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Circumcision Clamps for Adults

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Abstract

Circumcision is one of the surgical interventions with the longest historical tradition for various medical or non-medical, religious and social, reasons. Due to a high demand for this surgery, in recent years, a large number of plastic and disposable devices have emerged in order to optimize the technique. Although they were initially used in newborns and children, their use in recent years has been expanding to adults. The main objectives of these devices are to shorten the surgical time, simplify the technique, and maintain an adequate safety profile compared to the classic suture technique. All reviewed devices for adult circumcision appear to achieve these goals, making them a safe, fast, and feasible option for use in an outpatient setting or in high-demand areas.

Keywords: circumcision, plastic rings, adults, foreskin, phimosis

1. Introduction

Circumcision is one of the surgical interventions with the longest historical tradition for religious, mainly Muslim and Jewish, social and medical reasons with the aim of promoting hygiene and reducing the incidence of sexually transmitted diseases (HIV, human papilloma virus, and the herpes simplex virus) [1]. Many observational studies and three large randomized controlled trials conducted in Kenya, Uganda, and Orange Farm, South Africa, show that male circumcision reduces female-to-male HIV transmission by 60% [2] and even prevents penile cancer (Africa and South America). The World Health Organization (WHO) in 2007 recommended this surgery with the aim of reducing the incidence rates of sexually transmitted diseases in countries with high prevalence.

In developed countries, the surgical indication is usually purely medical, with phimosis being the main indication. There are also other pathologies that benefit from this intervention such as paraphimosis, balanitis (inflammation of the foreskin), posthitis (inflammation of the glans), localized condyloma acuminata, and localized carcinomas. For all these reasons, the demand is high and constant.

Around 25–33% of the world's total male population is circumcised [3], but this rate varies widely depending on the country analyzed. In the US, an average of one million newborn boys are circumcised annually. The circumcision rate in the US is as high as 70%, while in Britain it is 6%. In Nigeria, the circumcision rate is estimated at 87% [4]. Despite being such a frequent surgery, it is not exempt from complications, although the incidence is low when adequate sanitary conditions are met (2–4%) [5].

There are currently several surgical techniques to perform circumcision, but in general they can be classified into two large groups depending on the material used to adhere the cut edges and maintain hemostasis, regardless of the foreskin excision technique. In conventional circumcision, the cut edges of the wound are held together with sutures. The alternative technique known as minimally invasive circumcision uses a plastic device. These approximate the wound edges and control hemostasis. The goals of these devices are to achieve a safer, easier, and faster procedure, faster healing than conventional methods, require less surgical experience, and generate better esthetic results. Each surgical technique has its own limitations and risk–benefit ratios.

2. Classic technique with suture

Circumcision surgery is such a widespread surgery that, depending on the surgeon who performs it, it may undergo different modifications, but it must always comply with some basic premises: adequate asepsis and hemostasis, excision of the outer and inner preputial skin layers and protection of the glans and urethra during the procedure in order to avoid complications. We must also seek a satisfactory esthetic result for the patient.

In general, this technique consists of a dorsal incision until the glans can be uncovered and a subsequent circumferential incision approximately 1 cm from the balanopreputial sulcus. In the ventral part, the frenulum is sectioned, leaving the circumferential incision in the form of an inverted “V” at that level. This incision should traverse the dartos to reach Buck’s fascia. Next, we must suture the frenulum longitudinally with two to four points with 4/0 absorbable suture. With the foreskin reduced (not covering the glans), a second circumferential incision is made following the relief of the balanopreputial groove. Finally, we must excise the sleeve of skin that remains between the two incisions made, coagulate all the bleeding vessels and suture the edges of the wound with the same suture used previously. To carry out this suture, it is advisable to first make some cardinal points of reference and then give a few loose stitches between the initially given reference stitches. All this is carried out under local anesthesia. It requires 4 to 6 weeks of abstinence from sexual activity to allow complete wound healing.

Open surgical techniques require surgical experience and at least 20 minutes of operative time. They have a high rate of minor complications (mainly hematoma, bleeding, infection, and delayed healing), which decrease with surgical experience [6].

