



A novel disposable ring (Circumplast) showed no ring migration onto the shaft of the penis in first 1000 male children's circumcisions in a community specialist clinic

Atif Saeed^{a,*}, Darrel Gregory^b, Ruhul Amin^b, Murtaza Khanbhai^b, Abdul Khan^b

^a St George's University Hospital NHS foundation trust, London, United Kingdom

^b GP Clinic, Thornhill Clinic Limited, Luton, Bedfordshire, England, United Kingdom

ARTICLE INFO

Keywords:

Circumcision
Plastibell
Circumplast
Migration
Complications
Penile incarcerations

ABSTRACT

Male children circumcision is a frequently performed surgical procedure in the community. The Plastibell is the established device commonly used in the UK and USA. Migration of the Plastibell ring onto the penile shaft is a rare but serious risk. Proximal migration can lead to glans incarceration requiring urgent ring removal. Impaction and migration may be attributable to penile oedema, erection, incorrect ring sizing, excessive traction on the foreskin and intrinsically to the Plastibell's shape and design. We present our experience of the first 1000 circumcisions performed with a novel Circumplast device at our community clinic over two years. All circumcisions were performed under local anaesthesia by trained doctors with the backup of a paediatric surgeon. Data was collected prospectively. We assessed early and late complications of Circumplast circumcision. Follow-up consultations/visits were arranged if required. No episode of proximal ring migration or glans impaction was observed for male children circumcision was performed with a Circumplast device.

1. Introduction

Male circumcision is one of the most commonly performed surgical procedures [1]. Research has shown that the optimal time to perform circumcision is early infancy [2]. The risks are low, and the procedure is quick, simple, and convenient in community or hospital settings. In most cases, it can be performed without sedation or general anaesthetic.

There are various devices used for male children's circumcision. Plastibell, Gomco clamp and Mogen clamp [3] are commonly used. Plastibell is a sterile disposable male circumcision device. The Gomco and Mogen clamps are reusable devices that require sterilisation before each use. Circumplast has been used recently, as it functions like the Plastibell, which relies on ischaemic necrosis of the foreskin using a ligature.

Several complications were reported with Plastibell® circumcision. One rare but serious and specific risk is the proximal migration of the device onto the penile shaft proximal to the glans penis [4]. This migration can potentially lead to glans impaction and incarceration, requiring urgent removal. Proximal migration of the ring is related to the conical shape of the Plastibell device. Once the glans has slipped out from the narrow distal opening, venous congestion and glans swelling prevent reduction [4–6].

The Circumplast device is cylindrical and longer, so any potential migration will not cause any constriction, as the glans would never pass beyond the proximal edge of the device. This design makes it less likely for the ring to migrate over the shaft of the penis

* Corresponding author.

E-mail address: dryes4@hotmail.com (A. Saeed).

and cause complications (Fig. 1). We present the first report on outcomes of male children's circumcision using the Circumplast device.

2. Case report

Circumcision was performed under local anaesthesia using a ring block and dorsal penile block with 0.5% plain Levobupivacaine and 2% lignocaine. EMLA® (cream of 2.5% lidocaine and 2.5% prilocaine) and pre-medication (Midazolam) were also used in some children. The procedure was performed under aseptic conditions. The level of circumcision was marked. Glans penis was separated from the foreskin by releasing adhesions gently. A dorsal slit was made using a haemostat or bipolar diathermy. If there was a long frenulum, it was divided using bipolar diathermy or cautery. An appropriately sized Circumplast ring was selected, which fits adequately over the glans penis and coronal sulcus Fig. 1A. Next, the ring and foreskin were held in position by applying two artery forceps. The ligature was tightened around the foreskin at the proximal-most groove. More distal grooves are optionally available to remove less prepuce. The foreskin was trimmed, leaving a 2–3 mm margin from the thread. The handle, attached to one side of the ring, was detached. The margin of the prepuce and ring was cleaned with an antiseptic solution. The frenulum area and external meatal opening are visible through the distal end of the Circumplast device (Fig. 1B). The inside of the ring was checked for any bleeding. After 15–20 minutes of observation, the child was discharged home with aftercare instructions. Circumplast usually falls off gradually within 5–10 days (Fig. 1C and D).

Before introducing the Circumplast ring, Plastibell was exclusively used for male children's circumcision at our clinic.

