

Annette Schröder

---

## Introduction

At this time, there is insufficient data to recommend routine neonatal circumcision. Although there are potential benefits and risks, the procedure is usually not essential to the child's well being (Shapiro [39]).

Circumcision is the most frequently performed operation in the world. This circumstance is due to the fact that it is mostly performed for cultural and religious reasons in many countries. The controversies on whether or not it should be performed without a sound medical indication are immense, as is the spectrum of different opinions what actually constitutes such an indication, even in countries not performing it routinely. Equally diverse are the beliefs regarding a possible benefit of routine circumcision including hygiene, UTIs, transmission of STDs, penile cancer, and many papers that actually take sides in these matters are followed by several editorial comments and correspondences.

Gairdner stated in 1949 that the foreskin actually may have the important function of covering the glans and protecting it from urine at an age when the baby is incontinent, and the glans otherwise would be constantly exposed to sodden diapers [15].

---

A. Schröder, M.D., Ph.D.  
Department of Paediatric Urology,  
Hospital for Sick Children, University of Toronto,  
Toronto, ON, Canada  
e-mail: ask@guidetocircumcision.com

Considering that circumcision, regardless how commonly performed, is a surgical procedure that can potentially have severe complications, the benefits should be in balance with the risks.

---

## What Is a Physiological Phimosis?

The decision whether or not a phimosis is physiological and will resolve without intervention can be difficult, even for health care professionals, as clear-cut parameters cannot not always be applied [26]. In a British study, only 25% of the boys referred for circumcision actually required surgery [19]; a group from Canada only operated 14.4% of the 284 referred boys [13].

## Physiological Phimosis

The presence of phimosis naturally depends on the boy's age, the incidence decreasing without intervention to 8% at reaching school age and 1% at puberty [15].

The term "physiological" could simply be defined as nonretractile foreskin in the absence of problems such as pain, infections, and scars at prepubertal age. Even ballooning of the foreskin does not constitute a pathology, as long as the stream is sufficient [15]. When retracting a physiologically phimotic foreskin, it will exhibit a "flowering"; the meatal orifice is rarely visible [25].

## Pathological Phimosis

Abnormalities and scars of the prepuce opening constitute a pathological condition. Often the meatal orifice is visible even without retracting the foreskin. At retraction, the prepuce opening will not widen but stretch to a white fibrous ring, nor does the “flowering” occur [27]. The most distinct form of a pathological phimosis is the lichen sclerosis (see Chap. 17), which will be described in detail below.

## Indications for Treatment (Not Necessarily Circumcision)

There are purported reasons for circumcision including balanitis, paraphimosis, painful erection, and smegma retention. In addition, over the past years many claimed that the positive effect of circumcision on transmission of STD constituted a medical indication for circumcision. However, these are mostly relative indications, not written in stone.

In the light of the availability of topical steroids for effective treatment of phimosis, defining the indication for surgical intervention is difficult. Generally spoken, it can be said that a conservative approach by application of steroids is justified in all cases, except for lichen sclerosis and circumcision for prevention of recurrent infection.

Balanoposthitis is an inflammation of glans and foreskin, whereas balanitis is confined to the glans. Reddening, severe swelling, and often putrid discharge may cause dysuria and can in severe cases cause the child to retain urine. Most cases are self-limited or can be treated by simple local measures as bathing or antibiotic ointment; in some cases, systemic antibiotic treatment is needed. However, it rarely reoccurs or leaves scars, therefore only recurrent attacks or severe scarring justify circumcision [13].

Trapping of the glans behind the corona by a withdrawn phimotic foreskin can cause severe swelling of the distal penis, leading to paraphimosis. Manual reposition is mostly possible; only rarely a dorsal slit is needed. Circumcision should not be performed at the time of the incidence, as

cosmetic outcome maybe poor due to the severe edema. As the foreskin usually continues to develop normally after the incident, circumcision is not routinely indicated, in particular, as the cosmetic outcome of a dorsal slit is usually satisfactory [8, 9, 27].

If erection hurts, usually a phimotic band causes pain during erection. Almost invariably it can be treated successfully by local steroids [22, 23, 28, 31, 34, 35, 53].

Smegma retention cysts, also referred to as prepuce pearls, often worry the parents [29]. However, they are common, physiological, and are actually contributing to the separation of the foreskin from the glans [27, 30]. Furthermore, Smegma in childhood is sterile, so there is no indication for circumcision.

