Newborn Circumcision: The Gomco Method

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Here: a "how to" on Gomco circumcision, the method most commonly used in the US.

Suggested Equipment for Gomco Circumcision

- Gomco clamps (sizes 1.1, 1.3, and 1.4)
- Restraint board
- Pacifier and sugar water (eg, 25% sucrose)
- 1% Lidocaine without epinephrine
- Sterile skin marker
- 3 clamps (also known as hemostats, mosquito clamps, or Kelly clamps), at least one of which should be straight
- Blunt probe
- Scissors
- Safety pin
- Petroleum gauze strip
- Absorbable fibrillar hemostat
- Other necessary disposable supplies (such as gloves, gauze, syringe, needle)

Circumcision may be the oldest known surgical procedure. For the past 100 years, it has consistently been the most frequently performed surgery in the world.¹ The procedure is performed on almost all males in the Jewish and Muslim communities. The World Health Organization estimates that 30% of males worldwide are circumcised; the majority are Muslims.² In the United States, the prevalence of newborn circumcision peaked at 80% in the 1960s but had declined to 65% (or 1.2 million procedures annually) by 1999.¹ Circumcision is less common in other developed countries, where it is often viewed as unnecessary. Many types of physicians perform circumcisions, including obstetricians, pediatricians, family physicians, and surgeons.

Several techniques for performing circumcisions are in general use. In this article, I focus on Gomco circumcision, since this is the method most commonly used in the United States. ("Gomco" stands for Goldstein Medical Company, the original manufacturer of the clamp used in this method.) The Mogen technique is quicker and is the method of choice of some physicians and of mohels (Jewish persons specially trained to perform ritual circumcision). The Plastibell method has largely fallen out of favor because of an increased risk of infection associated with foreign-body retention.³

HISTORY

Although circumcision is commonly thought to have originated with Abraham (the patriarch of the Israelites) some 4000 years ago, Egyptian wall carvings that date back at least 6000 years depict the procedure.¹ Interestingly, when Europeans first made contact with the New World, they discovered that many American Indians were circumcised. In addition to the religious reasons for circumcision, foreskins have been removed as trophies of battle, for hygienic reasons, as a milder form of castration, for cultural identity, and as a rite of passage.¹ In the late 1800s, circumcision was touted as a means of freeing up the glans from a constricting foreskin that led to irritation of "other organs." Masturbation, headaches, gout, and a laundry list of other problems were thought to be preventable through circumcision. These theories were debunked in the 1900s, when cultural or cosmetic rationales for circumcision again became the norm. In recent years, new evidence has been emerging on the medical benefits of the procedure. Circumcision has been associated with a decreased risk of urinary tract infections; balanitis; phimosis; penile cancer; and sexually transmitted infections, including HIV infection.¹,³,⁵

PREOPERATIVE COUNSELING
Parents have often reached the decision to have their infant circumcised before I say anything. However, as with any procedure, it is prudent to discuss the associated risks and benefits beforehand; misinformation among parents abounds. I tell parents about the above-mentioned medical benefits of circumcision. You may also want to mention that several studies of sexual satisfaction among circumcised and uncircumcised men have been done; these show similar to slightly increased satisfaction among circumcised men and their partners.¹

**Associated risks.** I also discuss the risks associated with circumcision, which consist chiefly of pain, infection, and bleeding. Much less likely—but still possible—are lidocaine toxicity; trauma to the glans or urethra; and a "degloving" injury, in which the skin of the shaft retracts proximally and needs to be stitched back into place (seen primarily with the Gomco method). Another rare complication, seen primarily with the Mogen and Plastibell techniques, is paraphimosis. Meatal stenosis is a common late complication thought to be caused by chronic diaper irritation of an unprotected meatus; however, it is rarely of clinical significance.

I again emphasize that newborn circumcision is an entirely elective procedure. In a 2005 Task Force statement, the American Academy of Pediatrics did not recommend newborn circumcision. I also discuss the risk of a poor cosmetic outcome or a result that may not look exactly like what the parents had expected. Finally, I make sure that both parents are in agreement about proceeding with the procedure.

I often invite one or both parents to watch their baby's circumcision in order to relieve any anxiety about what is being done to their child. About half of parents take me up on this offer. It is a good idea to keep a chair nearby in case someone gets light-headed.

**Contraindications.** Cited contraindications to circumcision include illness, premature birth, age younger than 12 hours or older than 6 weeks, known bleeding diathesis, ambiguous or unusual appearance of genitalia, urethral anomalies, and—in the case of the Gomco method—a short penile shaft (less than 1 cm).³⁴ If a hypospadias is discovered on cutting open the foreskin, it is recommended that the physician suture the foreskin back up and abandon the procedure; the urologist is likely to need to use the foreskin to repair the defect.⁶

**ANALGESIA AND ANESTHESIA**

After 1 hour of nothing by mouth to minimize the risk of aspiration, I place the infant on a restraint board, preferably with a cuddly blanket wrapped around his upper torso. I give him a pacifier dipped in a solution of 25% sucrose, which helps soothe him during the procedure.

