

Modified partial circumcision for phimosis: techniques and surgical outcomes

Salvatore Arena, Pietro Impellizzeri, Saveri Parisi, Patrizia Perrone, Tiziana Russo and Carmelo Romeo

Objectives In the last years, many surgical techniques of preputioplasty have aimed to preserve the foreskin in case of phimosis. These techniques are not reliable for patients affected by phimosis linked to balanitis xerotica obliterans (BXO) and scarred foreskin. We tried an original technique of resection of the pathological foreskin, removing the mucosal internal layer followed by reconstruction of the foreskin. The aim was to evaluate the outcome of paediatric patients who underwent modified partial circumcision for pathological phimosis.

Patients and methods In all, 360 patients with phimosis underwent modified partial circumcision at our institution. The mean age of the boys was 8.9 years, range 5–15 years. In 145 (40.3%) cases, indication for surgery was clinical suspicion of BXO, in 215 (59.7%) cases it was chronic inflammation of the foreskin.

Results In all cases, the postoperative period was uneventful. Cosmesis was considered by parents as excellent in 95.2% of patients. In these patients, the glans was almost completely covered by soft foreskin. Histopathological examination of the removed foreskin

documented BXO in 162 (45%). Twelve (3.3%) patients complained of recurrences and five (1.4%) patients of smegmatic cysts.

Conclusion The described surgical technique of modified partial circumcision for the correction of pathological phimosis appears cosmetically well accepted, safe, and simple with low rate of late postoperative complications. *Ann Pediatr Surg* 14:151–156 © 2018 Annals of Pediatric Surgery.

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Introduction

Circumcision is the amputation of the foreskin, resulting in a permanent alteration of the anatomy and histology of the penis [1–3]. It is a very common procedure in the USA, where up to 85% of boys and men are circumcised, while it is not so frequent in Europe [3]. Usually, boys and appreciably fewer adult men are circumcised for three reasons: first of all, it is considered a religious ritual; second, it is a prophylactic measure against future ailments (reducing the risk of penile cancer, urinary tract infection, and sexually transmitted diseases); and third, it is performed for medical indications [4]. The latter reason represents the subject of this article. Phimosis is defined as an abnormal tightness of the foreskin, preventing it being retracted over the tip of the penis. Pathological phimosis due to balanitis xerotica obliterans (BXO), affecting 0.8–1.5% of boys [5,6] and recurrent balanoposthitis, involving about 1% of boys [7] are reported as indications for circumcision. For these indications, less than 2.5%, by a generous estimation, of boys requires circumcision.

It is known that the foreskin is a primary, erogenous tissue necessary for normal sexual function [8]. In this way, surgical amputation of the foreskin removes many of the fine-touch corpuscular receptors from the penis. Moreover, the residual exposed glans mucosa becomes abnormally keratinized with an increase in the number of cell layers in granular mucosal epithelium, reducing sensitivity.

Research exploring sexual functioning across circumcision status has produced mixed results [9]. In this regard, the absence of fine-touch receptors, a desensitized glans, and

the impossibility of an erogenous mobility of the prepuce might necessitate inordinate stimulation of residual penile nerve endings to achieve pleasure and orgasm [9–11]. Furthermore, many circumcised men reported that restoration of the foreskin resolved the unnatural dryness of the circumcised penis, which caused abrasion pain or bleeding during intercourse and that restoration offered unique pleasures, which enhanced sexual intimacy [9,12,13]. Moreover, 0.9–7.29% of circumcised men complained of meatal stenosis [14,15].

