

Complications of Circumcision

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Case scenarios

Case 25.1:

Twenty-four hours following a routine circumcision performed in the operating room, a 1-year-old boy returns to the emergency department with oozing of blood from the dorsal suture line. The parents noted the problem 4 hours earlier but pressure has not stopped the bleeding. He is noted to have a swollen, purplish discolored penis. There are clots covering the distal shaft and glans and the diaper is bloody.

- 1 What should be included in the differential diagnosis and what is the most likely cause of bleeding?

Case 25.2:

You are called to the NICU because of excessive bleeding following a Mogen clamp circumcision. The obstetrician is concerned that there may be a glans injury. Urologic evaluation reveals that the resected foreskin specimen contains the entire glans.

- 1 What immediate steps should be taken to deal with this crisis?
- 2 What is the approach to re-anastomosis in the OR?

Case 25.3:

The parents of a 1-month-old boy who had a neonatal circumcision have noticed that his penis looks as though it has disappeared. There is very little outside penile skin present and the penis is palpable inside the pubic fat pad. There is a tight constricting ring over the glans and the meatus is just visible. He has no difficulty voiding. The parents are very upset.

- 1 What is the problem?
- 2 What are likely causes?
- 3 What are the options of treatment?
- 4 What steps should be taken during the revision?

Case 25.4:

Three-year-old twin boys are referred by their pediatrician because their circumcised penises don't look right. They are otherwise asymptomatic and voiding well. On exam, twin A's coronal margin is visible only on the right side. The coronal margin is covered by skin dorsally and on the left, and this looks like a simple adhesion. Twin B's coronal margin is also mostly obscured but has a different appearance because the adhesions are caused by dense bridges

of skin. Small openings can be seen on the sides of the skin bridges.

- 1 What causes these adhesions?
- 2 What are the treatment options for twin A?
- 3 What are the treatment options for twin B?

Case 25.

Parents of a 1-year-old boy are upset because it looks to them that not enough skin was removed during his circumcision. On exam, the penile shaft skin overhangs the glans.

- 1 How do you determine if the correct amount of skin was removed?
- 2 If there is excess skin, can the child eventually "grow into it"?

Case 25.6:

A 2-year-old boy who had a neonatal circumcision is referred because his penis curves down, especially with an erection. On exam, his meatus is located on the glans, but he has a small urethrocutaneous fistula, and his ventral skin is short. Insertion of an 8 French catheter for 2 cm shows no obstruction, but there is a paper thin urethra with fistula and moderate-to-severe ventral curvature.

- 1 What are the treatment options?

Intro

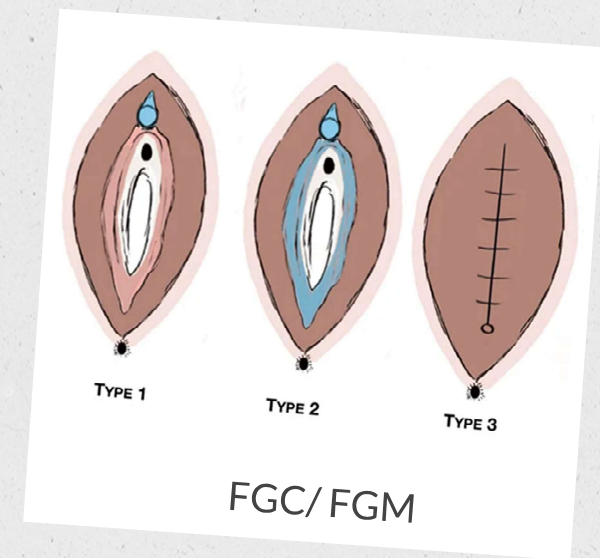
- Removal of the foreskin (prepuce) in males
- The oldest and most frequently performed operation
- Controversy on benefits and inc activism against procedure
- Inadequate training of clinicians and traditional healers contribute to complications



Ancient tomb in Egypt

Misnomer

- **Female Circumcision** is not equivalent in scope, purpose, or consequences to a male circumcision.
- Appropriate term is **Female Genital Cutting / mutilation**
 - Type I – Clitorectomy
 - Type II – type 1 + removal of labia
 - Type III – type 2 + infibulation (re-approximation of labia)



Outline

Why
Circumcision?

The
prepuce

Circumcision
Technique

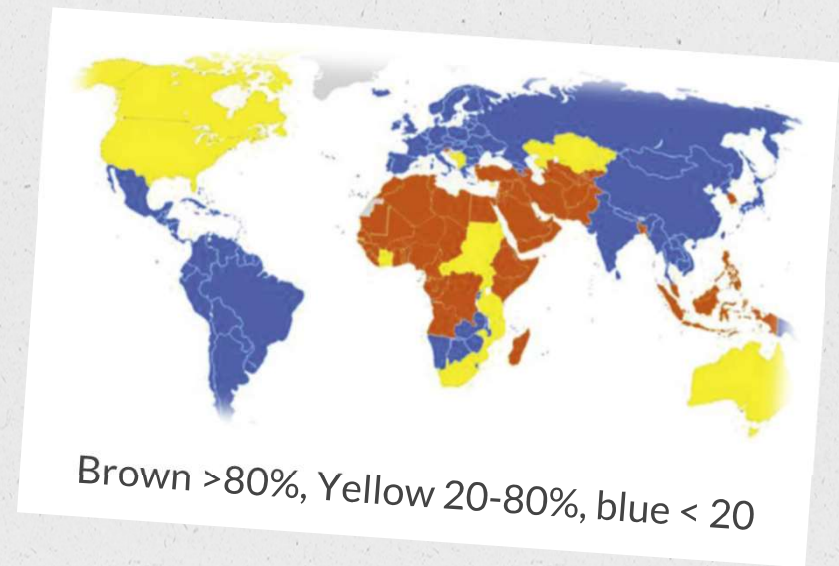
**Complications
of
Circumcision**

Traditional
Circumcision

Why
circumcision?

