ISSN: 2320-9267

Indian Journal of Pharmaceutical and Biological Research (IJPBR)

Journal homepage: www.ijpbr.in

RESEARCH ARTICLE

Comparative Study for the Safety of Circumcision by Classical Method and by Plastibell in Children

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ABSTRACT

Background: Circumcision is one of the most commonly performed surgical procedures in children. Classical (dissection) circumcision and the Plastibell device are among the most widely used techniques, but there is limited consensus on which offers the better safety profile across different paediatric age groups.

Aim: To compare the safety of circumcision by the classical (dissection) method and by the Plastibell device in children, and to assess whether complication rates vary with age.

Materials and Methods: This prospective comparative study was conducted in the Department of General Surgery, Victoria Hospital, Bengaluru, over a 3-month period (March–May 2026). A total of 100 boys ≤5 years presenting for circumcision were included, 50 undergoing the classical technique and 50 undergoing Plastibell circumcision. Patients were followed up postoperatively, and complications — bleeding, surgical site infection, adhesion, and delayed ring separation (Plastibell only) — were recorded and compared between groups and across age categories.

Results: The overall complication rate was significantly lower with the classical technique than with Plastibell (10% versus 28%, p=0.008). Individual complication types — bleeding, surgical site infection, and adhesion — did not differ significantly between groups. Complication rates increased with age in both groups, most markedly with Plastibell (7.7% in neonates to 50.0% at 5 years), although the age-stratified differences between techniques did not reach statistical significance at any individual age category (all p>0.05).

Conclusion: Plastibell circumcision is safe and broadly comparable to the classical technique in children when complications are examined within specific age categories, though its overall complication rate is higher. Complication rates rise with increasing age up to 5 years, and this trend is more pronounced with Plastibell, supporting closer postoperative follow-up in older children undergoing this technique.

Keywords: Circumcision, Classical technique, Plastibell, Postoperative complications, Children.

Indian J. Pharm. Biol. Res. (2026): https://doi.org/10.30750/ijpbr.14.3.51

INTRODUCTION

Circumcision is one of the oldest and most frequently performed surgical procedures worldwide, undertaken for religious, cultural, medical, and public health reasons.[1] It carries recognised public health relevance, being associated with reduced transmission of certain infections and a lower incidence of some genital conditions.[2]

Numerous techniques of circumcision have been described, but the classical (freehand dissection) technique and the Plastibell device remain the two most widely practised methods.[3] The classical technique involves surgical excision of the prepuce under direct vision with primary suturing, while the Plastibell technique uses a plastic ring tied over the glans to achieve haemostasis and ischaemic separation of the redundant prepuce, which is then trimmed away without the need for sutures.

Each technique carries a distinct complication profile. Plastibell circumcision is generally regarded as quicker and technically simpler, but is associated with device-specific complications such as delayed ring separation and, in some series, higher rates of bleeding, particularly in older children. The classical technique, while more time-consuming, allows direct haemostasis under vision and avoids retained-device complications altogether.

This study was undertaken to compare the safety of the classical and Plastibell techniques of circumcision in children ≤5 years, with particular attention to whether complication rates differ across specific paediatric age categories.

MATERIALS AND METHODS

Study Design

Hospital-based prospective comparative study.

Study Setting

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How to cite this article: Khalique A, Pasha I, Punekar MD. Comparative Study for the Safety of Circumcision by Classical Method and by Plastibell in Children. Indian J. Pharm. Biol. Res. 2026;14(3):333-337.

Source of support: Nil

Conflict of interest: None.

Received: 08/07/2026 **Revised:** 13/07/2026 **Accepted:** 03/08/2026 **Published:** 13/08/2026

Study Duration

3 months (March 2026 – May 2026).

Study Population

Boys ≤5 years presenting for circumcision.

Sample Size

100 patients — 50 in the Classical group and 50 in the Plastibell group.

