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The comparison of surgical and thermocautery-assisted techniques used in neonatal circumcision

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Abstract

Neonatal circumcision is a frequent procedure performed all around the globe, and it has a low complication rate when performed by trained experts. Our aim is to evaluate the outcomes and potential complications of two neonatal circumcision techniques. Fifteen hundred twenty-one infants who underwent neonatal circumcision at Hisar Intercontinental Hospital between 2010 and 2020, were evaluated retrospectively. Patients who had surgical procedures were classified as Group 1, whereas those who underwent thermocautery-assisted technique were classified as Groups 2. The outcomes and complications of both groups were compared. Group 1 had 758 patients, whereas Group 2 had 763. Both groups were aged 13.69 ± 7.45 days and 13.44 ± 7.70 days ($p=0.1$). Although there was no significant difference between the two groups when the complications were examined individually, there was a significant difference when all complications were considered, and the complication rate was greater in group 2 ($p=0.01$). While the hemorrhage rate was higher in Group 1 ($p<0.001$), edema ($p<0.001$), meatal stenosis ($p=0.03$), and long foreskin ($p=0.06$) were more common in Group 2. Although both procedures are safe for neonatal circumcision, the surgical method may be preferable since the complication rate is lower.

Keywords: Circumcision, newborn, thermocautery

Introduction

Circumcision is the surgical procedure of cutting the prepuce covering the glans penis in a certain form and length, exposing the tip of the penis. Besides being a long-standing custom, it is also the most often used surgical operation in the world [1-3]. It is estimated that one-sixth of the world's male population is circumcised [1,2].

Pathological phimosis and recurring balanitis are the two most major unarguable medical indications for circumcision [4].

Circumcision is the most frequently performed surgical operation in the United States, and it has been stated that circumcision is often performed for aesthetic reasons [5].

Circumcision lowers the risk of a variety of severe illnesses, including urinary tract infections, penile and prostate cancer, cervical cancer in female partners, human papillomavirus, herpes simplex virus 2, human immunodeficiency virus (HIV), and other sexually transmitted diseases [6]. Since circumcision is a commonly performed surgical intervention, the importance of complications that occur during and after this operation has grown in importance [7]. There are numerous techniques for circumcision. Circumcision can be performed surgically (Sleeve method, Dorsal slit method, Dorsal slit, and excision method, Guillotine method) or using instrument-assisted techniques (Special circumcision clamps such as Gomco Clamp, Mogen Klamp, Plastibell, Winkelman Clamp used especially in neonatal circumcision, also new generation special circumcision clamps such as AccuCirp, Ali's Klamp, Ismail Klamp, PrePex, Shang Ring, Smart Klamp, Sunathrone, Tara Clamp), depending on the surgeon's preferences [3].

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Although thermocautery circumcision has been performed for years, there was no comparison between surgical and thermocautery circumcisions in newborns. In this article, we compared the complication rates in surgically applied neonatal circumcisions with the complication rates in thermocautery-assisted neonatal circumcisions.

Materials and Methods

This study began with the consent of Helsinki Declaration standards and the local ethics committee (Hisar Intercontinental Hospital Ethics Committee, 15/06/20 21, 2021 / 2-52).

Inclusion criteria were applicable for male infants circumcised and under the age of 30 days.

As a criterion, male infants who were circumcised following the neonatal period, and diagnosed with additional urological disorders (undescended testis, hydrocele, hernia, hypospadias, epispadias, etc.) and had urinary infections were excluded. Before undergoing local anesthetic for circumcision, all patients had a urological examination.