Prevalence

- Currently **30-35%** are circumcised.
 - common in US, Africa, Australia, Arabs.
 - less in Europe, Asians and Hispanics
- Reasons are
 - Religion
 - Tradition
 - Health



Cultural

Prelude to marriage in primitive culture (symbolic indication sexual intercourse is permitted). Performed prepubertal age

- Currently traditional reasons for circumcision are
 - To be like their father, siblings, or peers.
 - Believe it improves sexual performance or enjoyment
 - Believe it looked better to women



Grave statue from
2,181 BC

Religion

Abraham was ordered to get circumcised in order to conceive.

His son, Isaac, was circumcised a week after birth.

- **Jewish** = requirement on the **8th day**, by a mohel
- **Islam** = not in Quran but uniformly practiced. **Timing variable**
- **Christian** = **Coptic church** kept circumcision. Eastern Europe orthodox opposed it. Catholic church is ambivalent
- **Other** = Hinduism and Buddhist do not circumcise.



Traditional bris

Medical

Adopted in the English speaking world in the 20th century to prevent syphilis.

- Routine circumcision has only been recommended in Sub-Saharan Africa to prevent HIV. However, circumcision offers protection from
 - **Phimosis**
 - **Infection**
 - Balanitis-posthitis
 - UTI
 - STI (urethritis, HSV, syphilis, HIV, HPV)
 - **Cancer** - penile ca , prostatic ca, cervical ca

The Prepuce

Anatomy

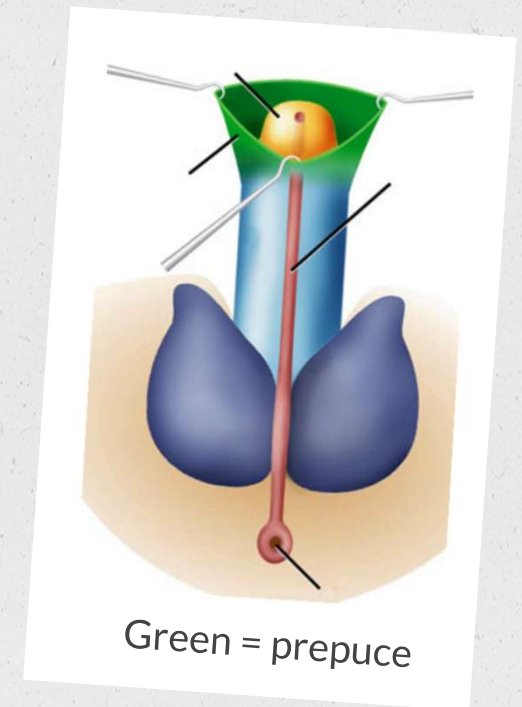
- **Location** – skin over glans with thicker texture b/c 2 layer outer keratinized layer and inner mucous membrane
- extends from the shaft skin and folds over itself at distal glans to form **mucocutaneous junction** (like lips, eyelid)
- Buck's fascia terminates but **dartos** continues into prepuce
- **Frenulum** (mucus memb with vessels and fibrous band) tethers prepuce along the ventral raphe



Layers of the foreskin

Embryology

- 8 wk – ring of thickened epidermis at **base of glans**
- 16-wk - fold of skin **migrates distally** to cover the glans,
 - Initially dorsal, **migrate ventrally** with urethral development
- 20 wk - inner layer of prepuce **fuses with glans epithelium**
- Birth – puberty = keratinization and sloughing forms **smegma** and **preputal space**



Function?

- **Immunology** - Secrete lysozyme, cytokine and high vascularity delivers phagocytes, to fight infection. Lubricate & protect glans
- **Erogenous tissue** – has somatosensory and autonomic innervation with fine touch discrimination which is lacking in glans.

Physiologic

Physiologic phimosis

- only 4% of newborns have a retractable prepuce b/c fused to glans
- Separates with keratinization over time (6-17yr)
- nonretractile foreskin in the absence of pain, infections, and scars is normal in prepubertal age .
- It will exhibit a “flowering” on retraction, meatus is rarely visible.



Flowering on retraction

Physiologic

Ballooning on Micturition

- Preputal space may fill up with urine but resolves once prepuce becomes retractile
- Ballooning is not a pathology as long as there is good stream
- circumcision may be needed in megaprepuce with massive ballooning



Ballooning

Physiologic

Smegma retention cyst (prepuce pearls)

- white/ yellowish oval “pearls” located in the subcoronal space
- contribute to the separation of the foreskin from the glans.
- washed out when the foreskin separates completely



smegmoma

Pathology

True/ pathologic phimosis

- white, scarred preputial orifice
- most common just before puberty
- causes pain during erection
- conservative approach (topical steroids) is justified
- balanitis xerotica obliterans is a cause of severe phimosis and a true indication for Circumcision



