ORIGINAL ARTICLE

EFFECTIVENESS OF THE PLASTIBELL CIRCUMCISION IN NEONATES AND INFANTS AT A TERTIARY CARE HOSPITAL

Muhammad Abid Owais[1],Sidra Abbas[2], Imran Sharif[3],Khalid Ahmed[4]
,Abdul Ghaffar Arain[5], Bashir Ahmed Soomro[6]
[1-3]Assistant Professor, Department of Surgery, Baqai Medical University.
[4]Professor of Surgery, Department of Surgery, Baqai Medical University.
[5]Senior Registrar, Department of Surgery, Baqai Medical University.
[6]Associate Professor, Department of Surgery, Baqai Medical University.

ABSTRACT

Objective:Circumcision is the most frequently performed surgery in neonates and infants across the globe. The objective of this study was to assess the effectiveness of circumcision performed by Plastibell method by means of its safety and complications in neonates and infants.

Methods: This prospective study was carried out in the department of surgical sciences, Baqai medical university on 480 male neonates and infants who were circumcised with plastibell technique during January 2017 to November 2019. Data were collected on a set proforma indicating age of the patient, plastibell size, time required by the device to detach and complications. Children were divided into two arms; neonates (0 to 4 weeks) and infants (5weeks to 1year). On discharge parents were instructed about the care of the device and were asked to follow up on day 3 and on day of detachment of the Plastibell.

Results: During our study period, we included and evaluated 480 cases of circumcision by plastibell method. Out of these 480 cases, 198 (41.25%) were neonates, while the rest of 282 (58.75%) were infants. Majority of the cases 429 (89.38%) showed no complications. Amongst these, 258/282 (91.49%) were infants whereas 171/198 (86.36%) were neonates. A small number of patients 51 (10.63%) presented with trivial complications. In infants, among 198 cases, 27 (13.64%) presented with complications whereas, in neonates, only 24 (8.51%) out of 282 cases showed complications. The complications were delayed detachment of Plastibell ring in 21 (41.18%), while in 13 (25.49%) ring migrated proximally cases, bleeding occurred in 12 (23.53%), and minor superficial infection seen in 5 (9.8%) cases. The most common Plastibell size used was 1.3cm (n=216, 45%) while 1.6cm was the least commonly used ring (n=2, 0.42%). The average time of surgery was 5 minutes (range 3-9 minutes).The mean time for device to fall-off was 6 days (range 3 - 9 days). A significant difference of ring fall-off time was observed between neonates and infants (p value < 0.004). But, ring fall-off time did not affect the complications(pvalue 0.887).There was no correlation between the age at circumcision and Plastibell size.

Conclusion: The disparity in the frequencies of complications amongst infants and neonates is negligible. Hence, the dissimilarity of age in neonates and infants does not affect the usefulness of Plastibell technique and proves it secure and comparable in its result. Therefore, we can say that a circumcision done by appropriate Plastibell technique gives acceptable results and can be performed even in a year-old child and emends the doubtfulness in the minds of surgeons.

Keywords: Circumcision, plastibell, neonates, infants.