## Indications for Circumcision

Lichen sclerosis or balanitis xerotica obliterans (BXO) is a chronic inflammatory disease of unknown etiology that can affect the foreskin, glans, frenulum, meatus, and urethra [36]. The clinical appearance is usually easy to recognize, mostly being a severe phimosis with white sclerotic scarring of the prepuce (see Chap. 17) [5].

Apparently, the incidence of BXO in children has long been dramatically underestimated, being considered a rather rare event, an assumption being proven false by several recent studies [16]. A British group found histological confirmation of BXO in 12.1% of the boys referred to their clinic [51]; an earlier study from Hungary found BXO in 1,178 boys as often as in 40% of the cases [20].

A similar degree of underestimation appears to exist regarding the risk of penile cancer development in context with BXO. A prospective study found BXO in 28% of men operated for penile cancer [33].

After circumcision and confirmation of BXO, a close and long-term follow-up is needed as progression of the disease is possible, causing meatal stenosis in the short run and penile cancer in the long run. Topical application of tacrolimus

ointment (off-label) shortly after surgery was shown to be a safe measure of preventing progression of the disease in 20 boys [11]. In light of the possible progress, the availability of preventive measures, and the possible malignant degeneration, it is advisable to always perform histological investigation of the tissue [5].

Recurrent balanitis/balanoposthitis is one of the rare medical indications for circumcision [25].

### Considerations Besides Phimosis

In 1982, Ginsburg reported that the occurrence of UTI in boy was significantly decreased after circumcision [17]. Several studies by Wiswell et al. confirmed this finding [48–50]. However, a meta-analysis comprising the data of more than 400,000 children revealed that only those children profit from circumcision who have a significantly increased risk for recurrent UTI, that is, children with abnormalities of the upper urinary tract, in particular dilating vesicoureteral reflux (VUR), or those with recurrent UTI [40]. The newly released AUA guideline on VUR suggests circumcision of boys with VUR of any degrees merely as an option [32]. After surgical correction of the VUR, however, Kwak et al. found no difference in the occurrence of UTI comparing boys circumcised during antireflux surgery with those not circumcised [21].

Three large RTC in South Africa, Kenya, and Uganda were terminated, as interim analysis showed a significant protective effect against transmission of HIV after circumcision [2, 3, 18]. However, it has to be taken into consideration that AIDS in those countries has endemic proportions and the degree of education, knowledge of ways of transmission of and protection from STDs (i.e., condom use; avoidance of risky sexual practices and promiscuity) cannot be compared with that in most societies.

Therefore, the degree of benefit demonstrated in these studies can hardly be readily applied to the rest of the world, neither should it be even suggested that circumcision “protects” from HIV transmission as safe sex practices do.

The assumption that circumcision evidently protects from HPV infection is subject to much

debate. Van Howe contradicted that claim in a meta-analysis, reasoning that there was a significant sampling error in those studies supporting this assumption [45]. However, his appraisal is controversial, and further RCT have to be awaited [6].

It is unarguably true that penile cancer occurs less often in circumcised men; however, the mere presence of the foreskin does not constitute a risk of developing penile cancer. Several factors other than not being circumcised after birth appear to contribute to the incurrence of penile cancer, including smoking, promiscuity, HPV infection, history of penile rash, and penile tear. The study suggesting the above risk factors included 42% previously circumcised men at some point in their lives with penile cancer [10, 24]. Even cases of penile cancer after neonatal circumcision were published [37].

The wrong assumption that children do not suffer from pain in the neonatal period was partly based on the publication of Swafford and Allan in 1968, who stated that “pediatric patients seldom need medication for relief of pain. They tolerate discomfort well.” [41]. Neonatal circumcision is, therefore, even nowadays often performed without anesthesia. In a prospective randomized placebo controlled study, Taddio et al. found that neonatal circumcision performed with and without local anesthesia compared to uncircumcised children, resulted in a long-lasting effect in pain response; at the time of vaccination later in life, there was an increasing pain score, which was lowest in the uncircumcised group, and highest in those circumcised with placebo only [42]. The American Academy of Pediatrics and the International Evidence-Based Group for Neonatal Pain both recently strongly recommended the use of one of the following anesthetic techniques during newborn male circumcision: local anesthesia including application of a lidocaine or prilocaine cream such as EMLA<sup>®</sup> before the procedure, a dorsal nerve block, or a subcutaneous ring block [39].