True phimosis

Pathology

Paraphimosis

- withdrawn swollen foreskin cause trapping of the glans
- Leads to swelling of the distal penis
- Manual reposition is mostly possible
- rarely a dorsal slit is needed.
- Circumcision should not be done immediately as cosmetic outcome maybe poor due to the severe edema



paraphimosis

Pathology

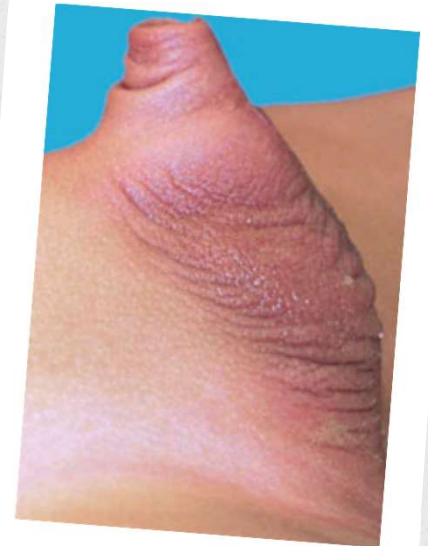
Balanoposthitis

- inflammation of glans and foreskin
 - Inner lining of prepuce: Thin, easily torn, Easily infected
 - Preputial sac: Moist and warm, bacterial growth in pool of smegma.
- Can have putrid discharge and may cause dysuria
- Self limited - Simple local measures (bathing. antibiotic ointment)
- systemic antibiotic treatment is needed in some cases.
- recurrent attacks or severe scarring justify circumcision

Pathology

Buried penis

- Pile skin pushed over shaft and penis sinks into pubic fat
- Maybe due to excessive inner prepuce with abnormally loose dartos attachments to Buck's fascia.
- Urine has to be expressed from the prepuccial sac by milking
- Circumcision in newborns with this variant leads to either excessive removal of skin or insufficient removal leading to secondary phimosis



Buried Penis

Techniques of circumcision

Timing

- Recommend within first 6 wks of life.
 - Older = bleeding, inadequate pain control, and child movements/awareness.
 - infants >2-3mo = schedule after 6mo for circumcision under GA
- Most neonatal circumcisions are performed during the first week of life (religious)
- circumcision is delayed in infants with any medical issue (eg, fever, respiratory distress)

Prerequisites

- Weight of at least 2.25 kg
- Good general health
- Normal vital signs
- Absence of jaundice, petechiae, and rash
- Absence of urogenital anomalies

Contraindications

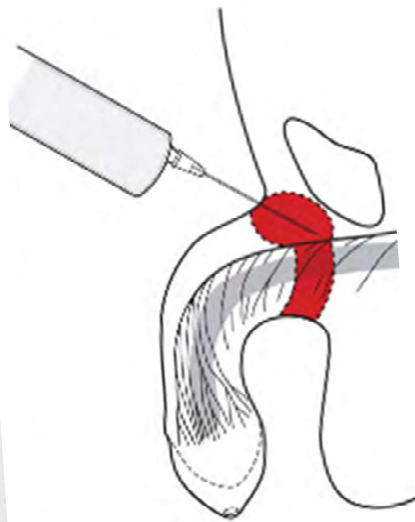
Defer circumcision (6mo-1yr) in urogenital anomalies

- Micro-penis (need endocrine evaluation)
- Prepuce needed for reconstruction
 - hypospadias, epispadias, penoscrotal transposition
 - chordee, penile torsion
 - Ambiguous Genitalia and indicators (bilateral UDT)
- Difficult to judge how much to remove
 - Webbing, buried penis
 - large hydrocele and hernias

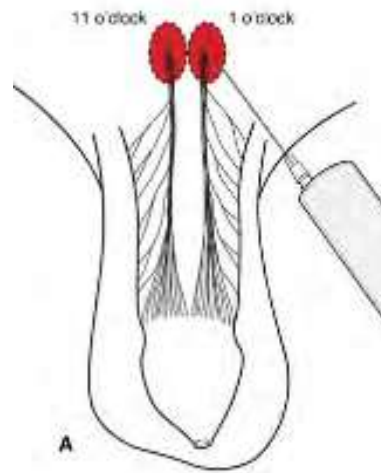
Pain control

- Pain in neonates causes disturbance in feeding & sleep cycles, future hyperalgesia
- **Local anesthesia** (block) 0.8ml of 1% lidocaine without epi or 0.25% bupivacaine
 - topical lidocaine–procaine (EMLA cream 1-2h prior)
 - Acetamenophen
 - Sucrose on a pacifier (2 min before the painful stimulus)
- **general anesthesia** or sedation for older children

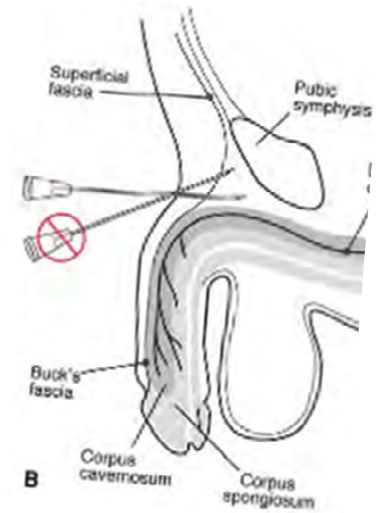
Pain control



Subcutaneous ring block



Dorsal block: 10 & 2 o'clock



Dorsal N. block:
suprapubic space, 0.5-1cm, parallel to buck's

Preferred technique

- Type of technique not important but the proper application of that technique.
 - both layers (of foreskin) are evenly removed
 - coronal sulcus should be clear of skin and adhesions.
- There are acceptable variations in the execution of each technique.
- Suggestions
 - infants first 2 mo of life – clamp/bell techniques with LA
 - Revision circumcision – freehand/sleeve (mostly for redundant skin)
 - Older infants and children – freehand technique under GA
 - Adult – freehand technique under LA, protect adequate shaft skin

Initial steps

- Skin and field sterilely prepped
- Separate adhesions between the glans and inner surface of the prepuce.
- Mark extent of foreskin to be excised with a pen or a crush with clamp.
- A dorsal slit allows the instrument to be placed over the glans
- Electrocautery should never be used with devices because of transmission of the electrical current to the penis.