We divided the patients into two groups. Patients in Group 1 that were circumcised using a scalpel or scissor as a surgical procedure, and patients in Group 2 that were thermocautery-assisted circumcised. The groups were compared in terms of early (bleeding, edema and infection) and late complications (meatal stenosis and insufficient circumcision). All circumcision procedures were performed under local anesthesia. Lidocaine and prilocaine (EMLA® 5% cream) were used as topical local anesthetic, and lidocaine HCL (Jetokain ampule, Adeka, Turkey) was as penile block. Circumcisions were performed by urologists and pediatric surgeons. After cleaning the circumcision area with a batticon and covering it with a sterile cover, the circumcision operation began. Those with phimosis and attached preputium were opened 15 minutes after local anesthetic,

and the preputium was first loosened and retracted to minimize damage to the glans, before the urethral meatus was revealed.

After the circumcision, the patient was monitored for one hour. Following that, patients and parents were advised to continue living their daily routines. After the surgery, only pain relievers were administered, and the bandages and dressing were removed three days later.

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Results

Complications were evaluated according to the modified Clavien-Dindo classification system (CDCS) method. According to this categorization, none of the patients suffered a complication of rating 4. or 5. [8,9].

Group 1 had 758 patients, whereas Group 2 had 763. Both groups were aged 13.69 ± 7.45 days and 13.44 ± 7.70 days ($p=0.10$). Although there was no significant difference between the two groups when the complications were examined individually, there was a significant difference when all complications were considered, and the complication rate was greater in group 2 ($p=0.010$). While the hemorrhage rate was higher in Group 1 ($p<0.001$), edema ($p<0.001$), meatal stenosis ($p<0.01$), and long foreskin ($p<0.05$) were more common in Group 2. [Table 1, Table 2].

Table 1. Average age of patients, complication rates

	Group 1 (n=758)	Group 2 (n=763)	p Value	Significance Level p
Age (day)	13.69 ± 7.45	13.44 ± 7.70	2.6	0.105
Bleeding	% 0.078 (59)	%0.034 (26)	13.80	0.000**
Long foreskin	%0.010 (8)	%0.027 (21)	5.85	0.648
Meatal stenosis	% 0.014 (21)	% 0.0589 (45)	8.95	0.003*
Infection	%0.027 (21)	%0.030 (23)	0.81	0.777
Edema	%0.015 (12)	%0.096 (74)	46.94	0.000**
All complication	% 0.196 (121)	% 0.307 (189)	18.17	0.000**

* $p<0.01$, ** $p<0.001$

Table 2. Classification of postoperative circumcision-related complications according to the Clavien-Dindo Classification system

Grade	Definition	Our study		Management
Grade 1 n=212 % 13.94	Those treated with medication only (not requiring surgical or endoscopic treatment). Allowed drugs; drugs such as antiemetics, antipyretics. Analgesics and physiotherapy can also be included in this group.	Simple bleeding		Daily dressing with cohesive bandage (Coban)
		Group 1 n=57 % 7.52	Group 2 n=25 % 3.28	
		p<0.001		
		Mild infection		Fucidic acid pomade. daily dressing
		Group 1 n=21 % 2.7	Group 2 n=23 % 3.0	
p>0.05				
		Edema		Maintenance ibuprofen. Daily dressing
		Group 1 n=12 % 1.5	Group 2 n=74 % 9.6	
		p<0.001		
		Bleeding causes of hematoma		Hospitalization. daily dressing with cohesive bandage
		Group 1 n=2 % 0.26	Group 2 n=1 % 0.13	
p>0.05				
Grade 2 n=3 % 0.19	The need for treatment with additional medications other than those permitted for Grade I complications.	Reoperation		Reoperation
		Group 1 n=8 % 1.05	Group 2 n=21 % 2.75	
		p<0.05		
		Meatal stenosis		Meatotomy Urethral dilatation
		Group 1 n=21 % 2.77	Group 2 n=45 % 5.89	
p<0.01				
Grade 4 n=0	Complications that can be life-threatening	None	-	-
Grade 5 n=0	Death	None	-	-

Discussion

Various circumcision methods are commonly utilized today. The type of circumcision chosen is determined by the doctor's degree of comfort and education. There are several techniques. Surgical techniques such as Sleeve, Dorsal slit, and guillotine can be counted, as can techniques utilizing standard surgical equipment such as Gomco, Mogen, specially used PlastiBell, Alisclemp, Tara, and Shang Ring. All of these techniques can be used in operating rooms and outpatient clinics [10]. One of the techniques widely performed by surgeons in Turkey is pinching the foreskin with a clamp and cutting it with a scalpel. This technique has been modified, and the approach used with electrocauterization is described to prevent bleeding and to conduct a quicker operation, rather than using a scalpel [11,12].