Topical anesthetics, such as lidocaine or EMLA (eutectic mixture of local anesthetics), have been shown to reduce the pain of circumcision if applied in advance. Injectable lidocaine without epinephrine is most often used. Some physicians dilute the lidocaine with 0.1 mL of 1% sodium bicarbonate to counteract the burning effect of this agent. The maximum dose of lidocaine for children is 3 to 5 mg/kg.⁴ Given that 1% lidocaine contains 10 mg/mL, the maximum dose for a 3-kg newborn would be about 1.5 mL. I superficially inject 0.4 mL of 1% lidocaine without epinephrine at both the 10 o'clock and 2 o'clock positions; I draw back first to avoid intravascular delivery (Figure 1).
). Failure to wait a full 5 minutes after injection before starting the procedure may be the biggest pitfall in pain management during circumcision.  

**GOMCO TECHNIQUE**

![Gomco Device Diagram](image)

Figure 2 – Labels identify the parts of this assembled Gomco device.

The Gomco device consists of 4 main pieces (Figure 2):

- The distal penis protrudes through the **base plate**.
- The bell fits over the glans but under the foreskin (bells come in a variety of sizes, including 1.1 cm, 1.3 cm, and 1.4 cm). A thoughtful engineer also designed the bell with a small hole; this allows for the passage of urine, should the infant void during the procedure.
- The **rocker arm** has a yoke in which the arms of the bell rest.
- The **nut** secures the other end of the rocker arm to the base plate.

![Skin Marker Diagram](image)

Figure 3 – A skin marker is used to identify the corona of the glans. Note that the corona curves around more distally on the ventral aspect.

The device is designed to crush the foreskin between the bell and the base plate. Before beginning the procedure, make sure that all of the parts of the device fit together properly; mismatched parts sometimes get autoclaved together.

**Marking the foreskin to guide removal.** Determining how much foreskin to take off often presents difficulties for learners. The edge of the foreskin should end up nice and tidy around the corona. Marking the foreskin at the level of the corona before the procedure can eliminate some of the guesswork (Figure 3).
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Separating the foreskin from the glans. Apply 2 clamps—at the 2 o'clock and 10 o'clock positions on the distal foreskin—taking care to avoid the glans. Using your nondominant hand, hold these clamps under gentle traction to keep the preputial orifice open. At this point, it will be evident whether the anesthesia is working. If you have waited a full 5 minutes since the lidocaine injection, the anesthesia is almost certain to have taken effect. However, if the anesthesia is not good, I usually avoid giving additional lidocaine because of toxicity risks; instead, I focus on completing the procedure quickly.

Next, blunt dissect the foreskin away from the glans using either a blunt-edged probe or a clamp. I lubricate the tip of a probe with the petroleum gauze that will later be used as a dressing, then insert the probe into the foreskin opening at the 12 o'clock position. I use the probe to make a track down to the coronal ring while tenting the skin upward to avoid entry into the urethra (Figure 4). After the track is created, I insert a lubricated clamp and open it in gentle sweeping motions around the glans to break up adhesions (Figure 5). Each time I spread the blades of the clamp open, I gently withdraw them from the penis in order to close them under visualization (to avoid a crushing injury.
to the glans). Blunt dissect circumferentially all the way to the frenulum at the 6 o'clock position, but do not dissect away the frenulum; it has a little arteriole and will bleed.

Preparing for insertion of the bell. Next, use a straight clamp to create a crush line on the dorsal aspect of the foreskin at the 12 o'clock position. Again, tent the skin up as you advance the lower blade of the clamp in order to avoid entry into the urethra. The crush line should stop about 1 cm distal to the coronal sulcus (Figure 6).³ ⁶ You need only keep the clamp on for a few seconds to create the crush line. Next, cut down the middle of the crush line with scissors that have at least 1 blunt-tipped blade (Figure 7). You are creating an opening through which the bell will later be inserted; it need only be large enough to accommodate the bell. If the cut edge of the crush line bleeds, briefly crush that edge again with the clamp.

With the 2 o'clock and 10 o'clock clamps still attached, the foreskin can now be retracted to remove any additional adhesions—which there usually are. Although a blunt-edged probe may be used to remove these remaining adhesions, I prefer firm pressure with gauze (Figure 8). Failure to break down all of the adhesions is cited as the primary reason for a poor cosmetic result.⁶ As before,
respect the ventral frenulum, since it tends to bleed if disturbed; however, do free up adhesions just lateral to the frenulum.

**Inserting the bell.** With the glans exposed, determine which size bell will best cover the glans completely (1.3 cm is the most commonly used size). Too small a bell will force you to pull more foreskin than underlying mucosa through the hole in the base plate, and too large a bell will tent the foreskin up away from the shaft, making it hard to see landmarks. I wipe the edge of the bell with the petroleum gauze (this helps it slip off the foreskin at the end of the procedure) and apply the bell to the glans. Make sure that the bell completely covers the glans and that the arms of the bell remain perpendicular to the axis of the patient.