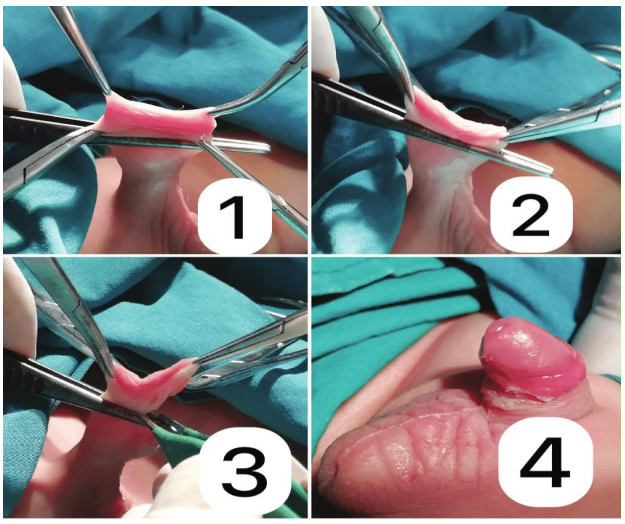

Figure 1 -4: Classical (dissection) circumcision technique. (1) Crushing/clamping of the prepuce prior to incision; (2–3) circumferential excision of the redundant prepuce; (4) appearance following completion of the procedure.

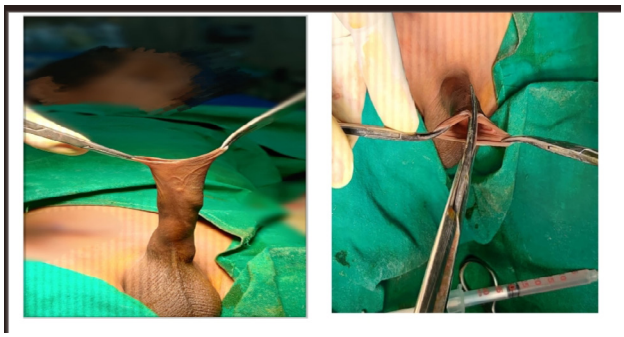

Figure 5: Plastibell circumcision — preputial dilation, adhesiolysis, and placement of the Plastibell device over the glans prior to ligature application.

Inclusion criteria

- Boys aged 5 years or below presenting for circumcision.
- Parental/guardian consent obtained after adequate counselling.

Exclusion criteria

Hypospadias, epispadias, or other disorders of sexual development.

Micropenis

Active infective conditions of the external genitalia at presentation.

Operative Technique

In the classical technique, the prepuce was dilated and adhesions to the glans were released. The prepuce was then clamped, incised, and excised under direct vision, with meticulous haemostasis and primary approximation of the inner and outer preputial skin edges using absorbable sutures (Figure 1-4).

In the Plastibell technique, the prepuce was similarly dilated and separated from the glans, following which a dorsal slit was made to admit the bell of the Plastibell device

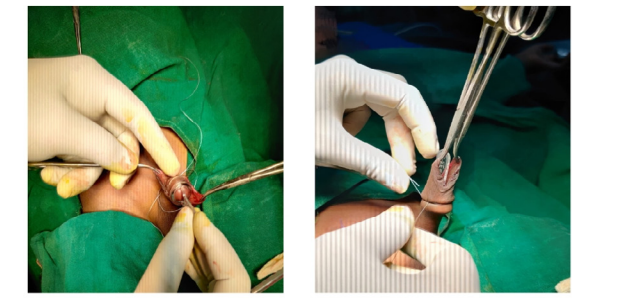

Figure 6: Plastibell circumcision — tying of the ligature around the groove of the device and trimming of the redundant prepuce.

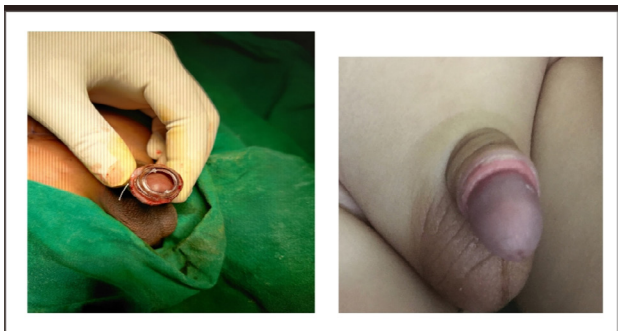

Figure 7: Plastibell circumcision — appearance immediately after ring placement (left) and healed appearance on postoperative day 8 (right).

