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ORIGINAL PAPER

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Neonatal circumcision: profile of neonates with complications resulting from the use of plastibell

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ABSTRACT

Introduction. Circumcision is one of the most performed surgical procedures in neonates.

Aim. The aim of this study was to evaluate our experience with neonates who developed complications following the use of plastibell for circumcision.

Material and methods. This was a retrospective study of male neonates who were managed for complications resulting from circumcision (performed with plastibell) over a 5-year period at the pediatric surgery unit of a teaching hospital in Enugu, Nigeria. Ethical approval was obtained from the ethics and research committee.

Results. Out of the 1794 neonatal circumcisions (using plastibell) performed during the study period, 134 (7.5%) neonates had complications. Sixty percent (1074) of the circumcisions were performed in the teaching hospital while 40% were referred cases**.** The ages of the patients ranged from 7 to 27 days with a median of 10 days and their mean weight was 2.5 kilograms. Majority of the plastibell circumcisions that developed complications was performed by unregistered (auxiliary) nurses. Retained plastibell was the most common complication and its removal was the most performed procedure. No mortality was recorded.

Conclusion. Complications following circumcision with plastibell vary widely. Retained plastibell was the most common in the present study. The most complications occurred when the circumcision was performed by auxiliary (unregistered) nurses.

Keywords. circumcision, complications, neonatal, plastibell

Introduction

Circumcision, a cultural and religious practice, has well documented risks and benefits.[1] The removal of the prepuce to expose the glans penis (circumcision) has been performed for more than 5000 years.[2] It is one of the oldest and most controversial surgical procedures performed globally.[3] In 1971, the American Academy of Pediatrics (AAP) Task Force on circumcision considered circumcision unnecessary. However, in 1999, AAP revisited the issue stating that circumcision has potential benefits. However, AAP did not recommend routine circumcision.[4] Historically, the oldest documented evidence of circumcision dates back to 2345-2181 BC in tomb artworks in Egypt.[4] Male mummies in Egypt were found to be circumcised.[5] The book of Jeremiah, written in the 6th century BC listed Egyptians, Edomites, Ammonites and Moabites as circumcising nations.[4] Lots of controversies surround the issue of circumcision. Cir-

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cumcision is one of the most commonly performed procedures in Africa and about one third of the world male population is circumcised.[6] Worldwide, people continue to circumcise their sons for hygienic, cultural and religious reasons.[7] In Judaism, circumcision is considered a commandment from God and is performed without anesthesia on the 8th day of life.[8] The 3 most common devices used for circumcision include the Gomco clamp, plastibell device and Mogen clamp.[9] The plastibell circumcision device which was invented by Hollister in 1950 is a clear plastic ring with a handle and a circumferential deep groove for tying the suture. Although plastibell is simple device, complications can results from lack of aseptic techniques, use of wrong sized plastibell, loosely tied sutures and lack of follow up.[10] Several studies on circumcision have documented the benefits of circumcision. Such benefits include reduction of penile/cervical cancer, urinary tract infection and sexually transmitted diseases.[11] Some researches on the use of plastibell in childhood circumcision have reported complications whereas other studies documented that complication from plastibell are rare.[12,13]

Aim

The aim of this study was to evaluate our experience with neonates who developed complications following the use of plastibell for circumcision.

Material and methods

This was a retrospective study of male neonates who were managed for complications resulting from circumcision (performed with plastibell) between January 2015 and December 2019 at the pediatric surgery unit of Enugu State University Teaching Hospital (ESUTH) Enugu, Nigeria. ESUTH is a tertiary hospital located in Enugu, South East Nigeria. The hospital serves the whole of Enugu State, which according to the 2016 estimates of the National Population Commission and Nigerian National Bureau of Statistics, has a population of about 4 million people and a population density of 616.0/km^2. The hospital also receives referrals from its neighboring states. Patients with incomplete medical records and those older than 28 days of age were excluded from the study. Neonates who had no complications and those that had other methods of circumcision were also excluded. Information was extracted from the case notes, operation notes, operation register and admission-discharge records. The information extracted included age at circumcision, weight, cadre of health worker who performed the circumcision, type of complication, day post circumcision at which complication occurred, treatment offered, duration of hospital stay and outcome of treatment. Ethical approval was obtained from the ethics and research committee of ESUTH. Statistical Package for Social Science (SPSS) version 21, manufactured by IBM Cooperation Chicago Illinois, was used for data entry and analysis. Data were expressed as percentage, median, mean and range.

Results

Patients' demographics

A total of 1794 neonatal plastibell circumcisions were performed during the study period. Out of this number, 134 neonates had complications and form the basis of this report. The remaining 1660 (1794 minus 134) neonates had no complications. The 1794 neonates had only plastibell method of circumcision; those that had other methods of circumcision were not part of the study. Considering the number of neonates that had complications from plastibell in relation to the total number of plastibell circumcisions actually done, a complication rate of 7.5% (134/1794) was gotten. Sixty percent (1074) of the circumcisions were performed in the teaching hospital while 40% (720) were referred cases. Referred cases were circumcisions performed outside the teaching hospital but were referred to the teaching hospital on account of complications. Details of the demographics are shown in Table 1.