Complication rates are extremely low when circumcision is performed by competent physicians using proper anesthetic and equipment. We encounter complications ranging from hemorrhage or a simple infection to death when we look at the literature. The

complications are determined by the surgeon's experience, the environment, and the technique employed. When the literature is reviewed, there are publications reporting a wide range of circumcision complications ranging from 0.1 to 35% [13,14].

In a review of 100,157 cases of neonatal circumcision, Thomas et al. discovered that the total incidence of complications in US military hospitals between 1980 and 1985 was 0.19%. The highest incidence was hemorrhage (44% of all complications), followed by infections (32.6%), surgical trauma (1.3%), bacteremia, and urinary tract infection [15].

If we examine the frequency of early and late complications and complications during circumcision, we can see that:

It is one of the most frequently reported complications in the literature [13,16,17]. It is typically caused by an inability to regulate the veins in the frenular area or, less frequently, the veins in the dorsum. Various publications have reported hemorrhage rates ranging from 0.2% to 35% [18].

In a study conducted in England, 2% of complications were encountered in 66 519 circumcision cases. Hemorrhage occurred in 0.8% of the cases, respectively. A revision was required in 303 (0.5%) of the children, and 7 of them developed meatal stenosis [17]. Senel et al. reported the rate of hemorrhage in 5700 surgical circumcision cases to be 5% [19]. Buwembo et al. found the rate of hemorrhage in 5152 surgical circumcisions to be 29 patients (0.56%) [20]. Kazem et al. found a rate of 15 patients (0.4 percent) of hemorrhage in 3760 neonates who were surgically circumcised [1].

The hemorrhage rate in our 758 surgically circumcised cases was 59 patients (7.8 percent). We believe the reason the rate was found to be somewhat higher in comparison to previous studies is that our study included patients who had hemorrhages but did not require intervention. Only one patient had a subcutaneous hematoma; no drainage was required, and the hematoma resolved spontaneously with conservative treatment. There was no significant hemorrhage in any of the patients, necessitating surgical intervention. Kazem et al. found the rate of hemorrhage in 2356 patients who were thermocautery-assisted circumcised to be 68 (2.88%) [1]. The rate of hemorrhage in thermocautery-assisted circumcision of 1780 children performed by Tuncer et al. occurred to be relatively low (in a total of 4 patients) [21]. The rate of hemorrhage in thermocautery-assisted circumcision of 2973 children performed by Karakaya et al. occurred to be similarly relatively low (in a total of 4 patients) [12]. Cakiroglu et al. stated that they observed mild hemorrhage in 730 (2.3%) patients out of 32.000 patients with thermocautery-assisted circumcision and that no patients required reoperation [11]. Aslan et al. reported the rate of hemorrhage in 5781 patients who were thermocautery-assisted circumcised to be 0.05% [22].

In our study, hemorrhage was observed in 26 (3.4 percent) of 763 thermocautery-assisted circumcised neonates, but a surgical intervention was not required in any of these patients, and the bleeding was managed with conservative treatment. The hemorrhage rates in circumcisions done in aseptic conditions adhering to hygiene measures are relatively low.