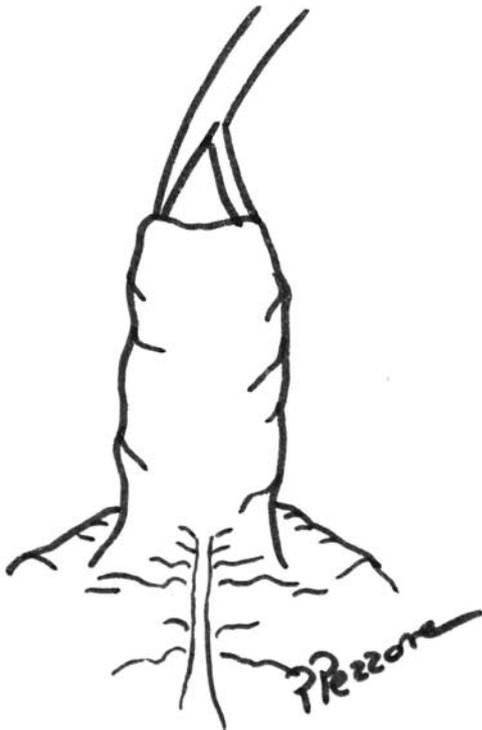
Some authors developed alternative procedures to circumcision for men who required surgery for phimosis, such as preputioplasty [16–19], to preserve corpuscular sensory receptors, dartos muscle, and complete function of the penis, thus avoiding abnormal exposure and keratinisation of the glans. However, for BXO-related phimosis, preputioplasty is not indicated as the affected foreskin is not removed. We have developed a technique of modified partial circumcision for paediatric patients affected by 'pathological' phimosis, removing the stenotic region and the internal layer of the foreskin but almost completely preserving the foreskin. In our opinion, this technique allows a cover for the glans, maintains the function of the foreskin, and avoids recurrence of phimosis with good cosmetic results.

Patients and methods

The study was approved by the Institutional Review Board. Between January 1998 and August 2009, 360 consecutive patients with 'pathological' phimosis underwent modified

partial circumcision at our institution. After informed consent of parents, all the patients underwent surgery as day cases under both general and locoregional infiltration anaesthesia (bupivaine 0.5% plain). The mean age of the boys was 8.9 years, range 5–15 years. In 145 (40.3%) cases, the indication for surgery was the clinical suspicion of BXO as a cause of troublesome phimosis. In 215 (59.7%) cases, the indication for surgery was the fibrotic scar of the preputial orifice after attempts to shift the foreskin with its radial laceration and fibrotic scar formation (chronic inflammation of the prepuce).

Fig. 1



Dilation of the stenotic preputial hole using clips and exposing the glans.

Surgical technique

After dilation of the stenotic preputial hole using clips and exposing the glans (Fig. 1), a frenulectomy using a bipolar is performed. Then, the foreskin is retracted, and a circumferential incision is made 0.5–1.0 cm proximal to the coronal sulcus, depending on the penile length (Fig. 2a and b). Two Allis' forceps are located on the edge of the prepuce, performing a light traction and a demarcation of the fibrotic preputial tissue that needs to be removed is carried out using a forceps (Fig. 3a and b). Thus, the foreskin is excised circumferentially with monopolar diathermy (Fig. 4a and b). Then, the foreskin is retracted, and the remnant mucosal epithelium is excised circumferentially (Fig. 5a–d). If necessary, the bleeding vessels are gently cauterized or tied off with 6–0 absorbable sutures.

The residual preputial skin is then sutured to the distal mucosal skin with a stitch in the dorsal midline and two ventral stitches on each side of the frenulum. These sutures can be used for gentle traction. The remaining preputial skin is sutured to the distal mucosal skin with 5–0 absorbable interrupted sutures (Fig. 6a and b). The reconstructed foreskin is gently pulled up to allow cover of the glans. In this way, the suture line lies on the internal part of the preputial sac (Fig. 7a and b). The removed prepuce is sent for histological examination. The patients were discharged the same day of the surgical procedure with topic antibiotic therapy for 7 days. In all patients with histological diagnosis of BXO, a local treatment with 0.05 clobetasol propionate was performed, according to the Pugliese *et al.* protocol [20]. In particular, one application per day for 4 weeks, then one application every 48 h for another 4 weeks and, subsequently, two applications per week for 1 month was followed.