Table 1. Demographic features of the patients that had complications (n=134)

Median age of the patients	10 days (range 7-27)
Mean duration of hospital stay	8 hours (range 3-36)
Mean weight of the patients	2.5 kilograms (range 2.0-4)
Day post circumcision at which complication occurred (mean)	6 days (range 1-10)

Cadre of health worker who performed the circumcision

The level of health worker who performed the circumcision and the specific complication rates are depicted in Table 2.

Type of complications

Delayed separation of the plastibell (retained plastibell) was the most frequent complication. Other complications are shown in Table 3 and figure 1-3.

Treatment rendered

Treatment of complications resulting from plastibell circumcision is dependent on the type of complication (Table 3). For instance, delayed separation of the plastibell (retained plastibell) requires removal of the plastibell to avoid glanular constriction and possible necrosis.

General outcome of treatment

All the patients recovered and were discharged home. There was no mortality.

Discussion

The complication rate of 7.5% recorded in the present study is comparable to the report of other authors.[7,8]

Table 2. Cadre of the health workers and specific complication rates

Cadre	Complication	Number of circumcisions	Number with Complication (%)
Pediatric surgeon		206	7 (3.4)
	Retained plastibell		4 (1.9)
	Bleeding		3 (1.5)
Resident doctor		422	21 (5.0)
	Retained plastibell		5 (1.2)
	Bleeding		5 (1.2)
	Redundant prepuce		10 (2.4)
	Wound infection		1 (0.2)
Registered nurse		446	32 (7.2)
	Retained plastibell		10 (2.2)
	Denudation of penile skin		11 (2.5)
	Skin bridges		8 (1.8)
	Wound infection		3 (0.7)
Traditional birth attendant		464	34 (7.3)
	Retained plastibell		10 (2.2)
	Wound infection		8 (1.7)
	Bleeding		14 (3.1)
	Skin bridges		1 (0.2)
	Urethrocutanous fistula		1 (0.2)
Unregistered nurse		256	40 (15.6)
	Retained plastibell		15 (5.9)
	Bleeding		15 (5.9)
	Wound infection		7 (2.6)
	Urethrocutanous fistula		2 (0.8)
	Glans necrosis		01 (0.4)

Table 3. Complications arising from plastibell circumcision and treatment offered (n=134)

Type of complication	Treatment rendered	No of patients (%)	Result of treatment
Retained plastibell	Removal of plastibell ring	44 (32.8)	Good healing
Bleeding	Pressure and vessel ligation	37 (27.6)	Bleeding controlled
Wound infection	Antibiotics and dressing	19 (14.3)	Infection cleared
Denudation of penile skin	Dressing	11 (8.2)	Good healing
Redundant prepuce	Refashioning	10 (7.5)	Good appearance
Skin bridges	Bridge release	9 (6.7)	No recurrence
Urethrocutanous fistula	Fistula repair	3 (2.2)	Good urinary stream
Glans necrosis	Glans refashioning	1 (0.7)	Conical glans penis

However, Al-Marhoon reported a complication rate of 2.3%.[14] The complication rate following plastibell circumcision may depend on the experience of the person performing the circumcision and on the age of the child. Mousavi and Salehifar in their study concluded that plastibell circumcision should be used in neonates with thin prepuce.[8] The median age of our patients is similar to report of Razzaq et al.[15] The cultural and religious practices in different settings may explain the peak age at circumcision. Plastibell method of circumcision usually does not require hospital admission. However, when there are complications such as bleeding, the neonate is admitted for observation in the hospital. As recorded in the present study, one-fourth of the patients were observed overnight in the hospital due to bleeding problems. The mean age of our patients is in agreement with the result of one study from Iran.[8] The size of the plastibell device corresponding to the diameter of the glans penis should be used for plastibell circumcision. The retained plastibell in our patients may be attributable to the plastibell size. Abdullah et al and Nasir et al reported the importance of choosing the right size of plastibell for circumcision.[16,17] The time of occurrence of complication following plastibell circumcision has to do with the type of complication. For instance, bleeding is more likely to occur before wound infection. In the present study, bleeding occurred within 24 hours of the circumcision and the neonates were observed in hospital. Hammed et al also reported bleeding in their patients and their patients were admitted for observation in the hospital.[18] Plastibell circumcision is usually a day case (outpatient) procedure. The length of time a