INTRODUCTION

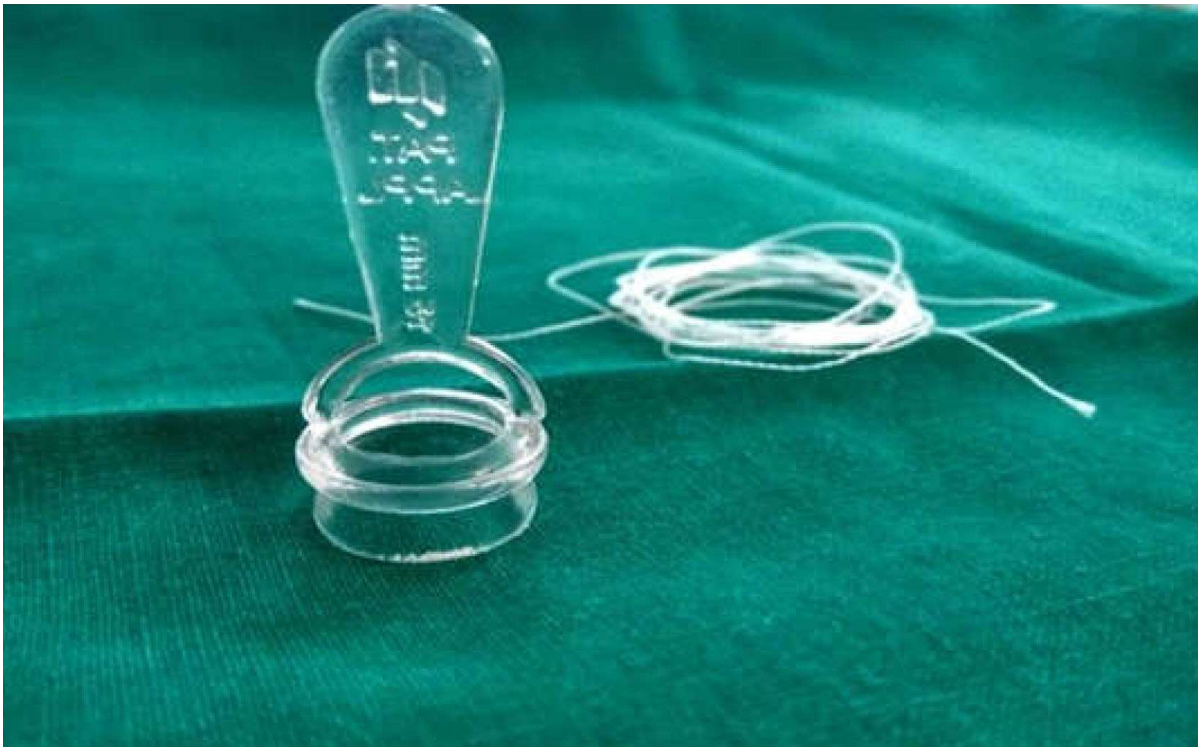
Circumcision is one of the most commonly performed operative procedures globally.[1] The invention of circumcision is about 15000 years back.[2]One third of world male populations are circumcised.[3]The plastibell technique for circumcision was first introduced in 1956.[4]Most common indications for circumcision is religion followed by culture. Medical indications include phimosis, balanoposthitis and chronic urinary tract infections (UTIs). It is contraindicated in hypospadias, epispadias, chordee, or ambiguous genitalia, in premature infants, clinically unstable and poor health.[5,6]Besides plastibell other methods available for circumcision are Gomco clamp, Mogen clamp, bone cutter method and dorsal slit (open cut) method.[7] Plastibell technique has also been acknowledged as a standard method by the World Health Organization(WHO)'s manual.[8] This technique has a complication rate of 2-11% and can be safely used not only in children below one year of age but up to the age of 2 years even in 12 year old boys.[2,7]

Complications associated with circumcision are hemorrhage, infection, meatal stenosis, inadequate removal of foreskin, penile injury, extra skin cutting, delayed separation of the plastic device, proximal ring migration, urethral injury and painful scarring.[2,9] This study was carried out to record our experience with the use of Plastibell device for circumcision and to find out the effectiveness and complications of plastibell circumcisiontechnique in neonates and infants in surgery department of Baqai Medical University.

METHODS:

