant waiting comprises the previously discussed steps of wound care and urinary diversion, in addition to antibiotic coverage, topical sterilization, and hydration of the area. Sterilization and hydration are achieved by daily cleansing of the exposed stump with antiseptic solution, followed by normal saline and coverage by lubricated gauze. Changing the gauze must be preceded by adequate moistening of the region to prevent peeling of the growing granulation tissues upon gauze removal. Topical treatment with nitrate-containing ointments has proven useful. As to urinary diversion, catheterization and meatotomy should be attempted. If unfeasible or is troublesome necessitating too frequent revisions, a suprapubic cystostomy or a surgical perineal urethrotomy may be considered. The latter (in our opinion) allows for long-term, catheter-free, continent diversion, with less incidence of cystitis. Being surgically created, its future closure should pose no problems. Meanwhile, the meatus should be calibrated as frequent as three times daily, if possible, to avoid total obliteration.

A progressive necrotic process afflicts part of the remaining penile shaft to variable degrees. It is crucial to wait until this maldestined tissue has fallen off and the process has ceased, or else this



Figure 1 Preoperative state: the penis is totally amputated. 254 × 269 mm (72 × 72 DPI).

tissue will undermine the results of the future repair by inviting infection and necrosis. The aforementioned measures are effective in reducing the rate of regression.

An alternative is “burial of the penis” within the suprapubic fat or scrotum, together with meatotomy. Burial of the stump into normal tissues provides vascular supply from without. This was accomplished by undermining the suprapubic region or scrotum to create space for the remnants. Adequate room was allowed to accommodate for the upcoming nocturnal erections in mind. Necrotic tissue was debrided down to healthy corpora. The tip of the urethra was spatulated and sutured to a slit in the abdominal or scrotal skin, such that the remnants were moderately stretched and encased in local tissues all around.

Upon future reconstruction, the penis is dug out and—in our experience—is always covered by healthy granulation tissues capable of adequately supporting skin grafts. The rate of tissue loss upon burial is much less than that in case the penis is left exposed. I highly recommend burial in cases of diathermy injury.

In addition to enhancing vascularity and protecting the remaining tissues, burial in the scrotum grants the penis a disk of pigmented skin on its summit, which is utilized to give the impression of a glans, as will be described later.

Restoration of the Shaft “Shaeer’s A-Y Plasty”

A circumferential incision (Figure 2) was cut to expose the remnant of the proximal corpora cavernosa. In case the remnant has been buried, the incision is placed around the meatotomy, incorporating a disk of skin. This is not necessary in cases presenting immediately after injury, considering that the gap between the severed penis and the pubic skin is not yet epithelialized. The disk of skin within the boundaries of the circumferential incision serves as a glans.

The fundiform and suspensory ligaments were exposed (Figure 3) and cut, flushed with and down to the lower border of the symphysis pubis. Care must be taken to avoid injuring the deep dorsal vein that will otherwise retract and necessitate a laparotomy for bleeding control. I prophylactically ligated the vein before cutting the ligaments by placing a figure-eight suture on either sides of the intended cut. The crura were mobilized off the pubic rami for a short distance. The released proximal corpora cavernosa and crura substituted the lost shaft to an adequate extent (Figure 4). However, the cavity between the released penis and the pubis pulled the former back to its original state, with total loss of the gained length.

In order to permanently push the released penis out of the cavity, “A-Y plasty” was performed [12]. An “A” was cut superficially into the pubic skin, with the base coinciding with the upper edge of



Figure 2 A circumferential incision is cut. 254 × 266 mm (72 × 72 DPI).



Figure 3 The fundiform and suspensory ligaments are isolated and cut 254 × 284 mm (72 × 72 DPI).



Figure 5 The "A" is incised. 254 × 335 mm (72 × 72 DPI).



Figure 4 A significant length of penis is released 254 × 301 mm (72 × 72 DPI).

the gap around the penis, wider than the base of the scrotal sac, and the vertical axis slightly longer than the base. The horizontal line of the "A" divides it into a "cranial triangle" and a "caudal rectangle" (Figure 5). The surrounding skin was undermined laterally and cranially, sparing the superficial blood vessels in the region, especially the superficial external pudendal vessels. Optical magnification was mandatory. Undermining should proceed in a superficial plane such that the "A" has a laterally based pedicle of adequate vascularity while still maintaining vascularity of the surrounding skin.

The caudal rectangle was deskinning, producing a "caudal fat rectangle" and a "cranial skin triangle" (Figure 6). The "A" was pushed caudally (forward), such that the "fat rectangle" descended into the cavity between the released penis and the pubis as an advancement flap, and the "skin triangle" was advanced forward to reach the released penis. The "fat rectangle" was sutured to the pubis (Figure 7). This filled up the cavity, preventing retraction of the released penis. The base of the skin triangle was sutured to the deepest possible point of the dorsum of the released penis, pulling it out and further securing it from retraction



Figure 6 The caudal rectangle is deskinning. The cavity between the penis and pubis is clearly depicted. 254 × 303 mm (72 × 72 DPI).