Senel et al. reported the rate of infection in 5700 surgical circumcision cases to be 239 patients (4.2%) [19]. Olcucu et al. found the rate of infection in 2356 patients who were thermocautery-assisted circumcised to be 39 (2.47%) [10]. Cecen et al. found the rate of infection in 2220 surgical circumcisions to be 26 patients (1.2%) [16]. Buwembo et al. found the rate of infection in 5152 surgical circumcisions to be 17 patients (0.33%) [20]. The rate of infection and meatitis in thermocautery-assisted circumcision of 1780 children performed by Tuncer et al. occurred to be relatively low (in a total of 3 patients) [21]. Karakaya et al. observed no infection in any of the 2973 thermocautery-assisted circumcised infants [12]. Cakiroglu et al. stated that they observed wound infections in 10 (0.3%) patients out of 32.000 who were thermocautery-assisted circumcised and that they were recovered with local creams without the need for systemic antibiotics in any of the patients [11]. Aslan et al. reported the rate of infection in 5781 patients who were thermocautery-assisted circumcised to be 0.01% [22]. While the infection rate in our surgical circumcision group was 21 (2.7%), it was found to be 23 (3%) in the thermocautery-assisted circumcision group. All patients were treated with local

pomades and were classified as Group 1 according to CDCS.

Since circumcision is a surgical operation, some edema is unavoidable during the operation. Olcucu et al. discovered edema rates after 2356 thermocautery-assisted circumcision to be ranging from 1.84 percent to 37.63 percent, depending on its degree (mild, moderate, and severe edema) [10]. Méndez-Gallart et al. reported that in 230 circumcisions performed with a bipolar diathermic knife and a conventional scalpel, they observed an edema rate ranging from 11.3% to 19% [23]. Cakiroglu et al. stated that they observed mild or moderate edema in 8320 (26%) patients out of 32.000 who were thermocautery-assisted circumcised, and that this edema resolved spontaneously in a few days without the need for additional treatment [11].

In our study, while the edema rate in the surgically circumcised group 1 was 1.5%, it was observed to be 9.6% in the thermocautery-assisted circumcision group 2. Edema was managed with conservative therapies in both groups, resolved spontaneously in a short period, and no extra treatment was required.

Additional treatments may be required due to inadequate tissue removal or the development of phimosis following circumcision. In general, in the circumcision process, when re-operation is expressed following the removal of inadequate tissue, terms such as long foreskin and secondary phimosis are employed. Although there are not many articles in the literature on this issue, it is commonly encountered [16,24-26].

The most prevalent complication in a large series that scrutinized nearly 9000 neonatal circumcisions was reported to be the requirement for reoperation due to inadequate tissue removal (2%) [24]. Cecen et al. found the rate of inadequate circumcision in 2220 surgical circumcisions to be 6 patients (0.25%) [16].

In our study, there was a total of 50 (3.2%) patients out of 1521 that had enough tissue to necessitate reoperation or experienced adhesions and were surgically opened.

Meatal stenosis can occur as a result of frenular artery ligation, meatus damage during circumcision or mechanical irritation of the external meatus owing to friction [27]. The diagnosis of Meatal Stenosis generally varies by a circular to the elliptical shape of the meatal orifice caused by fibrosis or scarring with visibly noticeable constriction [28]. The prevailing opinion is that meatal stenosis is caused by ischemia of the meatal mucosa caused by frenular artery injury [29]. Cakiroglu et al. stated that they observed meatal stenosis in 6 (0.018%) patients out of 32.000 that were thermocautery-assisted circumcised [11].

Meatal stenosis occurred at a rate of 1.4% in the surgical group and 5.9% in the thermocautery-assisted group in our study. Meatoplasty was applied on 3 of our resistant cases who were treated with repeated urethral dilatations.

Conclusion

The results of this study revealed that there was no statistically significant difference in terms of complications in neonatal circumcision performed surgical or thermocautery assisted. While hemorrhage is relatively more common in surgical methods, edema

may be more common in thermocautery-assisted circumcisions. We recommend neonatal circumcision since it has a very low complication rate when performed by skilled hands and ensures safe and quick wound recovery.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

This study began with the consent of Helsinki Declaration standards and the local ethics committee (Hisar Intercontinental Hospital Ethics Committee, 15/06/20 21, 2021 / 2-52).

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