Being operated on without anesthesia (even under local anesthesia) can cause severe distress at any age [47]; in most European countries, sedation at the least or general anesthesia, therefore, is common practice.

One of the most vigorously discussed subjects is regarding the effect of circumcision on penile sensitivity and sexual satisfaction. Most studies on sexual function after circumcision concern patients being circumcised as adults, showing small differences in either way. Some men had a longer ejaculatory latency time and considered it beneficial after being circumcised as adults [38].

A comparative analysis was conducted on 125 men (62 uncircumcised/63 neonatally circumcised) using a battery of quantitative somatosensory tests including vibration, pressure, spatial perception, and warm/cold thermal thresholds. The authors concluded that circumcision status does not significantly alter the quantitative somatosensory testing results at the glans penis [4]. An experimental study showed that the foreskin, being a double invagination of skin that covers the glans and unfolds with intromission, facilitates intromission significantly (measured by force in g), compared to the exposed glans [43]. However, there are many factors influencing sexual satisfaction, so far – to the author’s knowledge – no study has convincingly proven a benefit in sexual function, justifying neonatal circumcision.

### Complications of Circumcision

Circumcision is considered by many the teaching case per se and is, therefore, often performed by inexperienced surgeons. Sadly, in many countries it is performed by medical laypersons. However, considering the impact of complications, no matter how insignificant from the medical point of view, they can cause the need of further operation and can be devastating for the child. Therefore, circumcision must not be regarded as trivial.

The overall complication rate of 1.5% is low, but given the number of circumcisions performed worldwide, the number of affected children is enormous. Most complications are rather harmless, such as minor hemorrhage, inadequate skin excision, skin bridges or meatal stenosis, but many of these cases nonetheless require additional surgery [46]. In infants, meatal ulceration is not uncommon; it is hypothesized that with the missing protection of the foreskin, the glans

becomes susceptible to injury from contact with sodden nappies [14]. The incidence of meatal stenosis after neonatal circumcision can be as high as 7.29% [44, 52].

Serious complications include amongst others severe hemorrhage, sepsis, urethral fistulas, glans necrosis, penile denudation, penile loss, and Fournier gangrene [1, 7, 12, 47]. Although the majority of the severe complications occurred in the hands of inexperienced operators who were neither urologists nor surgeons [12, 46], complete attention to the details of this procedure has to be paid.

### Contraindications

In case of an anatomical anomaly, circumcision should be avoided, as usually more complex surgical procedures are required. This applies particularly to hypospadias and the concealed penis (see Chap. 5).

### Summary

Currently, there are insufficient data to justify surgical intervention just because of the mere presence of a foreskin, nor that of a phimosis in most cases. Harmless symptoms as ballooning or smegma retention cysts do not indicate surgery. The popular arguments of a protective effect from STDs or benefits regarding sexual function are controversial and these arguments need to be brought forward in a realistic and objective way, considering that circumcision is after all a surgical case, causing pain and possible complications.

The few medical indications for circumcision include recurrent infections and lichen sclerosis.

#### Editors’ Note

Many young boys who are referred for circumcision have already been incorrectly labeled as having a pathological condition. The family, thus, often brings their child to

the urologist/surgeon with the expectation that circumcision is required. Even with reassurance that smegma is normal or that an asymptomatic 1-year-old boy with an incompletely retractile foreskin does not have true phimosis, many families (and their referring doctors) still want circumcision to be performed. In the USA, there has been poor education of the primary care provider as to what normality of the foreskin truly is, and how to care for the retained foreskin. Because of centuries of American circumcision, the patient and/or family also has had little experience with care and appearance of the penis with an intact prepuce. As subspecialists, it can often become uncomfortable when discussing why perhaps a circumcision may not necessarily be required in many of these young boys.

Most complication articles deal with acute complications after neonatal circumcision. As pediatric urologists, we often are seeing the full spectrum of complications after circumcision, especially in USA, where this procedure is done more frequently than other countries. Most indeed are cosmetic and are minor, but some truly are severe and devastating. The majority of such complications are seen months or years after a neonatal circumcision, not acutely. I thus would hazard a guess that the true complication rate for circumcision is far, far higher than those reported in the literature. The costs of repairing those complications are extraordinarily high, as most require a general anesthetic and day surgical procedure. Thus cost-benefit analyses can be very inaccurate when looking at the issue of circumcision.

