

Male Circumcision using Bone Cutter with Thermal Cautery

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Abstract

Background: Bone cutter is a widely used procedure to cut the prepuce during circumcision. **Aim of the study:** The aim of the study was to assess the safety of circumcision of male using bone cutter with thermal cautery, including the operative time and healing time and the effect of dressing on rate of infection and bleeding. **Materials and Methods:** Over 20 years period from 1996 till 2015, six thousands of males were circumcised under local anesthesia (in form local infiltration of 1% plain lidocaine 5 min before circumcision and xylocaine spray after the procedure) using a bone cutter with thermal cautery, the first assistant is to fix the upper limbs, while the main assistant is to fix the knees in a fully extended position by the left hand, while the right hand used to elevate the two mosquitoes, then by using thermal cautery to cut the foreskin above the jaw of bone cutter and by using S-ring in certain situation to fix the bone cutter tightly. **Results:** Six thousands males were included in this study. The mean operative time was 1-2 minutes, healing time was 5-7 days, 387 cases (6.45%) developed early & late complications, 180 (3%) bleeding, 195 (3.25%) developed infection, 3 (0.05%) with mild glans injury need dressing only for 24-48 hours only 9 (0.15%) need re-circumcision later on in the same procedure. **Conclusions:** Bone cutter with thermal cautery circumcision is feasible with a relatively lower complications rate, shorter operative time, and short healing time.

Keywords: Bone cutter, Circumcision complications, circumcision, S-ring, thermal cautery

INTRODUCTION

Male circumcision (in Latin *Circumcidere*, which means “to cut around”) is the partial or complete surgical removal of the foreskin (prepuce) of the penis.^[1] Male circumcision is done for religious, cultural, social, and medical reasons, it is one of the most common and oldest surgical procedures worldwide.^[2]

The foreskin (prepuce) is two layers of skin of the penis representing part of the skin system of the penis extending forward over the glans of the penis, then the inner fold attached to the shaft of the penis in the groove (sulcus) just behind the glans.

The frenulum is a band of elastic tissue that connects the foreskin to the underside of the glans and keeps the complete cover of the glans. It is often partially or totally excised by circumcision.

There are many methods for circumcision the more common types are:

Mogen (Bronstein style) clamp

The Mogen clamp is a simple shield with a narrow gap that protected the glans, while the foreskin was pulled through

and excised as the same principle of the bone cutter, crush the foreskin tissue, and guide the scalpel for cutting the foreskin.^[3] There is a risk that the glans can be pulled into the slit and crushed or partially severed.^[4]

Plastibell

It is a widely used technique around the world, it can be used in children up to 2 years as well as infants, and the incorrect technique can result in complications like pressure necrosis with injury to the glans as well as skin loss depending on bell sizes. The prepuce is pulled slightly forward and suture material is looped around in the groove and tied tightly, enough to cut off the blood supply to the prepuce distal to the groove, which withers and drops off in 7–10 days^[5] [Figure 1].

Dorsal slit

The prepuce is freed from the glans and with the aid of artery forceps placed at 10 and 1 o'clock, a 12 o'clock slitting of both

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layers of the prepuce is done to some few millimeter of the corona, this procedure prevents phimosis and paraphimosis, but it is cosmetically unacceptable.^[6]

Sleeve resection

Dorsal slit incision of both layers of the prepuce is distal to the corona, then circumferential incision is made around the shaft of the penis, the frenulum can be included with this incision or can be cut separately, then the cutting edge of prepuce can be sutured using 4/0 cut gut. Other types of sleeve can be done by crushing the prepuce by forceps or bone cutter, then cut the prepuce just above forceps by scalp or thermal cautery.^[6]

The benefits of male circumcision are:

1. Reduction in risk of female-to-male human immunodeficiency virus transmission among circumcised men compared to uncircumcised men^[7]
2. Circumcision protects males from penile cancer and females from cervical cancer caused by human papillomavirus and also reduces the risk of invasive squamous cell carcinoma and reduces the risk of urinary tract infection.^[8] Circumcision has no bad effects on sexual function in future.^[9]

Circumcision is contraindicated:

1. In infants with certain congenital anomalies like hypospadias and epispadias, curvature of the head of the penis (chordee), or ambiguous genitalia, because the foreskin may be needed for reconstructive surgery
2. Clinically unstable premature infants^[8]
3. Positive family history of serious bleeding disorders (Hemophilia), so blood should be checked for coagulation properties before circumcision.^[8]

Aim of the study

The aim of the study was to assess the safety of circumcision of males by using a bone cutter with thermal cautery, including the operative time and healing time and the effect of dressing on the rate of infection and bleeding.