Fig. 1. Bleeding from plastibell circumcision

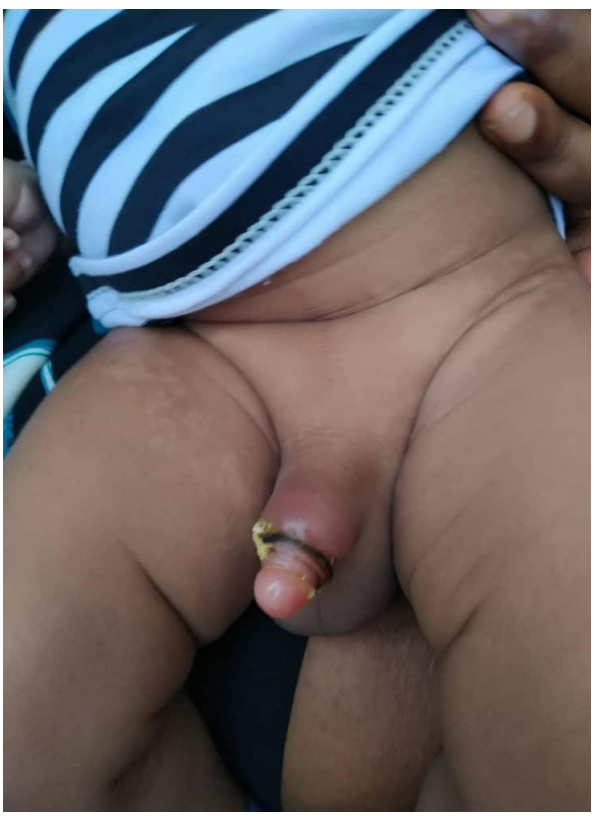

Fig. 2. Retained plastibell

Fig. 3. Redundant prepuce from poorly performed plastibell circumcision

neonate stays in the hospital after circumcision may depend on the presence or absence complications at the time of the circumcision. Neonates who are bleeding or who are unable to pass urine may stay longer in the hospital. However, none of our patients had difficulty passing urine.

In the index study, most complications were seen in circumcisions performed by unregistered and unqualified nurses working in maternity homes. In developing countries, maternity homes are quite common. One study from Bradford hospital in United Kingdom reported higher complications in plastibell circumcision performed by nurses.[19] Another study from Oman reported that the risk of complications with plastibell complication is increased eight-fold when performed by nurses compared to surgeons.[14]

Plastibell is widely used for circumcision due to its versatility; it is even used by non-qualified people because of its ease of use.[17] Plastibell circumcision is fraught with complications and the complication may be life threatening.[14] Retained (impacted) plastibell was the most frequent complication recorded in the current study. Other series also reported retained plastibell as the most common complication.[20,21] Howbeit, other researchers reported bleeding and surgical site infection as the most frequent complication.[12,16] The reason for these differences in complication is not known. Retained plastibell may not reflect an intra-procedural technical

problem but a pre-procedural problem in the choice of right size of plastibell for a particular patient and this may cause complications. There are seven sizes of plastibell device and retained plastibell may result from the use of inappropriate plastibell size. Retained plastibell causes glanular constriction and possible proximal plastibell ring migration. Bleeding following circumcision with plastibell may result from tearing of the frenulum during insertion of the plastibell ring or from too long dorsal slit of the foreskin such that part of the slit is not secured with the tie around the ring.[18]

Treatment of complications resulting from circumcision with plastibell varies with the specific complication. Early complication such as hemorrhage required pressure application and ligation of bleeding vessels. Diluted adrenaline (1: 200,000 dilutions) was applied topically in recalcitrant oozing of blood. Redundant prepuce does not require immediate treatment. An interval of 6 months post circumcision was required for scar tissue maturation, subsequently excess skin was excised taking care not to damage the urethra ventrally. Retained plastibell required immediate removal of the plastibell. The plastibell was cut with Mayor's scissor. Smith et al reported the novel use of orthopedic ring cutter for removal of retained plastibell without any sequelae.[7] Infected circumcision wounds required repeated wound dressing using normal saline and appropriate antibiotics, based on the culture and sensitivity results. Skin bridges (penoglanular adhesions) required taking down the adhesion and separating the raw areas using non-adherent dressings to avoid recurrence. In glans necrosis, time is given for the proper separation of necrotic tissues from viable tissues. The remnant viable glans tissue was fashioned into a conical glans.

Urethrocutanous fistula due to plastibell circumcision occurred at a mean period of 9 days, post plastibell insertion. The fistulous communication resulted from pressure necrosis of the intervening tissues between the plastibell and urethra due to tight plastibell that stayed longer than necessary. Treatment of urethrocutanous fistula entailed repair of the fistula with or without a urethroplasty.

Although no mortality was recorded in the present study, one study from Benin, Nigeria reported a mortality of 1.2%.[22] Death from plastibell circumcision results from uncontrolled blood loss.[23]

Conclusion

Circumcision with the use of plastibell may be safe in trained hands. However, a wide range of complications can occur if proper care is not taken. The most complications occurred when the circumcision was performed by auxiliary (unregistered) nurses; these circumcisions were performed outside the teaching hospital. Retained plastibell and bleeding were the most common complications in the present study.

Recommendations and limitations of study

Circumcision in the hospital by experts, creation of parental awareness and early referrals of children with complications are advocated.

This was a retrospective study and a single institution experience which may not be generalizable.

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