3. Disposable devices for adult circumcision

Recently, a series of minimally invasive techniques performed with plastic devices have emerged. This type of sutureless device has traditionally been more studied and used in children. We will focus our review on the devices currently available in adults and their possible advantages.

These types of devices generally sandwich the mucous and cutaneous layer of the foreskin between two concentric rings, one inside and one outside. The glans is usually protected by placing a bell-shaped protector between the two on the glans. These devices act in the form of a clamp, cutting off the blood supply to the distal part of the foreskin. This can be excised or left to necrotize. Most of these devices must be kept in place for a week before removal, which allows circumcision without sutures. The procedure is ideal for outpatient settings or for use by healthcare personnel with basic surgical knowledge.

However, the beginning of the concept of disposable devices arose with the introduction of metallic instruments to facilitate the surgical incision during circumcision. Although these devices are made of reusable metal, we wanted to add them to this chapter as it is one of the pioneering techniques in sutureless circumcision surgery. They are the Gomco and the Mogen clamps.

Gomco clamp

The Gomco clamp was launched in 1935 in the US. It has traditionally been used in neonates, especially in the US, but its use has been expanded to adults. The main difference between both groups is that in adulthood we need to suture the edges of the wound in order to avoid bleeding, specially once the patient begins to move and notice erections, obviously stronger to that of neonates or children. However, this issue was questioned when studies in 2002 demonstrated the superiority of tissue adhesives over suture closure in circumcisions [7, 8]. These reduce operative time, improve cosmetic outcome, and increase patient satisfaction [8].

Removal of the foreskin with the Gomco forceps and sealing of the wound edges with tissue adhesive results in a minimally invasive circumcision that is easy to perform, heals quickly, and has excellent cosmetic results [9]. In a study by Millard et al., this device was compared with the classic suture technique in adults. The authors concluded that the Gomco device with the tissue adhesive required much less operative time, was easier to perform, had much better cosmetic results, and was potentially safer than open surgery. It takes 1–2 min to place the Gomco instrument, 5 min to wait, and 2–3 min to remove and apply the adhesive (**Figure 1**) [9].

Mogen clamp

By this instrument, the foreskin is stretched distal to the glans and a metal shield is slipped over the foreskin just distal to the glans. A scalpel is used to remove the redundant distal foreskin. The frenulum is not involved in the excision. The Mogen clamp is held for a few minutes, and a bandage is then placed to prevent bleeding (**Figure 2**).

Moving back to the disposable devices, there are a large number of them of which we will just analyze the most used today (**Table 1**).

3.1 Alisklamp

This clamp system is supplied in two parts, a clear polycarbonate tube and a white plastic clamping mechanism. He achieves circumcision by crushing the foreskin



Figure 1.
Gomco clamp device [10].

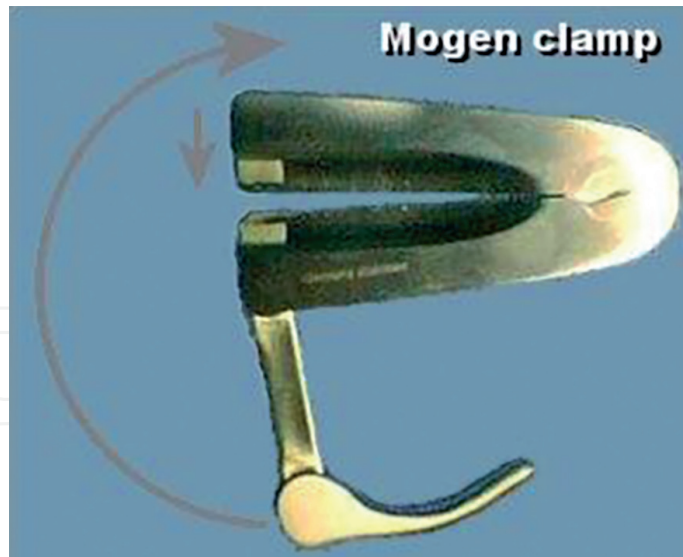


Figure 2.
Mogen clamp device [11].

