

Complications of Circumcision And its Management in Pediatric Age Group

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ABSTRACT

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Background: Circumcision is the most common & oldest surgical procedure in the world, about one third of males in the world are circumcised.

Objectives : to evaluate the predisposition of early & late complications of circumcision in different age group regarding the technique used & operator as well as management strategy for each complication.

Methods: A prospective case series study conducted at the pediatric surgery centre at AL-Khansaa Teaching Hospital in Mosul city in Iraq from the first of June /2019 to the first of December/2020. The complications were categorized as early complication (< 1 week) such as, infection, bleeding, huge mucosal edema, penile amputation & glans injury. Late complications (>1week) such as phimosis/trapped penis, adhesions/skin bridges, excess foreskin, ventral curvature, retention cyst, meatal stenosis & penile torsion.

Results: 105 cases were referred to our pediatric surgery center. 101 (96.19%) circumcised by paramedical staff (nurse, dresser), 3 (2.85 %) patients circumcised by paediatric surgeon & 1 (0.95%) circumcision done by general surgeon {P=0.001}. Early & late complications included : phimosis/trapped penis [n=47 (44&%)], meatal stenosis [n=9 (8.5 %)], torsion [n=1 (0.95 %)], bleeding [n=11 (10.4%)], mucosal edema [n=1 (0.95 %)], ventral curvature [n=3 (2.8 %)], glans injury [n=4 (3.8 %)], penile amputation [n=1 (0.95 %)], urethral fistula [n=1 (0.95 %)].

Conclusion: There circumcision complications may be high in the infantile age group. Many complications seen in those circumcised by untrained paramedical staff with unauthorized thermocautery machine.

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Introduction

Circumcision is done by removing the foreskin from the penis by surgical procedure, it is the most common & oldest procedure in the world. The rate of circumcision among Muslims and Jewish approaches 100% (Ritual indications) [1].

Medical indications as phimosis, paraphimosis, balanitis (inflammation of glans), posthitis (inflammation of prepuce), protection from sexually transmitted diseases (HIV, HPV (& protective role from cervical cancer of female partners and cancer of penis and decreases the rate of UTI [2][3][4][5][6].

Methods of circumcision includes:

Mogen clamp: Usually used in Jewish ritual circumcisions & Gomco clamp which consists of 4 pieces, both provide hemostasis [7].

Free-hand circumcision: Usually in theatre and includes excision of the prepuce, using electrocautery for hemostasis. The “sleeve technique” circumferential line of incision of prepuce that should be done at the same distance from the corona on the inner and outer preputial surfaces [7][8].

Plastibell: It is an effective tool for religious and cultural circumcisions. The device is positioned over the glans and the foreskin pulled over. A ligature is then tied around the foreskin over the groove of the plastibell [9].

Complications Of Circumcision Can be early like penile swelling or inadequate skin removal. However, serious complications can occur, including death from excess bleeding and amputation of the glans. Late complications like wound infection, a penoglanular skin-bridge/adhesions, infection, urinary retention, meatal stenosis, fistulas, and oedema of the glans [10].

Medical contraindications include sick infants (jaundice), bleeding disorder, anatomical contraindications include; epispadias, chordee, buried penis & webbed penis, micropenis ambiguous genitalia [11]

The aim of the study is a reflection of a single center experience to evaluate predisposition of early & late complications of circumcision in different age group in relation to technique used & operator as well as management strategy for each complication.

Methods

A prospective case series study conducted at the paediatric surgery centre at AL-Khansaa Teaching Hospital in Mosul city in Iraq from the first of June /2019 to the first of December/2020 . Inclusion criteria included all paediatric patients under went circumcision and developed complications shifted to our centre by parents as an emergency or referred to our centre from private clinics, hospitals and other centres. The exclusion criteria included cases referred to our centre for other surgical problems with additional circumcision complications and patients with late complication but older than 14 years.

Most of the patients circumcised by paramedical staff under local anaesthesia by free hand traditional method or direct cutting of foreskin by thermocautery, or by scalpel/bone cutter technique. Some cases admitted as an emergency, but most patients admitted as a day case electively, others treated as outpatient.