MATERIALS AND METHODS

The prospective study of six thousand of males has been circumcised in private practice in Ana city and surrounding areas under local anesthesia using a bone cutter with thermal cautery during 200 years period from 1996 to 2015. The age ranges from 3 days to more than 11 years, as shown in Table 1.

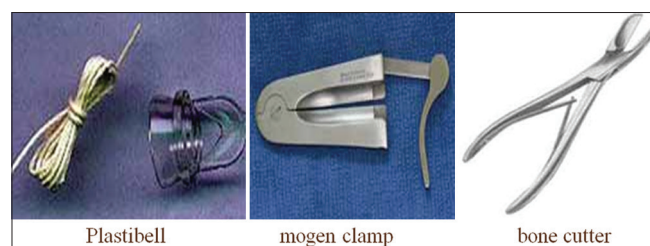


Figure 1: Circumcision device

All males in this study are circumcised including glandular hypospadias, while other types of hypospadias are delayed because the prepuce may be needed in operation of repair.

The instruments used are bone cutter with S-ring, two mosquitoes, and thermal cautery, as shown in Figure 2.

Methods

Verbal consent was obtained from parents of the baby after explanation of the procedure with possible complications that can happen and possible change to cut by scalpel instead of thermal cautery.

Under local anesthesia by infiltration of 1% plain lidocaine (without adrenaline), The maximum dose that can safely be given is 3 mg per kg of body weight. [e.g. for 1% lidocaine: contains 10 mg of lidocaine per 1 mL] injected at base of penis (avoid central position to avoid dorsal penile vessels) at 10 and 2 o'clock position (1-2 ml according to body weight of baby using 1ml sterile syringe) waiting 5 minutes.

Then in supine position with slightly separated thigh cleaning the area by povidone iodine 4% then foreskin [Figure 3] is freed from glans and it is fully retracted and the adhesion is removed and area is cleaned till the sulcus become clear and well demonstrated after that the foreskin returned back to its normal position.

The foreskin is caught dorsally and ventrally by using 2 mosquitoes hanging them up to tight the foreskin up, then open the jaws of bone cutter fully let the foreskin pass through it near the tips of mosquitoes at that time close the jaw to degree that permit the passage of fold of foreskin only then push the

Table 1: Ages of circumcised males

Age	n (%)
2- 7 days	550 (9.17)
8- 30 days	1200 (20)
31- 90 days	1600 (26.67)
91 days- 1 year	1315 (21.92)
2- 10 years	1280 (21.33)
>11 years	55 (0.92)
Total	6000



Figure 2: Thermal cautery

bone cutter downward as much as we can till it stopped at that time the glans is completely below the jaw of bone cutter and the excess foreskin above the jaw, now close the jaw tightly.

While the foreskin is still tight up above the jaw, thermal cautery is used to cut the foreskin immediately above the surface of the jaw it is preferable to keep tightness of bone cutter for at least ¼-½ minute then open the jaw of bone cutter, the glans is either exposed spontaneously and the remnant of foreskin retracted back or by using minor ventro-dorsal pressure to expose the glans and retract the remnant of foreskin back to its position.

The wound is wrapped by narrow bandage with mild tension then use xylocaine spray to this bandage [Figure 4].

The dressing stays in its place for 12–24 h during which I advise the family to use genidin eye ointment for at least 3 times on the bandage, then this bandage is removed by family after that time and allow his mother to wash the area gently with water after at least 48 h.