Male circumcision devices
Accucirc ® (Safecirc clinic, Wakefeld, United State)
AlisKlamp ® (Healing Hands Clinic, Ankara)
Circumplast ® (Emboss Medical Limited, United Kingdom)
Ismail clamp ® (Drims Trading Sdn Bhd, Malaysia)
Plastibell ® (Advin Health Care, India)
PrePex ® (Circ MedTech, Hod Hasharon, Israel)
ShangRing ® (Wuhu Snnda Medical Treatment Appliance Technology, China)
SmartClamp ® (GoDaddy Operating Company, United State)
SurgiPex ® (Dynamic experts, Pakistán)
Tara Klamp ® (Tara Medic Corporation Sdn. Bhd, Malaysia)
Unicirc ® (Unicirc Pty Ltd., South Africa)
Winkelmann clamp
Zhenxi rings ® (Weihai Zhenxi Medical Equipment Corporation, South Korean)

Table 1.
List of currently available male circumcision devices.

between the two components. Excess tissue is removed with a scalpel, but that cut does not define the scar line; scalpel cutting simply removes what would otherwise become a mass of necrotic tissue. The most frequent complications were excessive foreskin (0.7%), followed by bleeding (0.6%), infection (0.55%), wound dehiscence (0.25%), buried penis (0.25%), and urine retention (0.1%) (**Figure 3**) [11].

3.2 Plastibell

A plastic bell with a slit in the proximal part is slipped between the glans and the foreskin, and suture material is tied tightly. The suture produces necrosis, with the distal foreskin falling off in 7–10 days (**Figure 4**).



Figure 3.
Alisklamp device [12].

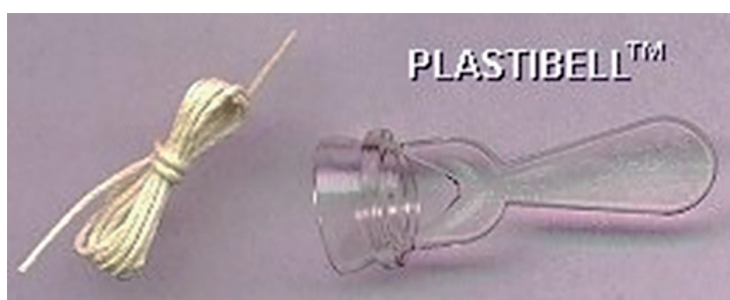


Figure 4.
Plastibell device [11].

3.3 Prepex

It consists of an inner ring, an elastic ring, a locating ring, and a verification thread. It has been approved by the US Food and Drug Administration (FDA) and carries a European mark of conformity (EC). To place the device, we must place the elastic ring on the placement ring. The placement ring is then left at the base of the penis, and the inner ring is inserted between the glans and the foreskin. The elastic ring is deployed between the placement and the inner rings at the circumcision line. This compresses the foreskin and cuts off distal circulation, causing necrosis and allowing it to be excised within 7 days after device placement without bleeding. The Prepex device can be applied and removed without the need for local anesthesia and has potential for use in non-sterile settings with limited resources (**Figure 5**) [13].

3.4 Shang ring

It is the most studied device, easy and fast to apply under local anesthesia. It is one of the devices prequalified by the WHO for use in adolescent and adult circumcision. It has also received FDA approval for use in adults, in addition to EC mark [15]. The estimated surgical time in adults is 3 to 5 minutes [16, 17]. The circumference of the penis must be measured accurately, and it is important to calculate the correct size. The device is available in 32 sizes to fit all ages, from newborns to adults. It is safe and effective in both adolescents and adults, with a success rate of the procedure greater than 99%. No serious adverse effects were reported (**Figure 6**) [18].



Figure 5.
Prepex device [14].



Figure 6.
Shang ring device [19].

3.5 Unicirc

It works very similar to the Gomco clamp. After the application of the device on the glans, the foreskin is placed on the transparent bell and adjusted accordingly. The device is then screwed on tightly and held in place for 5 minutes, bringing the mucosal and skin surfaces together to minimize bleeding while the foreskin is removed. The Unicirc is then removed and a cyanoacrylate adhesive is applied to promote healing by primary intention. The first version of the device resulted in higher postoperative blood loss compared to open surgery, prompting a change in the setting of the mechanism to ensure adequate hemostasis (**Figure 7**) [9].