The mean age of the patients was 11 ± 0.6 months (median 2, range 2 days–11 years) for the first 1000 circumcisions performed with Circumplast over 2.5 years. The overall minor complication rate was 10% ($n = 101$). The incidence of minor complications was significantly better in children under 3 months (7%, 39/554) than over 3 months (14%, 62/446) ($p < 0.05$ Chi-square). Later our clinic stopped using Circumplast over 5 years old because of the suitability of the size. There was no incidence of migration of the Circumplast ring onto the shaft of the penis observed in our cohort.

Postoperative use of antibiotics for infection was 5%, possibly due to the low threshold to start antibiotics for suspected infection after ring circumcisions. Postoperative bleeding (1%), preputial adhesions (1%), buried penis (0.6%), redo operations (0.7%), and urinary retention (0.01%) were recorded. The mean duration for follow-up consultations was 16 days (range 1–373).

3. Discussion

The differences in design between Circumplast® and Plastibell® are shown in Fig. 2. Circumplast is cylindrical, longer and has multiple grooves to secure the ligature at any desired level. Factors that reduce the risk of ring migration with Circumplast could be related to the shape of the ring, the length of the ring and the multiple grooves available to place the ligature. In a Plastibell circumcision, the shaft skin is pulled distally, and the ligature tie is applied at only one groove. The ring is conical with a narrowed distal end, and the glans is held against the distal ring opening. This ring can lead to the tip of the glans being pushed distally beyond the distal margin of the conical opening, leading to subsequent oedema and incarceration.



Fig. 1. Newborn circumcision with Circumplast device: A & B - At the time of the operation, C - Device is separating on the 5th postop day D - Outcome on 9th postop.

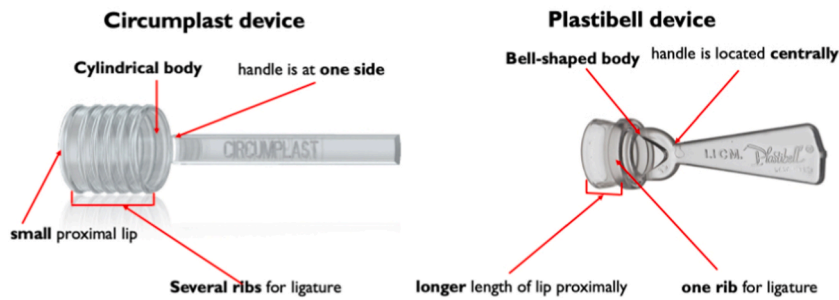


Fig. 2. Design of Circumplast and Plastibell devices.

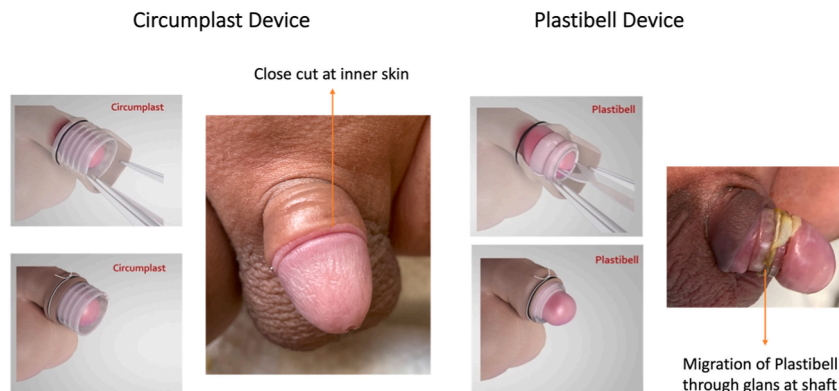


Fig. 3. Outcome of close-cut mucosa in Circumplast circumcision and Plastibell circumcision with the mechanism of Plastibell migration over the shaft of the penis.

Bode et al. concluded that there was a need to redesign the Plastibell ring to prevent its migration onto the penile shaft [4]. Under-sized rings may result in tissue necrosis after retained Plastibell, and oversized rings may result in proximal ring migration. However, Plastibell retention and migration can still occur with the correct size because, during penile erection, the glans tends to advance through the short and conical-shaped Plastibell [4–7].

The Circumplast shape and design allow the tie placement in a proximal groove without any unnecessary stretch of the foreskin at the resting position. The glans does not move beyond the distal margin of the ring, thus decreasing the risk of ring migration and glans incarceration.

Samad et al. suggested that in addition to the possibility of operator error, an intrinsic device flaw may call for the redesign of the Plastibell and incorporate an anti-migration or quick-release component [4].