(Figure 7). To allow a resistance-free descent of the “fat rectangle,” the lower lateral corners of the “A” were released from their attachment to the surrounding fat, again while taking care to preserve the feeding vessels as much as possible.

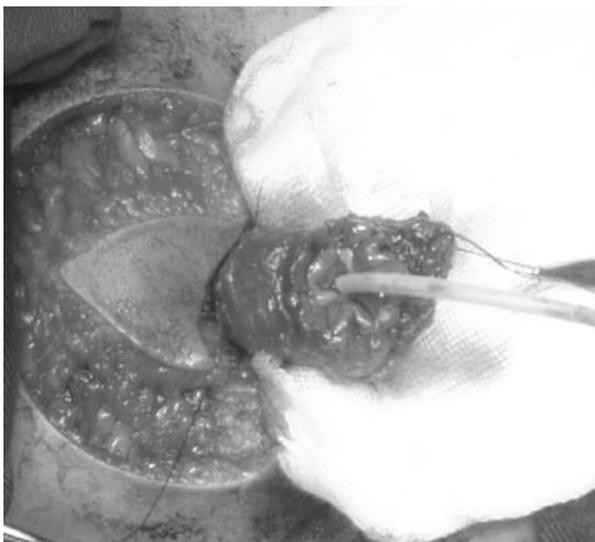


Figure 7 The fat flap is pushed into the cavity, and the released penis is secured to the base of the skin triangle. 254 × 230 mm (72 × 72 DPI).



Figure 8 The “A” is closed as a “Y”. 254 × 192 mm (72 × 72 DPI).

The skin that surrounds the “A” was sutured to the skin triangle as an inverted “Y” (Figure 8). This pushed the skin triangle caudally. Eventually, the released penis was permanently pushed out of the prepubic space by the fat flap, and pulled out by its attachment to the skin triangle.

Skin Coverage

Having completed the release of the phallus, Dartos muscle flaps were fashioned based on the scrotal septum. The flaps were wrapped around the released penis and were sutured to its summit (Figure 9). The Dartos flaps should be dissected to an adequate length to avoid shortening the penis by pulling it downward. They are intended to provide vascular support for the skin graft, especially in case of burns or diathermy injury. Dartos flaps are not necessary if the raw surface of the penis is of good vascularity, especially if it has been iatrogenically buried prior to reconstruction.

Skin coverage followed, either by a full-thickness graft or by a split-thickness graft. Full-thickness or thick split-thickness grafts are used in case the recipient site is adequately vascularized, and should not be used in cases of diathermy or thermal injuries, where thin split-thickness grafts are preferable, although they may need regrafting on account of high liability for contracture.

Full-thickness skin grafts were harvested from the gluteal or inguinal areas as two sheets, one from each side, with dimensions wider than those of the penis to accommodate for recoil and contracture. The width ranged from 3 cm to 5 cm according to the stretched length of the released penis. The length was an average of 10 cm. They may be



Figure 9 Dartos flaps are fashioned. 254 × 300 mm (72 × 72 DPI).

harvested from the medial thigh as one or more strip, 5–10 mm in width, and as long as 15–20 cm. Upon harvesting, graft thickness was usually around 0.5 cm. Grafts were defattened, wrapped around the released penis (in a spiral fashion in case of a thigh graft) (Figure 10), and sutured by fine absorbable sutures to the summit of the penis, to their own borders as they meet during wrapping, to the surface of the corpora, and eventually to the “skin triangle” and the lower lip of the circumpenile incision around the base (Figure 11). The graft should be snugged but not tight.

A glans-like shape of the summit was possible by preserving a disk of skin around the meatus as described earlier, or grafting the summit by a disk of skin separately from the shaft, and leaving a narrow area between the summit skin graft and the shaft skin graft to act as the coronal sulcus. This area may be grafted by a split-thickness graft.

The distal end of the urethra was spatulated. The mucosa was sutured to the skin graft and summit of the stump of the penis by absorbable sutures. In some cases, urethral advancement may be necessary to match the length of the released penis. A urethral catheter was left in place. The catheter should project out vertically. If the catheter falls back at the tip of the penis, it causes pressure atrophy of the graft. A concomitant



Figure 10 A full-thickness skin graft is wrapped around the penis. 254 × 285 mm (72 × 72 DPI).

suprapubic cystostomy may be necessary because smaller catheters are frequently displaced or blocked. The catheter should be frequently irrigated to avoid block.