This prospective study was carried out at surgery department of Baqai medical University Hospital Karachi from January 2017 to November 2019. All the patients who were registered for study came via outpatient department (OPD) and were divided in two arms of neonates (birth to 4 weeks) and infants (5 weeks to 1 year). Each patient was examined before the procedure and those who had low birth weight(<3kg), deranged coagulation profile or immunocompromised status, hypospadias, extensive skin nappy rash, deep jaundice, chordee, epispadias, webbed penis, microphallus and having any sort of systemic illness were excluded from the study. A standard policy of preoperative genital examination, weight measurement, obtaining informed consent after full counseling of parents regarding benefits and likely complications of the procedure is adopted. Age of the patient, ring size, time required by ring to get detached and complications were recorded on a standard proforma and approved by institutional's review board. The Plastibell device is a transparent plastic ring with handle andit has a deep groove running circumferentially which is used for tying the thread around it (Figure 1). It comes indifferent sizes ranging from 1.1 to 1.7.All circumcisions were performed by consultant surgeons(Assistant Professors & Senior Registrars). Before starting the circumcision, one technician holds the baby in the required position while the other technician assists the surgeon. After taking all the aseptic precautions, 0.5% Xylocaine (1 mg/kg) given to the base of the penis in the form of ring block. Using artery forceps adhesions were divided between glans and foreskin then foreskin was retracted from the glans and adhesions between them were cleared with moist gauze. After that two curved artery forceps were used to hold the skin and straight artery was used to crush dorsal skin of prepuce at 12 o'clock, then the prepuce was longitudinally cut over the crushed line up to the lower edge of glans penis, foreskin retracted and glans penis uncovered. A suitable size of Plastibell device that closely fits in 2/3rd of glans penis was chosen .Plastibell device was thenpositioned on the glans and the foreskin was brought over it. A linen thread ligature which was tied tightly around the foreskin, crushing the skin against the groove in the Plastibell. The handle of the ring was broken and the excess skin beyond the groove was excised. Hemostasis was secured and rechecked after 10 minutes.

Figure 1: Plasti bell device



The compression caused by ligature will cause necrosis of the foreskin and the ring will fall within 3 to 7 days leaving a circumferential wound that will heal within few days. All children were discharged on same day on oral analgesics and local antibiotic ointment. On discharge, parents were given instructions on care of the device.All patients were called for follow-up in OPD on 3rd POD and on day of separation of the Plastibell and were told to return earlier, in case of any complication. The patients in which the ring was not detached within 10 days were called for follow-up and the ring was removed by cutting the ligature,ring was cut by ring cutter and excising necrotic foreskin.

The statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. Chi-square test was applied to test relationship between group of patients and complications. p-value<0.05 was considered statistically significant.All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS:

A total of 480 cases fulfilling the inclusion criteria were circumcised (Table 1), out of total cases 198(41.25%) were neonates and 282(58.75%) were infants (Figure 2). The complications were observed in 51 (10.63%) cases, involving 27/198 (13.64%) infants and only 24/282 (8.51%). Out of these 51 complications, the mostfrequent complications in neonates and infants were delayed ring separation (n=21, 41.18%), followed by proximal migration of the ring (n=13, 25.49%), bleeding (n=12, 23.53%) and infection (n=5, 9.8%) but there was no significant difference regarding all these complications among both groups (Table 2).

A significant difference of ring fall-off time was experienced between neonates and infants (p value < 0.004). But, ring fall-off time did not affect the complications(pvalue 0.887).The difference between the types of complications between neonates and infants is shown in Figure 3.

Demographics and outcomes

	Neonates *n*=282 (%)	**Infants** *n*=198 (%)	***p*-value**
Age (weeks)	2±1	33±18	-
Procedure time (minutes)	5±2	6±3	0.833
Plastibell size (cm)	1.1±1.4	1.3±1.7	<0.03
Ring sloughing time (days)	5±1	8±1	<0.004
Effect of ring size on sloughing time (days)	5.5	6	0.887

p-value 0f <0.05 is significant

Table: 2

Post-operative complications

Complications	**Neonates** *n*=282 (%)	**Infants** *n*=198 (%)	**Total** *n*=480 (%)	***p*-value**
Delayed ring separation	10 (3.55%)	11 (5.56%)	21 (4.38%)	0.90
Proximal migration of ring	6 (2.13%)	7 (3.54%)	13 (2.71%)	0.857
Bleeding	5 (1.77%)	7 (3.54%)	12 (2.5%)	0.714
Infection	3 (1.06 %)	2 (1.01%)	5 (1.04%)	0.66