Results

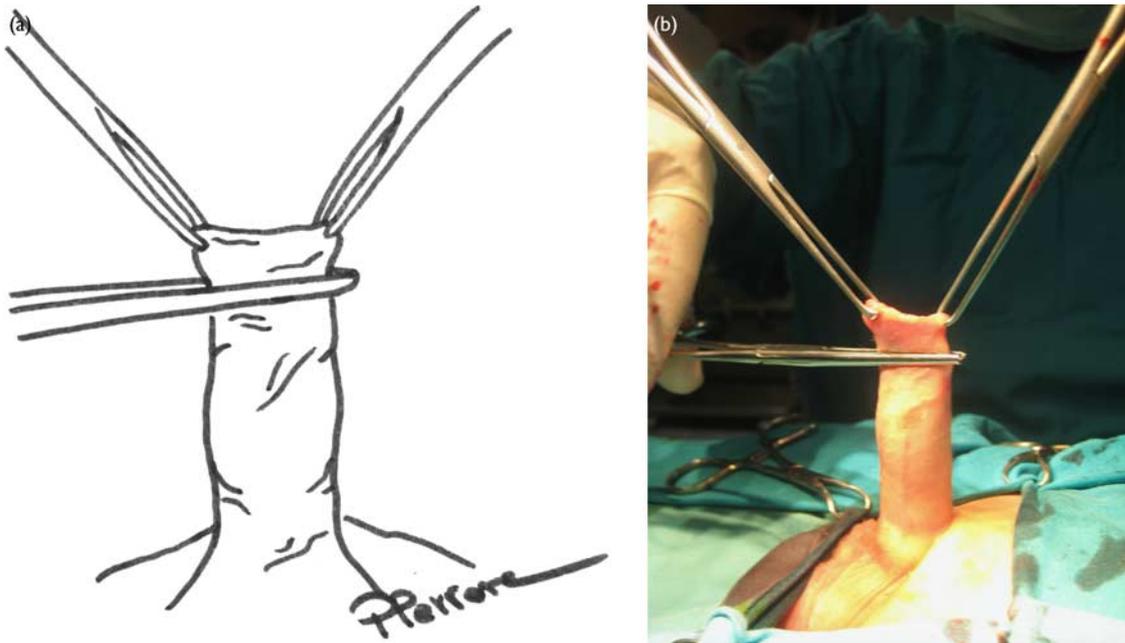
In all the cases, the postoperative period was uneventful, and no complications were reported. An outpatient follow-up was carried out at 1, 12 and 24 months. Cosmesis was considered excellent by parents in 95.2% of patients. In these patients, the glans was almost completely covered by soft foreskin, normally running upon the glands.

Fig. 2



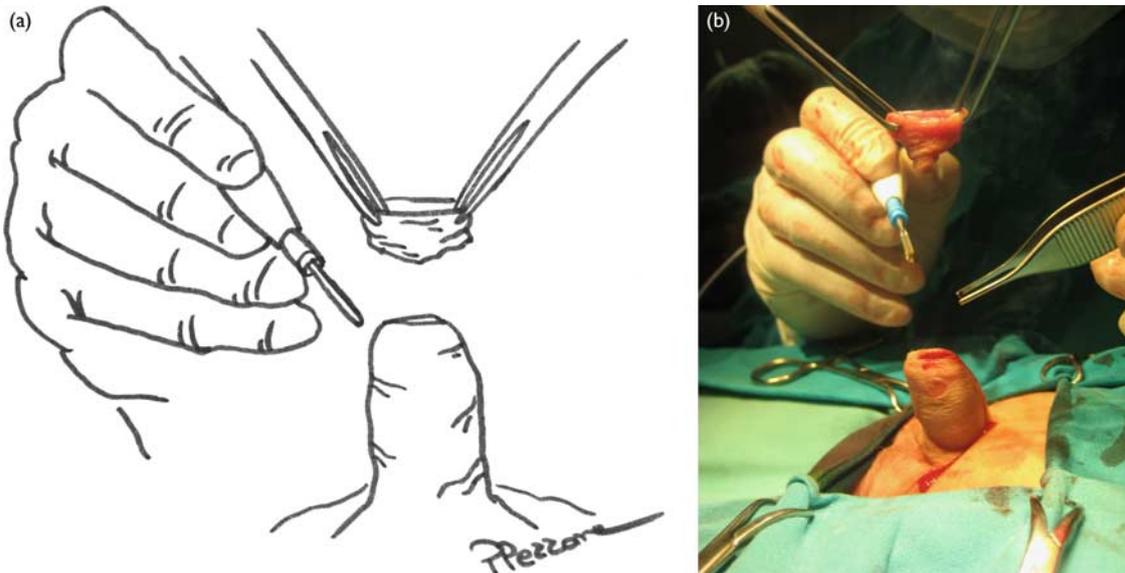
(a, b). Retraction of the foreskin and circumferential incision 0.5–1.0 cm proximal to the coronal sulcus.