**Placing the base plate over the bell.** The next step is to place the base plate over the bell. There are many variations on how to do this. I teach the safety pin method, since this technique seems easiest to grasp conceptually.
With your nondominant hand, hold the bell with the foreskin protracted back over it and the clamps still attached. Next, pierce the distal corners of the cut dorsal foreskin with a safety pin. Make sure to pierce through the outer foreskin and inner mucosal layers of each corner (Figure 9). Secure the safety pin and align it parallel to the stem of the bell. Remove the 2 o'clock and 10 o'clock clamps. Lower the hole of the base plate over the stem of the bell and the safety pin until it rests against the flare of the bell. Draw the foreskin evenly through the hole bilaterally using your ink mark as a guide. Use of another clamp can help with this step (Figure 10).

Completing assembly of the clamp, preparing to cut. Next, while holding the stem of the bell and the safety pin with your nondominant hand, use your other hand to place the yoke of the rocker arm under the arms of the bell (see Figure 2). Make sure that the ridge on the bottom of the rocker arm fits nicely into the notch on the base plate. Double-check to make sure that the apex of the dorsal slit ends distal to the intended crush area on the Gomco clamp. If you need to adjust the amount of tissue that has been pulled through the base plate, most authorities recommend removing the rocker arm from the bell and pulling the bell away from the base plate. Failure to do this could result in shearing of blood vessels as you try to pull more foreskin through the base plate. By this point, you have measured twice and are ready to cut once. Tighten the nut to secure the rocker arm to the base plate. With this action, you are applying 8000 to 20,000 lb of hemostatic force against the foreskin—and you are committed to what you will remove.
Removing the foreskin. You may cut the foreskin off at any time after the nut is secure (Figure 11). However, leave the clamp on for 5 minutes. You can use this time to hone your bedside manner (coo at the baby, work the pacifier). After 5 minutes, loosen the nut and disassemble the device. To coax the edge of the cut foreskin off the bell, apply pressure with gauze.

Despite the temptation to quickly appraise the result, I apply immediate pressure with gauze circumferentially and hold for 1 minute. After that, I assess for any bleeding and sometimes apply an absorbable fibrillar hemostat (although this is usually not necessary). Less expensive hemostatic agents, such as ferric subsulfate or a silver nitrate stick, can also be used, although these tend to be messy. If all else fails, an absorbable stitch may be placed at a bleeding point. I then take a look to assess cosmesis (Figure 12). Lastly, I apply a dressing of petroleum gauze and wrap it proximally on the shaft so that it will not fall off (Figure 13). Some nurseries make sure the infant urinates before being discharged home after a circumcision, but this is probably not necessary.⁶

AFTERCARE AND FOLLOW-UP
Acute complications from circumcision are rare; estimates range from 0.2% to 2%.¹ Bleeding and infection are the most common. Thus, I advise the parents to seek medical attention if there is any active oozing or blood stains on the diaper greater than the size of a quarter. As the cut edge of the foreskin heals, a yellowish mucoid reaction may be seen; mention to parents that this is normal. However, if there is any question about whether something they see is pus, or if they notice a foul odor, they should bring the infant in for re-examination.
I encourage bathing until the day after the procedure. Lubrication of the penis with white petrolatum will decrease friction against the healing foreskin. I emphasize the importance—after the initial
healing phase—of gentle retraction of the remaining foreskin at diaper changes to prevent new adhesions from forming between the cut foreskin and the glans. At follow-up visits, I sometimes need to use pressure with gauze to expose the corona again. I warn parents that this is mildly painful.

CONCLUSION

Despite controversies regarding the benefits and risks of the operation and nuanced preferences in technique, circumcision is a fairly straightforward and quick procedure that continues to stand the test of time. Because it does leave a memorable mark on patients, learners may first want to practice using a simulation model. Models using either a pacifier or a cocktail wiener covered by a surgical glove finger have been described in the literature and may make for a fun workshop.²⁷,⁸

KEY POINTS FOR YOUR PRACTICE

- If the genitalia just do not look right, refer to a pediatric urologist. After all, this is an elective procedure!
- Wait a full 5 minutes after anesthesia before starting the procedure.
- If it’s helpful to have a sterile plastic bag and disassemble all parts of the Gomco clamp before the procedure to make sure everything fits together properly.
- It’s also helpful to forget where is the level of the corona is during the procedure. A skin marking—made before starting the procedure—can help you keep your bearings.
- Avoid trauma to the urethra and glans in the initial step by careful placement and insertion of the clamps.
- Abandon the procedure and stitch the dorsal slit back up with absorbable suture if a hypospadias is discovered.
- Take your time in separating adhesions between the glans and foreskin. Failure to do this is cited as a common reason for poor cosmesis.
- Using the petroleum gauze dressing to lubricate the probe and clamp facilitates blunt dissection, and lubricating the edge of the bell makes it easier to remove the bell at the end of the procedure.
- Make sure equal amounts of both layers of the foreskin—skin and mucosal layers—are pulled through the base plate and over the bell.
- Although some physicians prefer to make an aggressive dorsal slit to use as a landmark in making the final circumferential cut, doing so requires close inspection to make sure that the clamp is applied proximal enough to the dorsal slit to avoid a V-shaped deformity of the foreskin. Using a skin marker and a less aggressive dorsal slit can avoid this risk.

REFERENCES:

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