The penis was dressed in lubricated gauze. Dressing is removed after 7–10 days unless it becomes soaked or infection ensues. The dressing should be removed carefully and slowly with copious saline irrigation to avoid sloughing of the graft in the process. The penis was thereafter left



Figure 11 Final outcome. 254 × 199 mm (72 × 72 DPI).

exposed and was cleansed daily. Urinary diversion was maintained until adequate graft take and resolution of edema, usually within 3–4 weeks. After removal of the catheter, the meatus always shows tendency for stenosis and obliteration on account of graft contracture. It is necessary to calibrate it three times daily for 6–12 months thereafter.

Results

In all 32 cases, the released penis was within the normal range of penile length for age, although this very range is controversial. The length was an average of 2 cm in patients less than 1 year of age, 3.4 cm between 1 and 6 years of age, compared with none at presentation. This favorable outcome was sustained through a minimum of 1-year follow-up, an average of 22 months. In many cases, the length subjectively matched the preamputation length, as subjectively reported by the parents, and was cosmetically acceptable (Figures 12–14). Nocturnal erections were reported in all patients starting 6 months following surgery.

All patients required calibration of the urethral meatus for 6–12 months. Afterward, most



Figure 12 Postoperative state. 254 × 202 mm (72 × 72 DPI).

patients who could be followed up had unhindered micturition. Most parents complained of sprinkling, which faded by the sixth month in most cases. Some patients had a slightly hypospadiac meatus.



Figure 13 An amputation-injury case. 152 × 47 mm (300 × 300 DPI).



Figure 14 A diathermy-injury case. 101 × 25 mm (300 × 300 DPI).

As of this writing, only one patient reached puberty. This patient reported a normal sexual function. The erect penis was measured as 11 cm in length and 9 cm in perimeter. Slight ventral curvature was noticed upon erection. A minor revision was performed where an area of contracture was released and regrafted. Curvature was thus eliminated. Neoglansplasty is planned for this patient by rectus abdominis island flap [13].

Patients who presented early and those with a cut injury demonstrated better and faster healing in comparison with those who presented late and those with a diathermy injury.

Discussion

Male circumcision remains one of the most commonly performed surgeries worldwide, whether because of medical or religious indications. Severe mutilation and disability have been reported as complications for the procedure.

In infants with amputation of the shaft, sex reassignment to females was resorted to, based on experience with intersex patients [14]. In older children with a clear gender identity, sex reversal is less favorable [15], outcome and eventual adaptation with one's phenotype being far from optimistic, not to mention that fertility is out of question.

An alternative is neophalloplasty, with a radial forearm free flap for instance. This staged procedure is performed around puberty, and not earlier, for several reasons including the higher difficulty of microsurgery in the pediatric age group, as well as unsuitability of the sizable neophallus for the prepubertal age. Unlike a normal penis, the neophallus does not harbor 5 α reductase enzyme. It will therefore grow in a somatic growth rate rather than the exponential genital growth rate at puberty. This is why the neophallus should be designed 60% larger than the size considered normal for the prepubertal age, hoping that future somatic growth will eventually yield a penis of normal size for adulthood [10].

Neophalloplasty as a solution for penile amputation generates several concerns. The child is left mutilated and deprived until the prepubertal period when neophalloplasty is feasible, with the consequent psychological distress. Neophalloplasty is surgically challenging, multistaged, and does have considerable failures and complications. Phallic growth into adulthood is questionable [10]. The functional characteristics of the neophallus are far behind the natural phallus.

"Shaeer's A-Y plasty" is capable of restoring the native phallus to an acceptable extent, both cosmetically and functionally. The length and diameter of the shaft were adequate, the impression of a glans was noticeable, micturition was normal, and erection was normal considering that most parents could confirm that their children manifested nocturnal erections. Naturally, the high erogenous sensibility of the glans cannot be restored. The procedure can be performed as early as 2 months of age, consequently sparing the patient and the parents from undue stress. Reconstruction does not require exceptional surgical skills as do neophalloplasty and sex reversal, and can be conducted in one session. Patients can live on the same gender line their nature dictates.

Although the results of our procedure in the single patient who reached puberty are encouraging, the full-blown picture is yet to be seen. As I wait for the rest of our patients to reach puberty and reevaluate the results of our approach, I can recommend it as an option other than sex reversal.

The hazards of male circumcision should be emphasized to physicians as well as to the public. Guidelines of surgical reconstruction should be established and popularized, and so should be the protective measures to prevent circumcision injuries in the first place, including prohibition of circumcision by nonmedical personnel, prohibition of the use of diathermy, discouragement of the use of bone-cutting forceps, and recommendation of circumcision by surgical dissection, which I believe is the safest method of all.

Conclusion

"Shaeer's A-Y plasty" is capable of restoring the native phallus following amputation, with preservation of both gender identity and physiological characteristics of the penis to a large extent.

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