Fig. 3



(a, b). Two Allis' forceps are located on the edge of the prepuce, performing a light traction and demarcation of the fibrotic preputial tissue that needs to be removed using a forceps.

Fig. 4



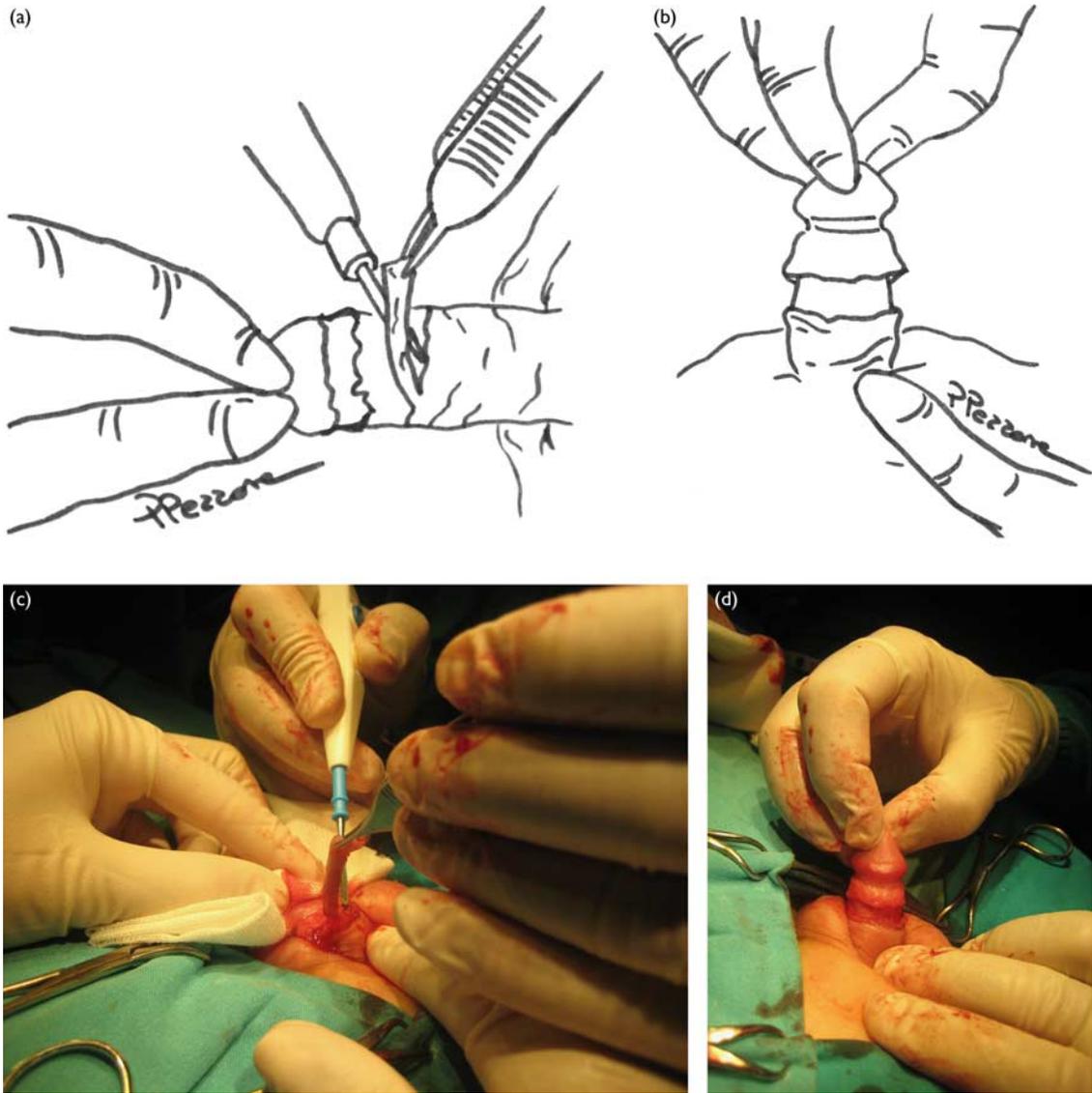
(a, b). Excision of the foreskin circumferentially with monopolar diathermy.