The complications were categorized as (early < 1 week) complications such as glans injury , infection & bleeding ; some patients requires admission and blood transfusion , others had moderate bleeding managed by haemostasis and suturing , others had minor bleeding controlled by dressing only .

Disastrous complications as glans injury or amputation treated urgently by folly's catheter and suturing the glans by 6-0 vicryl, others with glans reconstruction & meatoplasty and some patients not operated till now.

Late complications (> 1 week) such as phimosis/trapped penis, treated electively ; by excision of the fibrous ring & excess mucosa with re circumcision and suturing by 6-0 vicryl UGA , with or without folly's catheter for urine retention, some complication were corrected as an additional procedures with hydrocelectomy, or orchiopexy .

Excess foreskin treated by re circumcision & suturing UGA. Post circumcision meatal stenosis treated by meatoplasty UGA. Adhesions/skin bridges needed release of bridges & adherent skin on the glans with trimming and suturing by 6-0 vicryl UGA. Ventral curvature treated by degloving & remnant foreskin flap. Urethral fistula treated by double-layer repair & suturing by 6-0 vicryl with Folly's catheter as in post hypospadias fistula repair. Patients with post circumcision Penile torsion treated by degloving & skin realignment with re circumcision. All patients followed for a period of 4-6 months to evaluate the final functional and cosmetic results. Full medical consent was taken from all patients before any surgical procedure.

The ethical license approval number (6) on (May), 2025 "Ethical Committee of Nineveh university- College of medicine"

Results

A total number of 105 cases with complicated circumcision were managed in this study with 14 types of complications referred to our paediatric surgery centre, most of them circumcised at infancy 75 (71.4%) (Table. 1).

Table (1) Distribution of complications in relation to different age groups at circumcision

	Complications	(1day_1 Mon.)	(1_12 Mon.)	(1_3 Year)	
1	Phimosis/trapped penis**	4	38	5	47 (44.7 %)
2	Excess foreskin**	5	6	-	11 (10.4%)
3	Meatal stenosis**	2	7	-	9 (8.5 %)
4	Torsion**	1	-	-	1 (0.95 %)
5	Bleeding*	2	7	2	11 (10.4 %)
6	Adhesions/skin bridge**	2	8	-	10 (9.5 %)
7	Meatal fibrosis**	-	1	-	1 (0.95 %)
8	Infection*	-	3	1	4 (3.8 %)
9	Mucosal edema*	-	-	1	1 (0.95 %)
10	ventral curvature**	-	1	2	3 (2.8 %)
11	Glans injury*	-	3	1	4 (3.8 %)
12	Penile amputation*	1			1 (0.95 %)
13	Urethral fistula*			1	1 (0.95 %)
14	Retention (smegma) cyst**		1		1 (0.95 %)
	Total (%)	17 (16.1 %)	75 (71.4 %)	13 (12.3 %)	105 (100%)

*Early complication, ** Late complicatio

All of them circumcised under local anaesthesia using the freehand traditional method (72 [68.57 %] of them circumcised by thermal & 33 [31.42 %] circumcision done by scalpel/bone cutter, {P=0.001}.

Table (2) Techniques of circumcision & their percentages in relation to each complication type

	Complication	Scalpel / bone cutter	Thermal	Total	P value
1	Phimosis/ trapped penis	12 (25,53%)	35 (74.47%)	47	0.001
2	Excess foreskin	6 (54.55%)	5(45.45%)	11	-
3	Meatal stenosis	3 (33.33%)	6(66.67%)	9	0.001
4	Torsion	0	1	1	-
5	Bleeding	7 (63.63%)	4(36.36%)	11	-
6	Adhesions	3 (30.00%)	7(70.00%)	10	0.001
7	Meatal fibrosis	0	1	1	-
8	Infection	1 (25.00%)	3(75.00%)	4	-
9	Mucosal edema	0	1	1	-
10	Ventral curvature	0	3	3	-
11	Glans injury	1 (25.00%)	3(75.00%)	4	-
12	Penile amputation	0	1	1	-
13	Urethral fistula	0	1	1	-
14	Retention (smegma) cyst	0	1	1	-
	Total (%)	33 (31.42%)	72 (68.57%)	105	0.001

Children circumcised by paramedical staff (nurse, dresser) were 101 (96.19%) , three patients circumcised by paediatric surgeon (2.85 %) & one patient (0.95%) was circumcised by general surgeon {P=0.001} , (Table. 3) .