The literature seems to support the results of these devices in terms of efficacy and safety. Hohlfeld et al. state in their review published in Cochrane that the operative time is probably about 17 minutes shorter when a device is used instead of standard



Figure 7.
Unicirc device [20].

surgical techniques, which constitutes a clinically significant decrease in the procedure [21]. The suture surgical technique generally takes about 24 minutes. Another of the items studied in this review was pain. Hohlfeld et al. conclude that there is less postoperative pain during the first 24 hours when circumcision devices are used compared to standard surgical techniques (measured by visual analog scale (VAS)). Beyond those first few hours, there is little or no difference in postoperative pain experienced up to the first 7 days compared with standard surgical techniques [21]. In terms of adverse effects, when a circumcision device is used compared to a standard surgical technique, there are probably no more serious adverse events, such as hospitalization or permanent damage, although there may be a slight increase in moderate adverse events requiring minimal interventions, such as suture or antibiotics. No serious adverse events were reported when circumcision devices were used compared to standard surgical techniques [21, 22].

4. Complications

Weiss et al. reported in a meta-analysis a median frequency of 1.5% (range 0–16%) for any complication from circumcision [23]. The risks and severity of complications are greater with traditional non-medical circumcision than with medical circumcision.

Bleeding. In the suture technique, between 0.1% and 35% have been reported, although transfusion is unusual [24, 25], but if we focus on the device technique, we will discover that the bleeding rates are not usually exceed 1%. Of all the devices,

it is especially common in sutureless devices that only use the bandage to control hemostasis (Mogen). In systems such as Gomco or Plastibell, 1% of bleeding has been reported that required some action by the doctor to control it [26].

Glans necrosis. Distal ischemia resulting in such tissue loss may be due to infection, [27] the use of epinephrine-containing local anesthetic agents, attempts at cautery and suture hemostasis, and injudicious and prolonged use of a tourniquet or tight bandage [28]. It is especially common with the use of diathermy with metal clamps (Gomco). Necrosis as a complication of circumcision is very rare [27].

Lack of redundant foreskin droop. It may be due to a poor choice of size or a poor coupling of the device.

Infection. The incidence of infection in a series of neonatal circumcisions was 0.4%, while in a series of older boys it was as high as 10% [11]. Most infections are minor and of little or no importance. Gee et al. notes that infections were significantly more frequent with the Plastibell device than Gomco, even though it has a lower rate of dehiscence or results in removal of too much skin [26].

Urinary retention. This has been reported, after circumcision, secondary to a tight circular bandage [4]. It really is a very rare thing.

Fistula. Most cases have occurred after the use of a clamp-type device where hemostatic sutures were placed on the frenulum with inadvertent suturing of the underlying urethral tissue.

Suture dehiscence. This type of complication is especially mentioned in the works that refer to the Gomco device, where tissue adhesive is used. Although dehiscence rates are low (0–6.8%) [9], especially in children, the use of this material in adults seems to have a higher rate due to the tension that erections can exert on the suture. Despite this, this type of dehiscence usually does not require surgical repair.

5. Satisfaction in the sexual sphere

Since we are evaluating this minimally invasive circumcision technique in adults, we must mention the possible influence of these devices in the sexual sphere. Most of these devices recommend sexual abstinence for the first 4 weeks after surgery. After this time, erectile function and sexual libido in adolescents and adults were not affected by circumcision, and a high satisfaction rate was obtained [29].

6. Conclusions

There is an important variety of devices on the market, but they all seem to be based on the same mechanism, necrosis of the distal foreskin through vascular clamping of excess skin. The procedure is ideal for outpatient settings, where a large number of circumcisions are performed by personnel with less surgical experience.

The male circumcision technique in adults with plastic devices has great advantages over the classic suture technique. The procedure has low complication rates and results in a significant shortening of surgical time. Patients appear to be satisfied with the cosmetic result and experience less pain in the first 24 hours.

Comparative studies between the different devices are currently required in order to elucidate whether any of them stand out from the others in terms of safety and ease of use.

Conflict of interest

The authors declare no conflict of interest.

Appendices and nomenclature


FDA	US Food and Drug Administration
EC	European conformity
WHO	World Health Organization
VAS	visual analog scale

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