No surgical scar was seen (Fig. 8). Histopathological examination of the removed foreskin documented the characteristic findings of BXO in 162 (45%). In the remaining 198 (55%) cases, light microscopy showed nonspecific fibrosis. Twelve (3.3%) patients of which nine with histological diagnosis of BXO, complained of recurrence and a radical circumcision was performed. In five (1.4%) cases, a smegmatic cyst was noted for the presence of mucosa lamina propria along the suture line. In these cases, surgical resection of the smegmatic cyst was performed.

Discussion

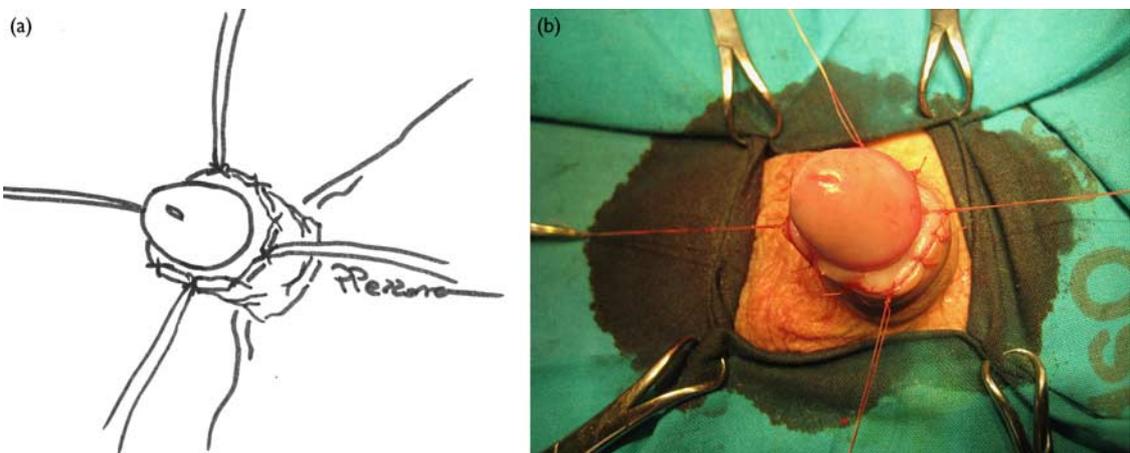
Without knowledge of the normal development of the penis, some physicians advocate childhood circumcision as a surgical treatment of normal anatomy [2]. For this reason, it has been estimated that the number of circumcision performed for medical reasons is less than 10% of all performed circumcision [21]. The foreskin is considered a main, erogenous tissue necessary for normal sexual function [2] and it is unclear if amputation of the foreskin might cause changes in sexual behaviour in men [9,22–24].

Fig. 5



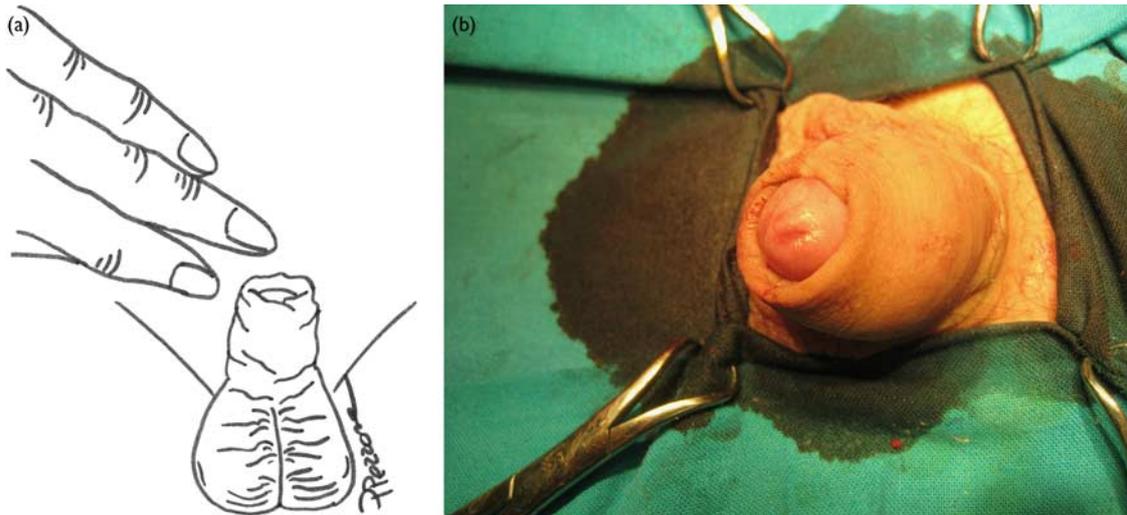
(a-d). Retraction of the foreskin and excision of remnant mucosal epithelium circumferentially.