Initial steps



Dilating the preputial orifice
avoiding frenulum (if fail to
push with blunt)



prepuce is everted.
smegma cleaned and
adhesions separated.



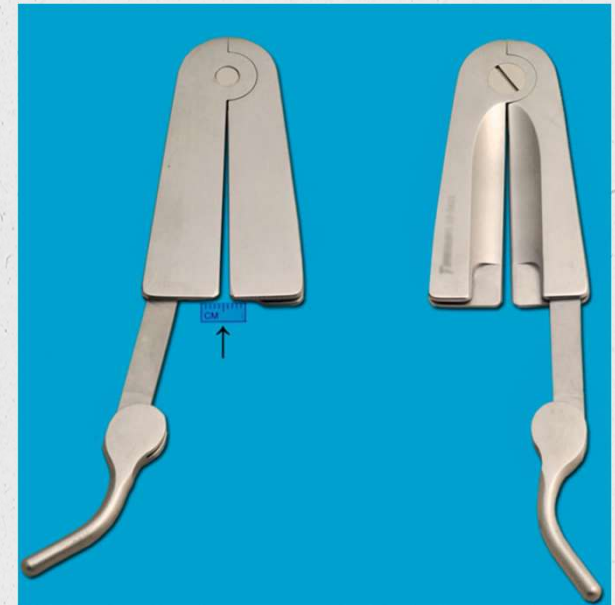
Incise to allow instrument
under prepuce

Neonatal devices

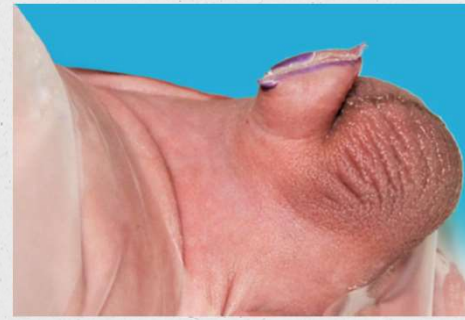
- Simple and quick
 - Reduced risk of bleeding
 - No stitches
 - Applied with topical anesthetic
 - However, need surgical backup if fail
- Gomco - ? inc infection & adhesion
 - Megan - risk of amputation
 - Plastibell
 - Needs to be worn 1 wk
 - Necrosis of foreskin cause odor and tetanus if unvaccinated
 - knot-slippage prior to 48 h
 - Ring migration to shaft

Mogen clamp

- stainless-steel shield-like clamp
- aperture should be < 3 mm (arrow)
- blades of the clamp are flush when secured (no significant amount of light passes through)
- Front side is flat- against which the foreskin is excised.
- Back side is concaved - to protect the glans.



Mogen clamp



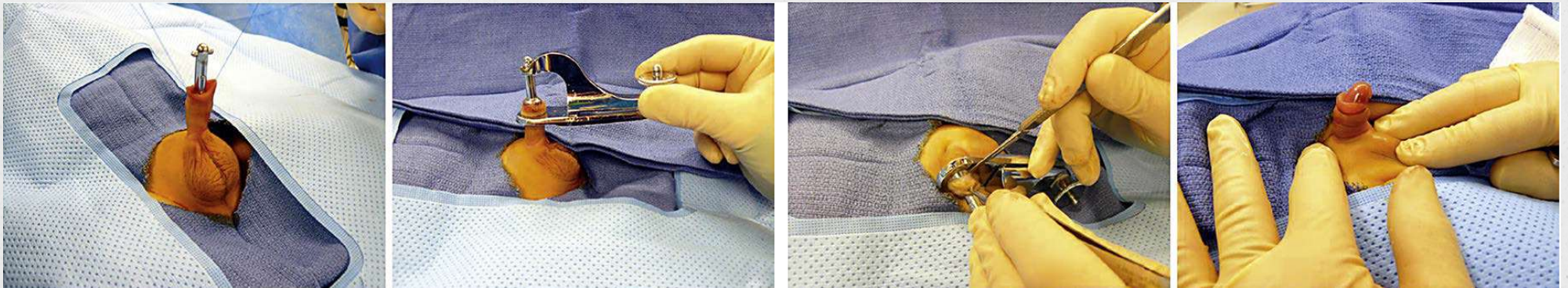
Place the Mogen clamp with the aperture at 12 o'clock on the foreskin (at the tight fold formed by the hemostat)
Reassess the amount of foreskin, amount of remaining penile skin, and that glans is behind the clamp. Close the cam lever arm all the way and excise the foreskin with a scalpel. This is best done by applying the scalpel with back edge elevated about 15° . .