## References

1. Agrawal A, Parelkar S, et al. Multiple circumferential urethrocutaneous fistulae: a rare complication of circumcision. *J Pediatr Urol.* 2009;5(3):240–2.
2. Auvert B, Taljaard D, et al. Randomized, controlled intervention trial of male circumcision for reduction

- of HIV infection risk: the ANRS 1265 Trial. *PLoS Med.* 2005;2(11):e298.
3. Bailey RC, Moses S, et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet.* 2007;369(9562):643–56.
4. Bleustein CB, Fogarty JD, et al. Effect of neonatal circumcision on penile neurologic sensation. *Urology.* 2005;65(4):773–7.
5. Bochove-Overgaauw DM, Gelders W, et al. Routine biopsies in pediatric circumcision: (non) sense? *J Pediatr Urol.* 2009;5(3):178–80.
6. Castellsague X, Albero G, et al. HPV and circumcision: a biased, inaccurate and misleading meta-analysis. *J Infect.* 2007;55(1):91–3; author reply 93–6.
7. Ceylan K, Burhan K, et al. Severe complications of circumcision: an analysis of 48 cases. *J Pediatr Urol.* 2007;3(1):32–5.
8. Choe JM. Paraphimosis: current treatment options. *Am Fam Physician.* 2000;62(12):2623–6, 2628.
9. Cuckow PM. Foreskin. In: Gearhart JP, Rink RC, Mouriquand P, editors. *Pediatric urology.* Philadelphia: W.B. Saunders; 2010.
10. Daling JR, Madeleine MM, et al. Penile cancer: importance of circumcision, human papillomavirus and smoking in in situ and invasive disease. *Int J Cancer.* 2005;116(4):606–16.
11. Ebert AK, Rosch WH, et al. Safety and tolerability of adjuvant topical tacrolimus treatment in boys with lichen sclerosus: a prospective phase 2 study. *Eur Urol.* 2008;54(4):932–7.
12. Eke N. Major surgical complications from minor urological procedures. *J Natl Med Assoc.* 2000;92(4):196–9.
13. Escala JM, Rickwood AM. Balanitis. *Br J Urol.* 1989;63(2):196–7.
14. Freud P. The ulcerated urethral meatus in male children. *J Pediatr.* 1947;31(2):131–41.
15. Gairdner D. The fate of the foreskin, a study of circumcision. *Br Med J.* 1949;2(4642):1433–7, illust.
16. Gargollo PC, Kozakewich HP, et al. Balanitis xerotica obliterans in boys. *J Urol.* 2005;174(4 Pt 1):1409–12.
17. Ginsburg CM, McCracken Jr GH. Urinary tract infections in young infants. *Pediatrics.* 1982;69(4):409–12.
18. Gray RH, Kigozi G, et al. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet.* 2007;369(9562):657–66.
19. Griffiths D, Frank JD. Inappropriate circumcision referrals by GPs. *J R Soc Med.* 1992;85(6):324–5.
20. Kiss A, Kiraly L, et al. High incidence of balanitis xerotica obliterans in boys with phimosis: prospective 10-year study. *Pediatr Dermatol.* 2005;22(4):305–8.
21. Kwak C, Oh SJ, et al. Effect of circumcision on urinary tract infection after successful antireflux surgery. *BJU Int.* 2004;94(4):627–9.
22. Lund L, Wai KH, et al. Effect of topical steroid on non-retractile prepubertal foreskin by a prospective, randomized, double-blind study. *Scand J Urol Nephrol.* 2000;34(4):267–9.
23. Lund L, Wai KH, et al. An 18-month follow-up study after randomized treatment of phimosis in boys with