p-value 0f <0.05 is significant

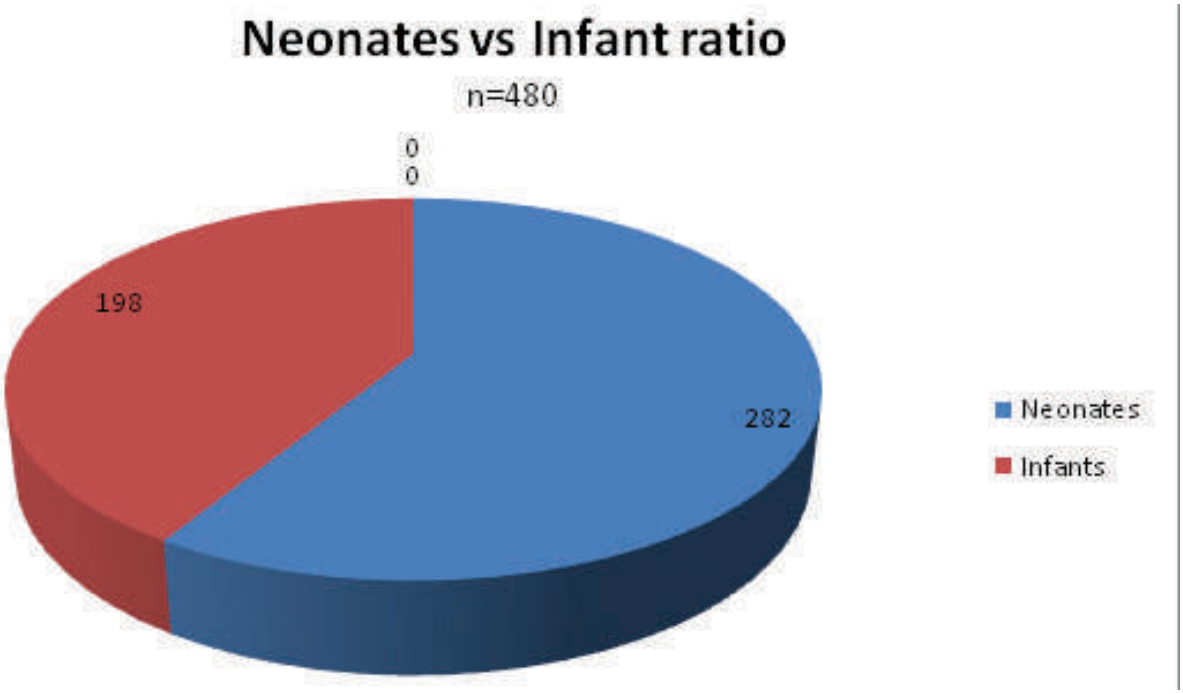


Figure 2: **Number of neonates and infants included in the study**

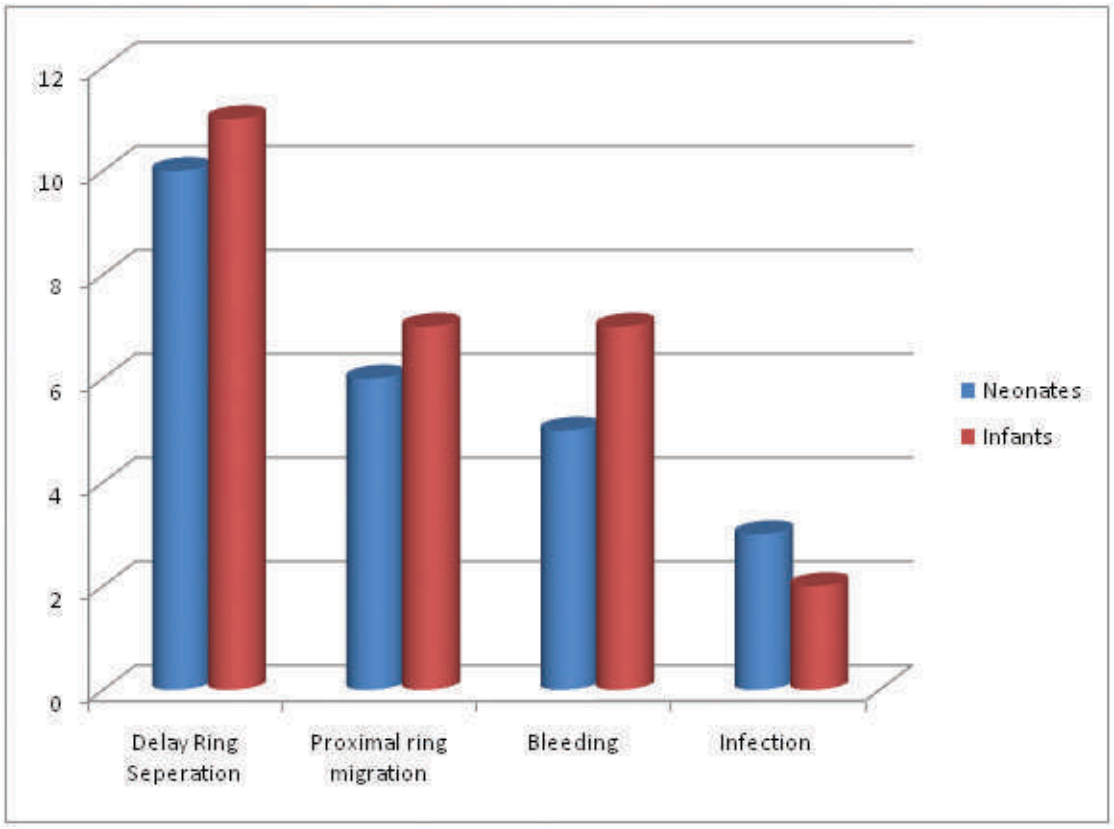


Figure 3: **Complications among neonates and infants.**

DISCUSSION:

Plastibell technique has become a patient friendly surgery because of its negligible trauma and aesthetic results.[10]Although, device that can easily measures which size of the plastibell ring snugs in the glans penis is accessible, but most of the surgeons can measure the size of glans with their experience simply by retracting the foreskin. Undersized ring can cause tissue necrosis and retention of ring[11] while oversized ring can cause proximal migration of ring.Studies shows complication rate associated with plastibell techniquehas been found to be about 2% to 11%.[12,13,14] In our study complication rate is quite low both in infants and in neonates which can be compared to studies that shows similar rates of complications even in older children.[15,16] The most common complication of our study was ring impaction , while the proximal ring migration and bleeding were the 2nd and 3rd most common complications respectively.

Studies showed that bleeding can be managed by tight ligature around the bell and use of correct sized bellwhich perfectly fits over 2/3rd of the glans over the frenulum.[16-19]We found ring impaction, proximal ring migration and bleeding morecommon in infants while infection in neonates. Proper placement of the Plastibell ring over the glans and a tight ligature of thread over the ring is the most important step to prevent these complications.