Gomco®

- tighten nut slightly until the bell just contacts beveled hole
- the top plate should be parallel to the bottom plate with at least 2 mm between them.
- bell should form a seal with the base plate (size must match, light should not pass between them)



Gomco®



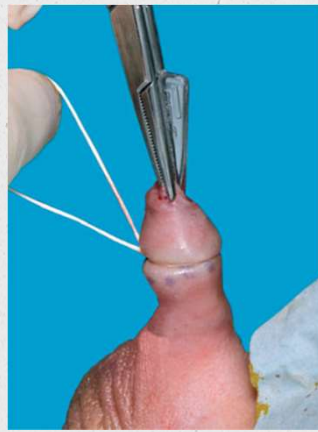
Bell placed over and foreskin brought through the opening in the clamp, extended, placed in the yoke, and then tightened. The excess foreskin distal to the base of the clamp is then excised after waiting for several minutes. The bell is released and removed. Catastrophic loss of the penis when electrocautery is used with a metal device

PlastiBell®

- Each packet contains
 - PlastiBell device
 - ligature.
- Note the size designation in upper right corner



PlastiBell®



Bell placed over glans and position so that a sufficient amount of foreskin will be removed. String tied around the prepuce over a groove in the bell. The excess foreskin is trimmed and the handle broken off the bell. The distal foreskin remnant will be strangulated resulting in sloughing of the tissue with ring in 1-2wk.

AccuCirc™

in 2008 to address the shortcomings of predecessor devices

- complete disposable kit
- does not leave retained parts,
- prevents mismatched parts from being assembled,
- does not require a dorsal slit,
- protects against glans avulsion,
- easy to master



AccuCirc™



Insert shielding ring. Advance shielding ring onto the glans pulling foreskin up distally lower foreskin holder down onto foreskin align pen mark with top of shielding ring. AccuCirc clamp over probe advancing until it locks into place with an audible click. close (activate) lever arm downward and lock in place. Leave locked for 5 min. After 5 min, release lever arm and lift it completely back to its up position. Gently remove clamp

Freehand techniques

Forceps guided (guillotine)

- simpler and faster method for GPs
- leaves 1.5 cm cuff of mucosal skin and risks glans amputation

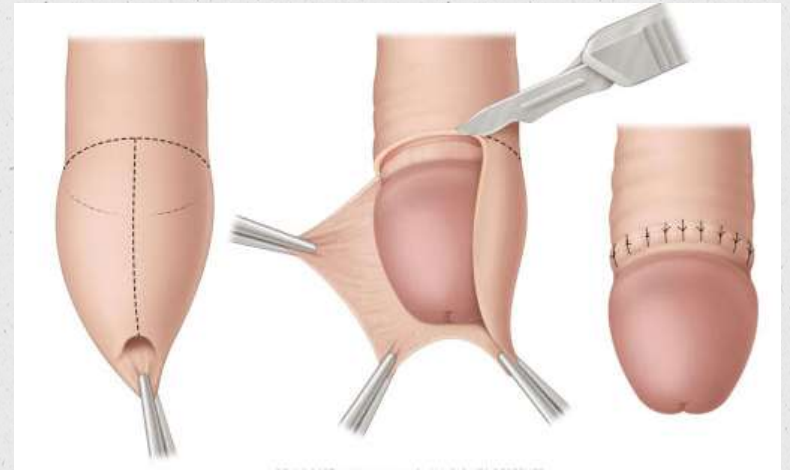
Dorsal slit

- used for medical reasons like phimosis.
- Slower than forceps guided but small risk of injury

Sleeve

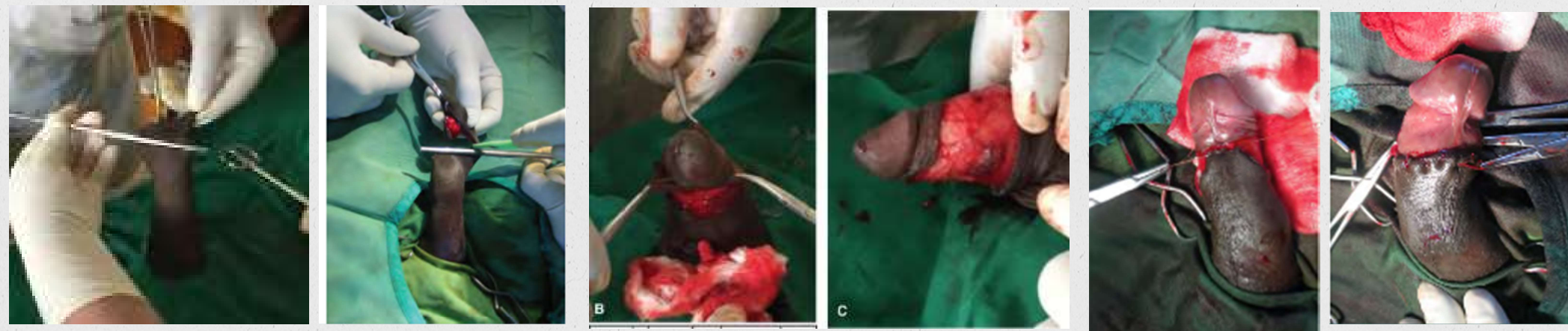
- Excellent cosmetic outcome
- requires most surgical skill