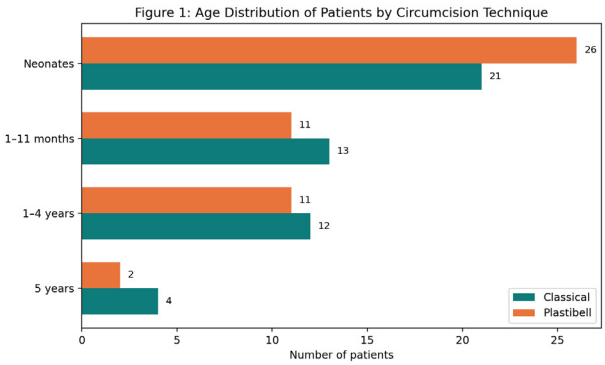

Figure 8: Age distribution of patients by circumcision technique.

over the glans. The prepuce was drawn over the bell and a ligature tied tightly around the groove of the device; the redundant prepuce distal to the ligature was then trimmed away, leaving the ring in place to separate spontaneously over the following days (Figures 5–7).

STATISTICAL ANALYSIS

Data were entered into a spreadsheet and summarised as counts and percentages for categorical variables. Complication rates were compared between the Classical and Plastibell groups using the Chi-square test where applicable and Fisher's exact test for age-stratified 2×2 comparisons with small expected cell counts. A p-value ≤0.05 was considered statistically significant.

RESULTS

A total of 100 boys ≤5 years underwent circumcision during the study period, 50 by the classical technique and 50 by the Plastibell device.[Table 1]

The overall complication rate was significantly higher in the Plastibell group compared with the Classical group (28% versus 10%, p=0.008). Bleeding occurred only in the Plastibell group[Table 2,3] (4 patients versus none), though this difference did not reach conventional statistical significance (p=0.057). Surgical site infection and adhesion rates were similar between groups (p=1.00 for both).

Table 1: Age distribution of patients by circumcision technique

Age category	*Classical*	*Plastibell*	*Total*
Neonates	21	26	47
1–11 months	13	11	24
1–4 years	12	11	23
5 years	4	2	6
Total	50	50	100

Delayed ring separation, a complication specific to the Plastibell device, occurred in 7 patients; as this complication is not applicable to the classical technique, no comparative p-value could be calculated for this row.

Complication rates increased with age in both groups. In the Classical group, rates rose from 4.8% in neonates to 25.0% at 5 years; in the Plastibell group, rates rose more steeply, from 7.7% in neonates to 50.0% at 5 years. Despite this trend, the difference in complication rate between the two techniques did not reach statistical significance within any individual age category (Fisher's exact p>0.05 for all comparisons), likely reflecting the small numbers

Table 2: Postoperative complications by circumcision technique

Complication	Classical	Plastibell	p value
Bleeding	0	4	0.057
Surgical site infection	4	3	1.000
Adhesion	1	0	1.000
Delayed ring separation	—	7	N/A
Complication rate	10%	28%	0.008

Table 3: Comparison of complications in different age categories between Classical and Plastibell techniques

Age category	*Classical, % (n/N)*	*Plastibell, % (n/N)*	*p value (Fisher's exact)*
Neonates	4.8% (1/21)	7.7% (2/26)	1.000
1–11 months	0.0% (0/13)	9.1% (1/11)	0.458
1–4 years	16.7% (2/12)	27.3% (3/11)	0.640
5 years	25.0% (1/4)	50.0% (1/2)	1.000