The total duration of this procedure is not more than 1–2 min, most of this time was consumed in separation of foreskin from the glans and cleaning the sulcus, the real time of clumping by bone cutter and cutting by thermal cautery and wrapping of the wound is not more than 1 min. The S-ring is almost always ready with a bone cutter as one instrument and to be used when needed [Figure 5].

The total numbers of males included in this study were divided into 2 equal groups. The first 3000 of them were left without dressing (wrapping) of the wound [Table 2]:

1. One hundred and twenty (4%) of them complain of bleeding within the first 4 h after circumcision needs reexamination of wound, then dressing (wrapping) the wound for 12 h, only five cases need suturing or ligation of bleeder
2. One hundred fifty (5%) of them complain of infection in first 7 days after circumcision needs local cleaning with diluted povidone solution once, then cleaning with water and soap as well as oral antibiotic for 5 days. All of them healed within 10 days.

The second 3000 of them use dry dressing (wrapping) of the wound for 12–24 h [Table 3]:

1. Sixty (2%) of them complain of bleeding in first hour necessitate changing the dressing only. Only 3 of them need suturing or ligation of bleeder using 4/0 cut gut.
2. Forty-five (1.5%) of them complain of infection as swelling at site of wound need local cleaning and oral antibiotic for five days and all of them healed within 10 days.

The S-ring made from leather, this ring is fit for the limbs of the bone cutter which the jaw of it is closed tightly; I call this ring S-ring, the benefits of this ring can be summarized by:

1. It is used to fix the jaw of bone cutter tightly around the foreskin so that the surgeon can use his right hand to cut the foreskin by diathermy, while the left hand is used to hung the mosquitoes stretching the foreskin so the surgeon needs only one assistant
2. It is also used when the probe of diathermy is destructed or cut during circumcision and needs to be changed, so this ring is used to fix the jaw tightly while the surgeon changes the probe and restart the operation
3. In any problem faced by the surgeon during the procedure, for example, the assistant unable to continue during the procedure
4. It is also used when the electric current is cut off; during that time, the surgeon prepares scalpel for classical circumcision.

Table 2: Complications in the first group

Complications	n (%)
Bleeding	120 (4)
Infection	150 (5)
Total	270 (9)

Table 3: Complications in the second group

Complications	n (%)
Bleeding	60 (2)
Infection	45 (1.5)
Total	105 (3.5)



Figure 3: Before circumcision



Figure 4: Dressing after circumcision

RESULTS

In general the complications associated with circumcision include bleeding 180(3%), infections 195 (3.25%), glans injury 3 (0.05%), those who need re-circumcision are 9(0.15%). The glans injury was usually mild and need only dressing for 24-48 hours and no need for catheterization. Only 9 of the males 0.15% need re-circumcision. The healing time ranging from 5-7 days [Figure 6 and Table 4]. The complications seen in 387 (6.45%) after circumcision of the total 6000 males, ($P < 0.0001$) ($X^2=4551.85$) was highly significant.

The complications associated with each age groups are mentioned in Table 5 which show the least complications in the first age group (2–7 days) and the last age group (>11 years). The younger the age group, the faster the healing time is.

In this study, there is no relation between body weight and any complications mentioned above.

In this study, bone cutter and thermal cautery (instead of scalpel) were used after freeing the foreskin from glans and the adhesion was removed and the sulcus was cleaned. The use of bone cutter parallel to sulcus in manner that the glans becomes completely below the jaw of bone cutter and the glans cannot be slipped above the jaw, so the injury of glans is very low, it only occurs in 3 males (0.05%), and it is mild lateral injury and not interferes with urethral orifice, so it needs only simple dressing for 48 h.

The use of thermal cautery to cut the excess foreskin is good way for hemostasis by coagulation of distal skin vessels this process is enforced by steady clumping of foreskin by bone cutter jaw for ½ minutes.

Table 4: Percentage of complications

Complications	n (%)
Bleeding	180 (3)
Infection	195 (3.25)
Glans injury	3 (0.05)
Re-circumcision	9 (0.15)
Total complication	387 (6.45)
Total normal (no complications)	5613 (93.55)
Total	6000



Figure 5: The S-ring fits for bone cutter limbs

Wrapping of the wound after removing the foreskin, make the bleeding after circumcision is very low only 60 (2%) and even mild and need only for change the dressing and no need for suturing.