Fig. 6



(a, b). Sutures between residual preputial skin and distal mucosa layer.

Fig. 7



(a, b). Final aspect of the penis: The suture line lies on the internal part of the preputial sac.

Fig. 8



Penis 24 months after surgery.

It has been suspected that the increased frequency of masturbation, anal intercourse, and fellatio reported by circumcised men in the USA might be due to the sensory imbalance caused by circumcision [25]. Furthermore, it has also been reported that woman preferred vaginal intercourse with an anatomically complete penis over a circumcised penis, which causes abrasion, pain, or bleeding during intercourse [25].

Many circumcised men complained of an annoying dryness and it has been reported that restoration of the foreskin resolves the unnatural dryness of the circumcised penis [12]. Uncircumcision, the procedure restoring the foreskin, has been performed from antiquity [13] and one of the first detailed descriptions of the operative technique was performed by Celsus [26].

In the last few years, many surgical techniques of preputioplasty have aimed to preserve the foreskin in

the case of phimosis [16–19]. Unfortunately, these techniques have not been proven reliable for patients affected by phimosis linked to BXO and in patients with scarred foreskin as these preputioplasties leave the pathological foreskin *in situ*. Furthermore, traditional partial circumcision, leaving the residual pathological foreskin behind, is often followed by recurrent cases, 50% in Becker's experience [27].

To resolve these issues, we tried this original surgical technique of resection of pathological foreskin, removing the mucosal internal layer followed by the reconstruction of the foreskin using the remaining unaffected cutaneous external layer, thus allowing an almost complete coverage of the glans.

Moreover, this technique, almost completely preserving the foreskin, appears well accepted by patients and parents, also because circumcision is considered as a mutilation in Europe. Moreover, using this technique, the suture line lies on the internal part of the balanopreputial sulcus with a very good cosmetic appearance of the penis. To reduce the incidence of recurrences of BXO in the remaining foreskin, meatus and urethra, we suggest pharmacological treatment with 0.05% clobetasol propionate [20,28,29]. In this manner, phimosis recurrence is 3.3% using this technique even if BXO could be considered as a risk factor [30]. In our experience, a recurrence occurred in 5.5 and 1.5% of patients with or without BXO, respectively. We believe that a complete resection of the lamina propria of preputial mucosa is mandatory to avoid the formation of smegmatic cysts: Tyson's glands, the source of smegma, are allocated in the mucosal lamina propria [2].

Conclusion

The surgical technique of modified partial circumcision that we have described above for the correction of pathological phimosis is safe and simple. Cosmetically, it is well accepted by patients and parents, with low rate of

late postoperative complications and with an acceptable rate of recurrence. We believe that a prospective study evaluating the satisfaction of sexually active patients who underwent modified partial circumcision could be useful.

Conflicts of interest

There are no conflicts of interest.