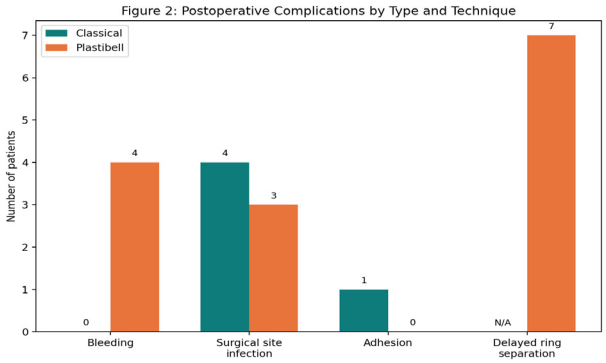

Figure 9: Postoperative complications by type and technique.

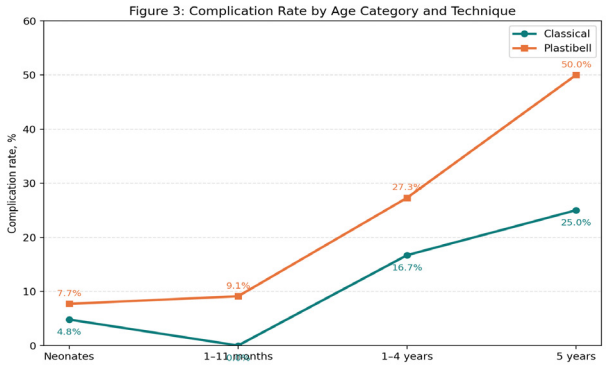

Figure 10: Complication rate by age category and technique.

of patients — and of complications — within each age subgroup.[Fig 8-10]

DISCUSSION

This prospective comparative study assessed the safety of classical and Plastibell circumcision in 100 boys ≤5 years at Victoria Hospital, Bengaluru. The overall complication rate was significantly higher with Plastibell than with the classical technique (28% versus 10%, p=0.008), a finding closely comparable to that reported by Hamza et al. in a similarly designed randomised study comparing freehand and Plastibell circumcision, who found an overall complication rate of 29.1% in the Plastibell group versus 9.1% in the freehand (classical) group (p=0.008).[4] The near-identical complication rates and p-values across the two studies lend external support to the reliability of this finding.

As in the comparator study, delayed ring separation was the leading Plastibell-specific complication in this cohort, and bleeding — while more frequent with Plastibell — did not reach statistical significance, mirroring the pattern reported by Hamza et al., who also found a non-significant difference in bleeding between techniques (P=0.057 in the present study;[4] Rates of surgical site infection and adhesion were low and statistically similar between groups in both studies, consistent with circumcision generally being a clean procedure with a low baseline infective risk.

The present study additionally examined complication rates across specific paediatric age categories. Complication rates rose with increasing age in both groups, and this rise was considerably steeper in the Plastibell group (7.7% in neonates to 50.0% at 5 years) than in the Classical group (4.8% to 25.0%). This is consistent with prior observations that Plastibell complications — particularly delayed ring separation and bleeding — are more common in older children, whose thicker prepuce and larger glans girth make ring sizing and spontaneous separation less predictable.[4,5] Notably, although the trend was clear, the age-stratified differences between techniques in this study did not reach statistical significance at any individual age point, in contrast to the strong age-correlation reported previously; this is most plausibly explained by the smaller number of patients within each age subgroup here, which limits statistical power for age-stratified comparisons.

Taken together, these findings suggest that Plastibell circumcision remains a broadly safe option across paediatric age groups, with a safety profile comparable to the classical technique when examined within individual age categories, even though its overall complication rate is higher. The findings support the general recommendation that Plastibell circumcision is best suited to younger infants, with closer postoperative follow-up warranted as age increases toward 5 years.

CONCLUSION

Plastibell circumcision is equally safe as the classical technique in children when complications are compared within individual age categories, despite showing a higher overall complication rate. Complication rates increase with advancing age up to 5 years in both techniques, and this increase is more pronounced with the Plastibell device. Age-appropriate technique selection and closer postoperative follow-up in older children, particularly those undergoing Plastibell circumcision, may help minimise complications.

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