Dorsal slit



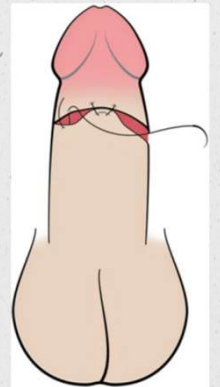
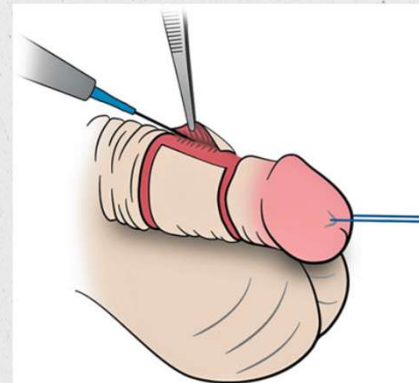
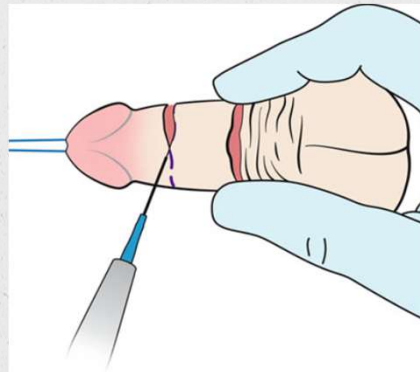
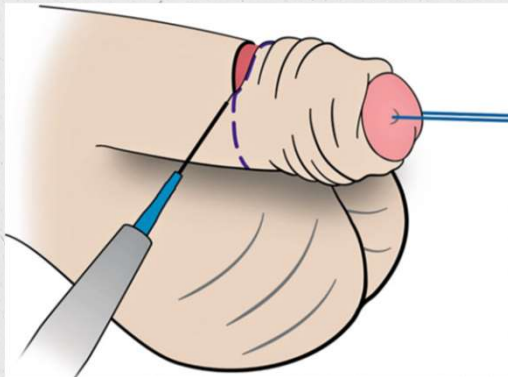
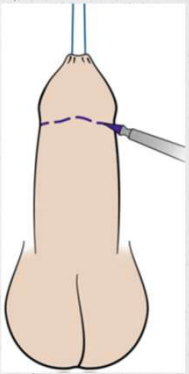
A dorsal slit is made on the preputial skin down to penile skin mark, after crushing with an artery forcep for 3-5 minute. Cutting the dorsal slit; making an incision in the foreskin at the central (12 o'clock) dorsal position. Starting at the 12:00 o'clock position, the circumferential cut is made using scissors, first in one direction and then the other. The cut continues towards the frenular ridge changing to make a V shape.

Forceps guided (*Guillotine)



Take care not to catch the glans in the forceps. Cutting off foreskin. application of a curved forceps to stabilize the cuff prior to trimming with scissors; Horizontal mattress suture at the frenulum (6:00 o'clock two or three simple sutures are placed between the principal mattress sutures (which are at the 12:00, 03:00, 06:00 and 09:00 o'clock positions)

Sleeve



Foreskin incised along the base of the glans with the foreskin in its normal position. Dissection is carried down to Buck's fascia. The prepuce is then retracted and an incision made in the subcoronal sulcus, leaving a generous cuff of subcoronal skin. The collar (sleeve) of foreskin that is isolated is excised. The shaft skin is approximated to the subcoronal skin using absorbable sutures. Frenular area is sutured followed by circumferential closure

Aftercare

- Clear written instructions for parents (Dressing, Wound care)
- **Plastibell ring** - separate between days 3 and 8 after the circumcision of a newborn.
 - Need to be removed if not separated by 12 days
- **Pain management**
 - Acetaminophen every 6 h for at least the first 24-h postoperative
 - In older children psychological trauma trumps the physical,
 - Oral Ketorolac or even narcotics may be necessary if painful erections occur.

Dressing

- Presentable dressing (except plastibell)
- can be wrapped in gauze with a petroleum ointment and secured with an elastic, self-adhesive tape
- Keep for 24-48h but may prolong in post-pubertal circumcision if erection cause excessive bleeding
- Remove in bath tub after soaking for 15–20 min



Dressing

Wound care

- Apply petroleum based jelly after each diaper change to protect wound from adhering to the diaper
- Activities limited for 2–3 days with no straddling of toys
- Bruising and swelling are expected and dec over 1 wk



Generous petroleum based jelly

Complications of circumcision

What is abnormal?



Penises come in all shapes and size and wound healing varies from person to person

- Regardless of which technique you use, most circumcisions should quickly heal and have an acceptable esthetic appearance.

Rate of complications

- Circumcision is considered a teaching case (often performed by inexperienced).
- 2-10% complicate in experienced hands, under sterile conditions
 - Infant 2-6 per 1000 (0.2-0.6%)
 - 20x inc risk for 1-9 yrs of age (4-12%)
 - 10x inc risk for >10 yrs (2-6%)
- acute complications should occur in less than 1% of patients
 - common complication are minor bleeding and infection

Prevention

- correct use of surgical equipment
- trained clinicians
- boys with congenital abnormalities should be referred to a pediatric surgeon/ urologist.