Plastibell circumcision needs less time.[18]The average time of procedure of our study is compararble to that in literature. The time taken by ring to be sloughed is usually within 10 days of circumcision.[19,20] In case of neonates the ring detaches early as neonates has thin prepuce.[20,21] Literature also showed that time needed by plastibell to separate was earlier in younger age.[17] Our study also showed that neonates took less time to get rid of ring in comparison with infants. Furthermore it also emphasizes the evidence that complications are not related to size of the ring and ring detachment time, and for that reason it indicates to the favourable[22] outcome in infants with least complications. These ideas assist the surgeons to continue with Plastibell technique without doubtfulness till one year of age. The limitation of this study is the need to be carried out in older children and a relatively larger sample size should be required in future.

CONCLUSION:

Plastibell circumcision is one of the safest surgeries with short learning curve among all other circumcision techniques. The rate of complication was negligible not only in neonates but also in infants, which offerssufficient evidence that this technique can be carried on without doubtfulness above neonatal age group. The only difference found between the two groups is in the time of ring detachment, but it has nothing to do with complications thus does not prevent the plastibell technique to be used in one year old child. The appropriate technique of the complete procedure with the proper placement of the ring with carefultying of the knots has significant importance in considering its effectiveness and lower rates of complications.

CONFLICT OF INTEREST: None

FUNDING: None

AUTHORS' CONTRIBUTIONS:

Muhammad Abid Owais and Khalid Ahmed conceived and designed the study, performed analysis and interpretation of data, draft and reviewed the manuscript. Sidra Abbas and Imran Sharif collected the data while Abdul Ghaffar and Bashir soomro critically reviewed the manuscript.