Table (3) Circumcision provider category & their percentage in relation to each complication type

	Complication	Paramedical	Surgeon	Total	P value
1	Phimosis/ trapped penis	46 (97.87%)	1 (2.13%)	47 (44.7%)	0.001
2	Excess foreskin	11 (100%)	0 (0.00)	11 (10.4%)	0.001
3	Meatal stenosis	9 (100%)	0 (0.00)	9 (8.5%)	0.001
4	Torsion	1	0	1 (0.95%)	–
5	Bleeding	11 (100%)	0 (0.00)	11 (10.4%)	0.001
6	Adhesions	10 (100%)	0 (0.00)	10 (9.5%)	0.001
7	Meatal fibrosis	1	0	1 (0.95%)	–
8	Infection	3	1	4 (3.8%)	–
9	Mucosal edema	1	0	1 (0.95%)	–
10	Ventral curvature	3	0	3 (2.85%)	–
11	Glans injury	2	2	4 (3.8%)	–
12	Penile amputation	1	0	1 (0.95%)	–
13	Urethral fistula	1	0	1 (0.95%)	–
14	Retention (smegma) cyst	1	0	1 (0.95%)	–
	Total (%)	101(96.19%)	4(3.80%)	105(%)	0.001

The types of complication were explained in (Table 1). There were early complications such as: Bleeding occurred in 11 [10.4 %] of the cases, all of them circumcised by paramedical staff {P=0.001}, seven (7 [6.66 %]) of them circumcised in the infancy, bone cutter/scalpel used in 7 of them without suturing {P=NS}, there was one child had bleeding tendency referred to the medical ward. One patient (1 [0.95%]) presented with huge mucosal edema, circumcision done by paramedical staff using thermocautery {p=NS} (Fig. 1).



Figure (1) huge mucosal edema

Glans injury : occurred in 4 patients (3.8 %), three of them circumcised at infancy (2.8 %), two (2) of the four patients circumcised by paramedical staff with thermo cautery used (one presented with ventral glans injury with exposed urethra, the other presented with lateral glans injury) ,the 3rd one circumcision done by pediatric surgeon using bone cutter/scalpel causing superficial glans & meatal injury , the 4th one circumcised by general surgeon with thermocautery causing glans injury with infection & skin necrosis {P=NS} (Fig. 2 , a).



(a)

(b)

Figure (2) (a: Glans injury with skin necrosis b: Big urethral fistula)

Urethral fistula: occurred in one patient ($n=1$ [0.95 %]) that was circumcised by paramedical staff using thermocautery { $P=NS$ }, (Fig. 2, b).

Penile amputation occurred in 1 (0.95%) patient circumcision done by paramedical staff using thermocautery.

Late complications such as Phimosis/trapped penis occurred in forty seven ($n=47$ [44.7 %]), forty six (46[97.8%]) of them were circumcised by paramedical staff, 35 [33.3%] of them circumcised by thermocautery without suturing, 38 [36.1 %] of them circumcised at infancy, only one patient was circumcised by paediatric surgeon by bone cutter/scalpel method.

Excess foreskin: this complication happened in eleven ($n=11$ [10.4%]) of the patients, six (6) of them (5.7 %) in the infancy, all of them were circumcised by paramedical staff, five (5) of them done by thermocautery { $P=NS$ }.

Meatal stenosis: occurred in 9 [8.5 %] of the patients, all of them were circumcised by paramedical staff { $p=0.001$ }, seven (7) of them were in the infancy (6.66 %), six (6) of them circumcision done by thermocautery { $P=0.001$ }. Penile torsion: occurred in 1 [0.95 %] patient that was circumcised by paramedical staff { $P=NS$ } using thermocautery.