List

Early complications

- Bleeding
- Infection (local, systemic)
- Local injury (glans, urethra)

Late complications

- Excess residual skin
- Epidermal inclusion cyst
- Meatal stenosis
- Adhesion / Skin bridges
- Secondary phimosis

Bleeding

- Excessive skin removal, improper clamp, aggressive separation of adhesion at 6 o'clock
- From frenular artery, dermal cut edges, rarely a large blood vessel on the penile shaft
- No difference based on the technique
- Gentle compression, 37% ligature, 3% transfusion
- If corrective measures fail, evaluate for **coagulopathy**



Subcutaneous
hemorrhage

Suture tracks

- Suturing has long been practiced as a method of controlling post-circumcision bleeding
- Even well placed, properly applied sutures can and do leave tracks



Suture tracks

Local infection

- Significant or prolonged swelling, delayed healing, erythema (especially spreading), pus, malodor
- Usually local but can cause **necrotizing fasciitis**
- topical antibiotic ointment (also prevents)
- systemic antibiotics and surgical debridement
- antibiotics are not necessary.



Infection

Glans amputation

- coronal sulcus should be clearly delineated prior to cutting and glans should be adequately protected (proper clamp)
- Glans is wrapped in saline-soaked gauze and placed indirectly on ice. Reattachment has good result within 8 hrs.
- If procedure not completed, remaining prepuce should be left



Glans injury

Urethral fistula

- not as common as in hypospadias
- on managing frenular bleeding
 - don't use cautery
 - Don't use thick suture material including big tissue/deep suture
- If circumcision not completed at time of injury, skin should be left
- Repaired after 6 mo



UCF

Penile degloving and denuding

- **Degloving** - skin not adhering to mucosal collar (loosely attached penile skin drops after proper circumcision)
 - Use skin sealant or sutures
- **Denuding**- Excess skin removal (cause chordee/torsion)
 - <1cm can heal by 2ry intention (antibiotic ointment)
 - May require penile skin flaps or Z-plasty for closure
 - primary re-approximation or skin grafting if severe



Skin loss

“Bad circumcision”

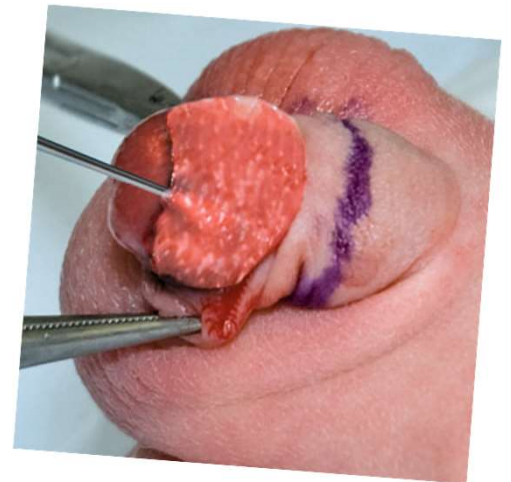
- Redundant skin
- may not appear to be circumcised / asymmetric.
- circumcision revision (freehand/sleeve)



incomplete
circumcision

Remnant mucous membrane

- Inner layer will keratinize and take on the appearance of foreskin if left untouched.
 - false space is created between the two layers of the foreskin during circumcision.
 - Sometimes, remnant mucous membrane regrows after proper circumcision
- Most cases will resolve nicely after puberty



Redundant Inner prepuce

Plastibell slip behind glans

- ring slide behind the glans, a paraphimosis-like situation
- can lead to venous congestion and ischemia
- Remove by splitting with scissors or ring or bone cutter



Ring migration

Early separated Plastibell

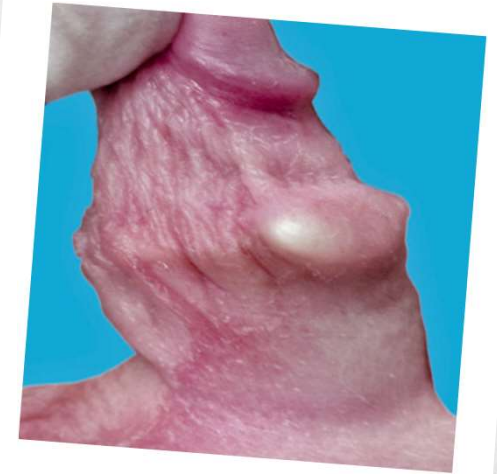
- ring may separate early, prior to 48 h
 - unfinished circumcision. (Incomplete necrosis of the tissue distal to the string)
 - hemorrhage



Early separation

Inclusion cyst

- implantation of smegma in the circumcision wound or by surgical inversion of the epidermis during circumcision
- can enlarge or become infected.
- conservative (eventually extrude and the pocket becomes marsupialized)
- surgical excision (remove entire cyst to prevent recurrence)



Cyst

Adhesions

- physiologic retraction of the penis caused by a suprapubic fat pad and diaper irritation of the penis
- Minor adhesions
 - lysed in the office with the application of EMLA cream
 - daily cleaning gently retracting skin to expose the glans penis.
- Skin bridges
 - broad or thick adhesions lead to penile chordee/torsion
 - require suturing of the glanular and shaft defects



bridge

Meatal stenosis

- **Meatitis** occurs in up to one-third of circumcised boys
- urethral meatus, no longer shielded by the prepuce, is exposed to the ammonia on urine-soaked diapers.
- urinary stream deviation in an upward direction, narrow, high-velocity stream, and pain at the initiation of micturition
- normal urethral meatus is 10 Fr before 4 years of age, 12 Fr from 4 to 10 years of age, and 14 Fr after 10 years of age
- Meatotomy (divide few mm ventrally and suture approximate edges) - low recurrence if caregivers manually distract meatus edges during routine cleaning on a once-a-day basis



stenosis

Epinephrine injection

- lidocaine usually contain low concentrations of epinephrine (1:200,000 or 1:100,000) and not likely to create a problem
- Accidental injection of a high concentration of epinephrine (1: 1,000) can potentially be serious
- Phentolamine, an alpha-blocker, has been shown, on ischemic fingers, to reverse the vasoconstrictive effects of epinephrine



Epinephrine

Paraphimosis

- incompletely circumcised penis.
- wrapping the penis with Coban or gauze after applying granulated sugar to reduce the swelling
- Initial manual reduction with gentle traction should be attempted by squeezing with sustained pressure
- Dorsal slit.