A Plastibell impaction rate of 6.1% was observed by Omole F et al. The impaction rate was 2.3% for babies under three months but gradually increased to 26.9% for children over five years [3]. The literature showed that the impaction rate of the Plastibell ranges from 0.5% to 17%, depending on the patient's age [1,4–8]. Since the Covid pandemic, some hospitals have been using electronic health record software to assess early complications, including migration of the Plastibell ring [9,10]. Bone cutter, ring cutter and umbilical cutter were used to remove the migrated Plastibell ring [4–8].

Circumplast® enables easy access to the glans and frenulum should there be any bleeding in the postoperative period. Applying haemostatic agents such as Dermobound Glue, Kaltostat® Alginate Calcium Sodium Dressing or cellulose polymer (e.g., Surgicel®) is easy because the distal end of the ring is wide open, and the glans is fully accessible. Access to the ventral surface is difficult with the Plastibell device. Some authors have described placing gauze dorsally to put indirect pressure on the bleeding frenulum to secure haemostasis [11,12].

As it was an observational study, it has its limitations. It did not compare circumcisions performed with Circumplast and Plastibell rings. In future, a comparison study will be beneficial to make a substantial conclusion between the Plastibell and Circumplast devices' complications, especially migration to the shaft of the penis. (See Fig. 3)

4. Conclusion

Male children's circumcision by the Circumplast device can be safely performed in a community specialist clinic. The proximal migration of the ring on the shaft of the penis and impaction have not been observed with the Circumplast ring in our cohort.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Dr A R Khan is the Medical Director of Emboss Medical Limited, which owns the trademark of the Circumplast device.

References

- [1] Iacob S.I, Feinn R.S, Sardi L. Systematic review of complications arising from male circumcision. *BJUI compass* 2022 Mar;3(2):99–123.
- [2] Highton M, Joseph R, Dyer N, Haydon D. Snip the tip: infant male circumcision and religious, cultural, and health agendas. *J Pediatr Surg Nurs* 2022 Oct 1;11(4):137–44.
- [3] Omole F, Smith W, Carter-Wicker K. Newborn circumcision techniques. *Am Fam Physician* 2020 Jun 1;101(11):680–5.
- [4] Samad A, Khanzada T.W, Kumar B. Plastibell circumcision: a minor surgical procedure of major importance. *J Pediatr Urol* 2010 Feb;6(1):28–31. <https://doi.org/10.1016/j.jpuro.2009.05.006> PMID: 19525148.
- [5] Bode C.O, Ikhisemogie S, Ademuyiwa A.O. Penile injuries from proximal migration of the Plastibell circumcision ring. *J Pediatr Urol* [Internet] 2010;6(1):23–7. <https://doi.org/10.1016/j.jpuro.2009.05.011>.
- [6] Ahmad A.M, Ahmed S.E, Mostafa N.A, Nafisah T.I. Proximal migration of Plastibell circumcision: two case reports and review of the literature. *Ann Pediatr Surg* 2022 Dec;18(1):1–4.
- [7] Smith A.W, Hebra A, Mansfield J.M, Streck C.J. Management of Plastibell circumcision ring migration and glans penis incarceration. *J Pediatr Surg Case Rep* 2013 Jul 1;1(7):186–8.
- [8] Oshiro R, Oshiro A.C. Novel method of treating movement of the Plastibell ring using an umbilical cord clamp cutter. *Clin Pediatr* 2017;56(13):1254–5.
- [9] Skertich N.J, Sullivan G.A, Herberg R.E, Gulack B.C, Madonna M.B, Pillai S, Shah A.N. The effect of inpatient versus outpatient location on postoperative healthcare utilisation after neonatal circumcision. *J Pediatr Surg* 2022 Jun 1;57(6):1072–5.
- [10] Diyaolu M, Perry T, Hui N, Hui T, Su W. Outcome assessment of office Plastibell circumcision in infants utilising interactive electronic health record. *J Pediatr Surg* 2023 Jan 19.
- [11] Güler Y, Özmerdiven G.Ç, Erbin A. Comparison of ring instruments and classic circumcision methods: a systematic review and meta-analysis. *Arab J Urol* 2022 Jul 3;20(3):144–58.
- [12] Qazi A, Haider N, Crabbe D. A simple technique to control bleeding after Plastibell circumcision. *Ann R Coll Surg Engl* 2010 Apr;92(3):261–2.