Ten patients ($n=10$ [9.5 %]) had Penile adhesions/skin bridges all of them circumcised by paramedical staff [$P=0.001$]; eight of them circumcised in infancy (7.6 %), seven of them circumcised by thermocautery (6.66 %) { $P=0.001$ }.

Ventral curvature: occurred in three patients ($n=3$ [2.8%]) all of them were circumcised by paramedical staff using thermocautery { $P=NS$ }, two of them (2) circumcised at toddler age (1_3yrs) (1.9 %) (Fig. 3)



Figure (3) Ventral penile curvature

Discussion

Reports about complications of circumcision from mild to severe, ranging from 0.0008% to 3.6%. However, most of these studies were based on, one clinical site, state or small sample [12]. Complications rate of circumcision is variable in types & number in different regions & localities according to the circumcision providers & techniques used. In Iraq /Mosul city, the circumcision is provided usually by paramedical staff (nurse, dressers) and to least extent by doctors (surgeons). Our study showed that most circumcisions complications done by the non-doctor staff (paramedical) n=101 [96.19%] the remaining done by doctors (surgeon) n=4 [3.8%], (Table. 3); and this is comparable to other studies with nearly similar to our locality as Ketabchi et al. and Ekenze et al [13] [14], (Table 4).

Table (4) Comparison of our study with other studies in relation to circumcision provider

	Provider	Our study	Ekenze et al. ⁽¹⁴⁾	Ketabchi et al. ⁽¹³⁾
1	Doctors (surgeon)	4 (3.8%)	5 (7.8%)	3 (5.35%)
2	Nurse	101 (96.19%)	54 (84.4%)	12 (21.42%)
3	Dresser		5 (7.8 %)	41 (73.21%)
	Total (%)	105	64	56

These complications might occur due to lack of training of the paramedical staff as well as the staff may not have the medical knowledge about the relative anatomical contraindications to circumcision such as buried penis, hypospadias, chordee, webbed penis or medical conditions such as bleeding disorders or jaundice which need expert pediatric surgeon to master the procedure and reduces the likelihood of complications.

Our study revealed that the most common age of circumcision was at infancy (1mon._12mon.) (n=75[71.4 %]) (Table. 1), while in Ketabchi A.A. et al. & Appiah et al. [13] [15]. The neonatal age was the most common age (n=23 [41.0%]) and this may be due to circumcision of neonate done before discharge from the hospital in these localities as a traditional religious rituals , in Mosul city we don't have the exact number of circumcised children because most of them circumcised at paramedical/dressers clinics , at homes or in far rural areas that makes it very difficult to record , also these were only the complicated cases that were referred to our centre , and this may be one of the limitation in this study.

In this study there is a variety of wide spectrum of complications early and late complications (Table. 1). In Ketabchi A.A. et al. [13] (Table. 5) the late complications were (56), and only 2 (3.5 %) patients had phimosis in neonatal age, but the method of circumcision not mentioned.

Table (5) Comparison of our study with other studies in relation to types of complications

	Complication	Our study	Ekenze et al. ⁽¹⁴⁾	Ketabchi et al. ⁽¹³⁾
1	Phimosis/trapped penis	47 (44.7%)	5 (7.8 %)	2 (3.5 %)
2	Excess foreskin	11 (10.4 %)	–	5 (8.9 %)
3	Meatal stenosis	9 (8.5 %)	14 (21.9 %)	15 (26.7 %)
4	Torsion	1 (0.95 %)	–	–
5	Bleeding	11 (10.4%)	–	–
6	Adhesions/skin bridge	10 (9.5%)	27 (42.2 %)	5 (8.9 %)
7	Meatal fibrosis	1 (0.95%)	–	–

8	Infection	4 (3.8 %)	–	–
9	Mucosal edema	1 (0.95%)	–	–
10	Ventral curvature	3 (2.8 %)	–	5 (8.9 %)
11	Glans injury	4 (3.8 %)	–	–
12	penile amputation	1 (0.95 %)	3 (4.6 %)	–

This might be age-related complication (the penis may become buried with growth due to increasing the suprapubic fat after the neonatal age), circumcision provider (paramedical staff) relation (such as patient with anatomical abnormality ; buried penis, webbed penis not detected or unfamiliar by the paramedical staff providing circumcision leading to phimosis) or technique-related (thermocautery used by paramedical staff for cutting the foreskin directly) causing burn & fibrotic scar leading to trapped penis.