Phimosis

Buried penis

- Retraction can occur with suprapubic fat
- Reassure parents if penis is easily revealed

Trapped penis

- inner prepuce not adequately removed
- instruct to make certain that the circumcision incision remains proximal to the glans in the early postoperative period.
- steroid cream -betamethasone 0.05% (BID for up to 6 weeks).
- repeat circumcision under general anesthesia

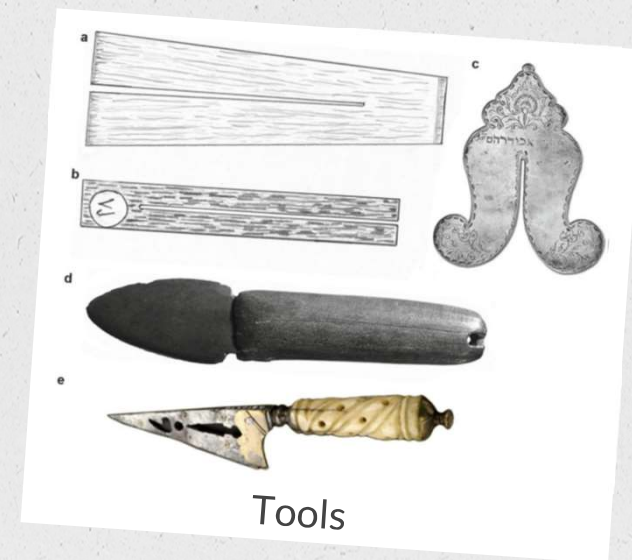


Cicatricial phimosis

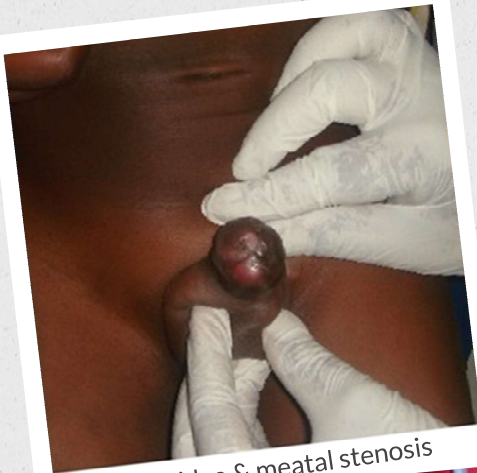
Traditional
circumcision

Method

- many tools have been used for the task
 - Metal
 - wood
 - ivory slit shields
- **Technique**
 - **Type 1** Foreskin pulled forward, and cut in front of glans. inner foreskin is pushed back (form wrinkles) or excised
 - **Type 2 dorsal slit** skin is not removed (falls away from glans) or excised following coronal sulcus



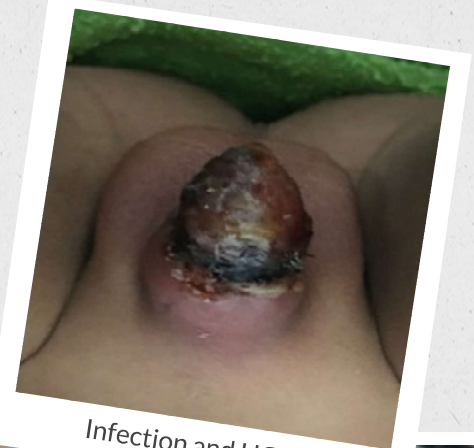
Reports from Ethiopia



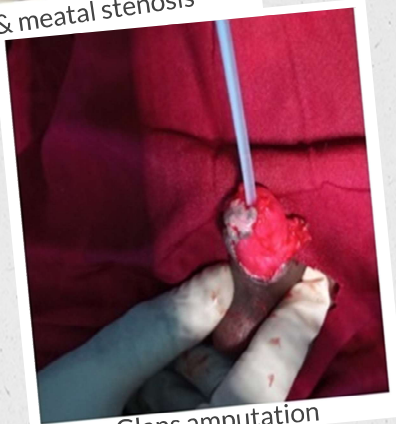
Skin bridge & meatal stenosis



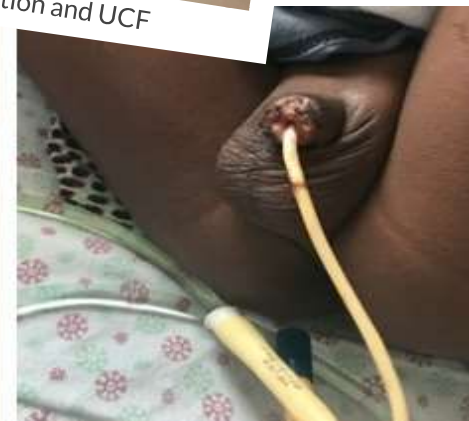
Phimosis



Infection and UCF



Glans amputation



Glans amputation

The End