REFERENCES:

1. Prabhakaran S, Ljuhar D, Coleman R, Nataraja R. Circumcision in the paediatric patient: A review of indications, technique and complications. Journal of Paediatrics and Child Health. 2018; 54(12):1299-1307.
2. Muneeb M, Baig M. Proper Technique Prevents Poor Performance And Fate: A Comparison Of Circumcision By Plastibell Method In Neonates And Infants. Journal of the Dow University of Health Sciences. 2019; 13(1):37-42.

3. Weiss HA, Larke N, Halperin D, Schenker I. Complications of circumcision in male neonates, infants and children: a systematic review. BMC Urol 2010; 10:2.
4. Bode C, Ademuyiwa A, Jeje E, Elebute O, Adesanya O, Ikhisemojie S. Preferred methods of male neonatal circumcision among mothers in lagos Nigeria. J West Afr Coll Surg .2011; 1(2):29-37.
5. Lissauer T, Clayden G. Illustrated textbook of paediatrics. Elsevier. 2011; 4:352–353.
6. Hay W, Levin M. Current diagnosis and treatment pediatrics. McGraw Hill Professional. 2012; 21:18–19.
7. Shinde N, Moinuddin M, Danish A. Plastibell circumcision in neonates and infants at tertiary care centre. International Surgery Journal. 2018; 5(4):1488.
8. Jimoh BM, Odunayo IS, Chinwe I, Akinfolarin OO, Oluwafemi A, Olusanmi EJ. Plastibell circumcision of 2,276 male infants: a multi-centre study. Pan Afr Med J 2016; 23:35.
9. Blank S, Brady M, Buerk E, Carlo W, Diekema D, Freedman A, et al. Male Circumcision. Pediatrics. 2012; 130(3): 756-85.
10. Khan NZ. Circumcision- A universal procedure with no uniform technique and practiced badly.Pak J Med Sci 2004; 20: 173-4.
11. Lazarus J, Alexander A, Rode H. Circumcision complications associated with the Plastibell device. S Afr Med J 2007; 97: 192-3.
12. Rafiq K. Plastibell-A quick technique to decrease the distress of neonatal circumcision. Ann King Edward Med Univ 2000; 6:412-3.
13. Bode CO, Ikhisemojie S, Ademuyiwa AO. Penile injuries from proximal migration of the Plastibell circumcision ring. J Pediatr Urol 2010; 6:23-7.
14. Manji KP. Circumcision of the young infant in a developing country using Plastibell. Ann Trop Paediatr 2000; 20: 101-4.
15. Netto JM, Araujo Jr JG, Noronha MF, Passos BR,Lopes HE, Bessa Jr JD, et al. A prospective evaluation of plastibell® circumcision in older children. Int Braz J Urol 2013; 39:558-64.
16. Samad A, Khanzada TW, Kumar B: Plastibell circumcision: a minor surgical procedure of major importance. J Pediatr Urol 2010; 6: 28-3.
17. Palit V, Menebhi DK, Taylor I, Young M, Elmasry Y, Shah T. A unique service in UK delivering Plastibell circumcision: review of 9-year results. Paediatr Surg Int 2007; 23: 45-8.
18. Nnamonu MI. Circumcision: experience at a private hospital in jos, Nigeria. Niger J Surg 2013; 19:1-3.
19. Hammed A, Helal AA, Badway R, Goda SH, Yehya A, Razik MA, et al. Ten years experience with a novel modification of plastibell circumcision. Afr J Paediatr Surg 2014; 11:179-18.
20. Jimoh BM, Odunayo IS, Chinwe I, Akinfolarin OO, Oluwafemi A, Olusanmi EJ. Plastibell circumcision of 2,276 male infants: A multi-centre study. The Pan African Medical Journal. 2016; 23:35.
21. Netto JM, Araujo Jr JG, Noronha MF, Passos BR, Lopes HE, Bessa Jr JD, et al. Prospective randomized trial comparing dissection with Plastibell® circumcision. J Pediatr Urol 2010; 6: 572-7.
22. Rasool N. Incidence of Complications in Plastibell Circumcision in Male Infants: Comparison between with and without Coagulation Hemostasis methods. J Surg Surgical Res 2017; 3:34-7.