The infection of the wrapped wound is very low 45 (1.5%) [Table 3]. While complications in unwrapped wound including the bleeding occur in 120 (4%) and infection occurs in 150 (5%) [Table 2].

The only late complication mentioned in this study is excessive residual skin in 9 (0.15%) which needs re-circumcision by the same procedure mentioned in this study. The period of follow-up in this study was (1–3 months) sufficient to detect early and late complications, the long-term complications are not detected.

The short operative time of this operation (1–2 min) make it safely done by experienced hand under local anesthesia, avoiding the risk, complications, longtime preparation, and recovery of general anesthesia.

DISCUSSION

There are many methods that had been used to cut the foreskin during circumcision, one of these methods is the use of a bone cutter. There is a high rate of glans penis injuries and even accidental amputation of the glans during clamping.^[10]

With an open method of circumcision, the complication rate is 3.5%,^[11] while with Plastibell technique, the complications rate was 2%–3% and operative time was about 4 min,^[12] The complications of Plastibell method include retention of Plastibell, slippage, and incomplete circumcision, mainly due to the incorrect size of Plastibell, it can be used safely in up to 2 year olds.^[13]

The use of the glans guard method bone cutter associated with the rate of complications ranged from 4.7% to 8.4%, but the operative time was 5–6 min.^[14] Furthermore, the study was done in Iraq in 2012 (Bone Cutter Circumcision in Neonates); under general anesthesia, complications were seen in 5.9%, and the operative time was 6 min.^[15]

Sleeve resection technique is done under general anesthesia with surgical assistant present usually associated with slightly



Figure 6: Seven days after circumcision

Table 5: Complications related to the age of males

	<i>n</i> (%)	bleeding	infection	Glans injury	Re-circumcision
2- 7 days	550 (9.17)	2			
8- 30 days	1200 (20)	20	35	2	4
31- 90 days	1600 (26.67)	30	60		4
91 days- 1 year	1315 (21.92)	100	90	1	1
2- 10 years	1280 (21.33)	25	10		
>11 years	55 (0.92)	3			
Total	6000	180	195	3	9

increased risk of glans injury and urethra-cutaneous fistula formation, this procedure needs a long time to be performed.^[16]

In comparison to this study, there is very low glans injury (0.05%) which is simple with no urethral-cutaneous fistula, there is a statistically significant difference in complication rates (especially with wrapped wound) (3.5%). The most important advantage of this procedure is the short time of procedure (1–2 min) and the period of healing was 5–7 days.

The procedure in this study can be used in any age group under local anesthesia in comparison to other methods which was done under general anesthesia with the risks and time consuming of general anesthesia.

The overall complications seen in this study (387, 6.45%) after circumcision of the total 6000 males ($P < 0.0001$) were highly significant, and it is significantly low complications when the wound was wrapped 3.5%.

In comparison to all other methods of circumcision mentioned, the procedure in this study has the shorter time procedure (1–2 min only) and shorter healing time (5–7 days), and it is done under local anesthesia at any age.

CONCLUSIONS

1. Circumcision using bone cutter with thermal cautery is a feasible and relatively safe procedure
2. A short operative time (1–2 min) and short healing time (5–7 days)
3. The complications are significantly low regarding bleeding and infection, especially when the wound is wrapped for 12–24 h and using genidin eye ointment locally
4. The use of S-ring is of great benefit when there is any problem during the procedure of circumcision.

Recommendation

1. Using bone cutter with thermal cautery associated with wrapping the wound, and using local genidin eye ointment is an easy, safe, and short procedure with a low rate of complications including infections and bleeding
2. It needs good training and good experience to minimize the complications which may occur
3. The use of S-ring is very important in reducing the urgent

shift to classical method of circumcision by scalpel, and it is very important when there is any problem during the procedure.

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Conflicts of interest

There are no conflicts of interest.

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