- topical steroid versus placebo. *Scand J Urol Nephrol*. 2005;39(1):78–81.
24. Maden C, Sherman KJ, et al. History of circumcision, medical conditions, and sexual activity and risk of penile cancer. *J Natl Cancer Inst*. 1993;85(1):19–24.
  25. Malone P, Steinbrecher H. Medical aspects of male circumcision. *BMJ*. 2007;335(7631):1206–90.
  26. McGregor TB, Pike JG, et al. Phimosis – a diagnostic dilemma? *Can J Urol*. 2005;12(2):2598–602.
  27. McGregor TB, Pike JG, et al. Pathologic and physiologic phimosis: approach to the phimotic foreskin. *Can Fam Physician*. 2007;53(3):445–8.
  28. Monsour MA, Rabinovitch HH, et al. Medical management of phimosis in children: our experience with topical steroids. *J Urol*. 1999;162(3 Pt 2):1162–4.
  29. Oh SJ, Kim KD, et al. Knowledge and attitudes of Korean parents towards their son's circumcision: a nationwide questionnaire study. *BJU Int*. 2002;89(4):426–32.
  30. Oster J. Further fate of the foreskin. Incidence of preputial adhesions, phimosis, and smegma among Danish schoolboys. *Arch Dis Child*. 1968;43(228):200–3.
  31. Palmer LS, Palmer JS. The efficacy of topical betamethasone for treating phimosis: a comparison of two treatment regimens. *Urology*. 2008;72(1):68–71.
  32. Peters CA, Skoog SJ, et al. Summary of the AUA guideline on management of primary vesicoureteral reflux in children. *J Urol*. 2010;184(3):1134–44.
  33. Pietrzak P, Hadway P, et al. Is the association between balanitis xerotica obliterans and penile carcinoma underestimated? *BJU Int*. 2006;98(1):74–6.
  34. Pileggi Fde O, Vicente YA. Phimotic ring topical corticoid cream (0.1% mometasone furoate) treatment in children. *J Pediatr Surg*. 2007;42(10):1749–52.
  35. Pileggi FO, Martinelli Jr CE, et al. Is suppression of hypothalamic-pituitary-adrenal axis significant during clinical treatment of phimosis? *J Urol*. 2010;183(6):2327–31.
  36. Potter B. Balanitis xerotica obliterans manifesting on stump of amputated penis; report of an unusual case and remarks on the nature of lichen sclerosus et atrophicus. *AMA Arch Derm*. 1959;79(4):473–6.
  37. Saibhskumar EP, Borg J, et al. Loose seeds vs. stranded seeds: a comparison of critical organ dosimetry and acute toxicity in (125)I permanent implant for low-risk prostate cancer. *Brachytherapy*. 2008;7(2):200–5.
  38. Senkul T, Iser IC, et al. Circumcision in adults: effect on sexual function. *Urology*. 2004;63(1):155–8.
  39. Shapiro E. American academy of pediatrics policy statements on circumcision and urinary tract infection. *Rev Urol*. 1999;1(3):154–6.
  40. Singh-Grewal D, Macclessi J, et al. Circumcision for the prevention of urinary tract infection in boys: a systematic review of randomised trials and observational studies. *Arch Dis Child*. 2005;90(8):853–8.
  41. Swafford NL, Allan D. Pain relief in the pediatric patient. *Med Clin North Am*. 1968;52:131–6.
  42. Taddio A, Katz J, et al. Effect of neonatal circumcision on pain response during subsequent routine vaccination. *Lancet*. 1997;349(9052):599–603.
  43. Taves D. The intromission function of the foreskin. *Med Hypotheses*. 2002;59(2):180–2.
  44. Van Howe RS. Incidence of meatal stenosis following neonatal circumcision in a primary care setting. *Clin Pediatr (Phila)*. 2006;45(1):49–54.
  45. Van Howe RS. Human papillomavirus and circumcision: a meta-analysis. *J Infect*. 2007;54(5):490–6.
  46. Weiss HA, Larke N, et al. Complications of circumcision in male neonates, infants and children: a systematic review. *BMC Urol*. 2010;10:2.
  47. Williams N, Kapila L. Complications of circumcision. *Br J Surg*. 1993;80(10):1231–6.
  48. Wiswell TE. The prepuce, urinary tract infections, and the consequences. *Pediatrics*. 2000;105(4 Pt 1):860–2.
  49. Wiswell TE, Hachey WE. Urinary tract infections and the uncircumcised state: an update. *Clin Pediatr (Phila)*. 1993;32(3):130–4.
  50. Wiswell TE, Smith FR, et al. Decreased incidence of urinary tract infections in circumcised male infants. *Pediatrics*. 1985;75(5):901–3.
  51. Yardley IE, Cosgrove C, et al. Paediatric preputial pathology: are we circumcising enough? *Ann R Coll Surg Engl*. 2007;89(1):62–5.
  52. Yegane RA, Kheirollahi AR, et al. Late complications of circumcision in Iran. *Pediatr Surg Int*. 2006;22(5):442–5.
  53. Zavras N, Christianakis E, et al. Conservative treatment of phimosis with fluticasone propionate 0.05%: a clinical study in 1185 boys. *J Pediatr Urol*. 2009;5(3):181–5.