References

- Taylor JR, Lockwood AP, Taylor AJ. The prepuce: specialized mucosa of the penis and its loss to circumcision. *Br J Urol* 1996; **77**:291–295.
- Cold CJ, Taylor JR. The prepuce. *BJU Int* 1999; **83 (Suppl)**1:34–44.
- Rickwood AM. Medical indications for circumcision. *BJU Int* 1999; **83 (Suppl)**1:45–51.
- Rickwood AM, Hemalatha V, Batcup G, Spitz L. Phimosis in boys. *Br J Urol* 1980; **52**:147–150.
- Escala JM, Rickwood AM. Balanitis. *Br J Urol* 1989; **63**:196–197.
- Jayakumar S, Antao B, Bevington O, Furness P, Ninan GK. Balanitis xerotica obliterans in children and its incidence under the age of 5 years. *J Pediatr Urol* 2012; **8**:272–275.
- Elder JS. Circumcision. *BJU Int* 2007; **99**:1553–1564.
- Winkelman RK. The erogenous zones: their nerve supply and its significance. *Proc Staff Meet Mayo Clin* 1959; **34**:39–47.
- Bossio JA, Pukall CF, Steele S. A review of the current state of the male circumcision literature. *J Sex Med* 2014; **11**:2847–2864.
- Halata Z, Munger BL. The neuroanatomical basis for the prostatic sensibility of the human glans penis. *Brain Res* 1986; **371**:205–230.
- Halata Z, Spaethe A. Sensory innervation of the human penis. *Adv Exp Med Biol* 1997; **424**:265–266.
- Hammond T. A preliminary poll of men circumcised in infancy or childhood. *BJU Int* 1999; **83**:85–92.
- Brandes SB, McAninch JW. Surgical methods of restoring the prepuce: a critical review. *BJU Int* 1999; **83**:109–113.
- Van Howe RS. Incidence of meatal stenosis following neonatal circumcision in a primary care setting. *Clin Pediatr (Phila)* 2006; **45**:49–54.
- Yegane RA, Kheirollahi AR, Salehi NA, Bashashati M, Khoshdel JA, Ahmadi M. Late complications of circumcision in Iran. *Pediatr Surg Int* 2006; **22**:442–445.
- Cuckow PM, Rix G, Mouriquand PD. Preputial plasty: a good alternative to circumcision. *J Pediatr Surg* 1994; **29**:561–563.
- De Castella H. Prepuceplasty: an alternative to circumcision. *Ann R Coll Surg Engl* 1994; **76**:257–258.
- Nieuwenhuijs JL, Dik P, Klijn AJ, de Jong TP. Y-V plasty of the foreskin as an alternative to circumcision for surgical treatment of phimosis during childhood. *J Pediatr Urol* 2007; **3**:45–47.
- Impellizzeri P, Turiaco N, Antonuccio P, Manganaro A, Romeo C. [Preputioplasty in the treatment of phimosis in pediatric age. Indications and results]. *Minerva Pediatr* 2006; **58**:15–19.
- Pugliese JM, Morey AF, Peterson AC. Lichen sclerosus: review of the literature and current recommendations for management. *J Urol* 2007; **178**:2268–2276.
- Ceylan K, Burhan K, Yilmaz Y, Can S, Kuş A, Mustafa G. Severe complications of circumcision: an analysis of 48 cases. *J Pediatr Urol* 2007; **3**:32–35.
- Laumann EO, Masi CM, Zuckerman EW. Circumcision in the United States. Prevalence, prophylactic effects, and sexual practice. *JAMA* 1997; **277**:1052–1057.
- Hosseini SR, Mohseni MG. Effect of timing of circumcision on sexual satisfaction and function. *Open J Urol* 2011; **1**:8–10.
- Kim D, Pang MG. The effect of male circumcision on sexuality. *BJU Int* 2007; **99**:619–622.
- O'Hara K, O'Hara J. The effect of male circumcision on the sexual enjoyment of the female partner. *BJU Int* 1999; **83**:79–84.
- Rubin JP. Celsus' decircumcision operation: medical and historical implications. *Urology* 1980; **16**:121–124.
- Becker K. Lichen sclerosus in boys. *Dtsch Arztebl Int* 2011; **108**:53–58.
- Folaranmi SE, Corbett HJ, Losty PD. Does application of topical steroids for lichen sclerosus (balanitis xerotica obliterans) affect the rate of circumcision? a systematic review. *J Pediatr Surg* 2018. [Epub ahead of print].
- Celis S, Reed F, Murphy F, Adams S, Gillick J, Abdelhafeez AH, et al. Balanitis xerotica obliterans in children and adolescents: a literature review and clinical series. *J Pediatr Urol* 2014; **10**:34–39.
- Schellhammer PF, Jordan GH, Robey EL, Spaulding JT. Premalignant lesions and nonsquamous malignancy of the penis and carcinoma of the scrotum. *Urol Clin North Am* 1992; **19**:131–142.