In our study Meatal stenosis n=9 (8.5%) the 4th most common complication all of children circumcised by paramedical staff {P=0.001} with thermocautery used in 6 (66.67%) {P=0.001} which is clinically & statistically significant , in Ekenze et al.(14) 14 (21.9 %) twelve circumcised by paramedical staff , in Ketabchi et al. [13] 15 (26.7%) all of them circumcised by paramedical staff (nurse) (Table. 5) ; so , the results of these studies are also comparable to our results regarding the complications by paramedical staff.

In Ekenze et al. [14] the penile adhesions were the most common n=27[42.2%] where 24 of them circumcised by nurse/dresser in the neonatal age group , in our study the adhesions/skin bridge were the 3rd most common complication n=10 [9.5%] all circumcised by paramedical staff with thermocautery used in 7 cases, and this might be caused by insufficient release of preputial adhesions to glans during circumcision , excess foreskin post circumcision or due to thermo cautery that caused burn with inflammation & fibrosis, and this may reveal increased risk of complication by paramedical staff compared with surgeons clinically and statically .

Penile amputation n=1(0.95%) circumcision done by paramedical staff at neonatal age (4 wks.) by thermocautery, this catastrophic complication may occurred due to small phallus that grasped and cut without feeling of the glanspenis by the provider, Ekenze et al. [14] revealed 3 (4.6%) cases of penile amputation all circumcised by paramedical staff (nurse) and this comparable to our study.

Another dangerous complication was Urethrocutaneous fistula n=1 (.095%) circumcision by paramedical staff by thermocautery , in Ketabchi et al. , Ekenze et al . , there were urethrocutaneous fistula complications; 3 (5.3 %), 11 (17.2 %), 17 (28.8 %) respectively , and these are higher than our study, also circumcision provided by paramedical staff(nurse/dresser) [13][14], it may be caused either by direct injury to the urethra or during hemostasis or suturing over the urethra ventrally or tenting the urethra during cutting the prepuce.

Ventral curvature or chordee n=3 (2.8%) all circumcised by paramedical staff with thermocautery, and this might be caused by missed anatomical abnormality (webbed penis) not detected by the circumciser or excision of excess foreskin ventrally, in Ketabchi et al. [13] 5 cases (8.9%) had chordee or curvature and this even more than our study, all of them circumcised by paramedical staff (nurse) and this is comparable to our study.

In our study we had one case of post circumcision penile torsion, n=1 (0.95 %) that was circumcised by paramedical staff using thermocautery, it was unknown if the torsion was present before circumcision or not, but this indicate there is a lack of medical knowledge about the congenital conditions of penis that needs special plastic circumcision, this case was treated by redo-circumcision with good results (degloving & foreskin realignment technique used in mild degrees of penile torsion in Al-Abbasi et al.) [16].

Finally, there should be proper education & training programs about the scientific & safe procedure of circumcision to the nurses, dressers, & non-surgeon doctors by the health authority to decrease the rate of circumcision complications as well as there should be good supervision of the devices used in circumcision by the health authority.

Limited number of patients, different levels of surgeons experience and unavailability of certain instruments were the main limitations of our study.

Conclusions

Although Circumcision is one of the simplest pediatric surgical procedures never the less it may carry a disastrous complications if its carried out by unexperienced providers like sub staff or nurse and complications were high in the infantile age group. Many complications were seen in those boys circumcised by untrained paramedical staff using unauthorized thermo cauter machine.

Although some of the complications are simple and treatable, other complications like glans injury and/or amputation may be disastrous that may cause big psychological trauma & burden to the parents and the child in future.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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