

## ORIGINAL PAPER

# Comparison of novel dorsal buttonhole slit versus conventional dorsal slit circumcision: Efficacy, safety, and parents' satisfaction

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## Summary

**Introduction and objective:** Circumcision is the most frequently performed surgical procedure worldwide. The World Health Organization recommends that circumcisions should be performed by dorsal slit incision.

**This study introduces the dorsal buttonhole slit, a novel modification of the conventional dorsal slit technique, and aims to evaluate its clinical outcomes and safety in a pediatric cohort.**

**Material and methods:** This retrospective descriptive study was conducted on 107 pediatric patients aged 1-10 years who underwent circumcision for religious reasons or phimosis between January 2022 and December 2023. Patients were divided into two groups based on the surgical technique used: dorsal buttonhole slit (n = 56) versus conventional dorsal slit (n = 51).

**The assessment parameters included intra-operative hemorrhage, operating time, healing time, postoperative complications, and parental satisfaction.**

**Results:** The mean operative time was significantly shorter in the dorsal buttonhole slit group compared to the conventional group (293.79 vs. 320.67 seconds, respectively; p = 0.028).

**There was no significant difference in wound healing time between the two groups. No postoperative complications, such as hemorrhage or need for revision, were observed in any patient during the 1-month follow-up period. All parents reported satisfaction with the functional and cosmetic results.**

**Conclusions:** The dorsal buttonhole slit technique was associated with a shorter operative time and excellent safety outcomes.

**While these results are promising, prospective randomized trials are required to definitively confirm the efficacy and safety of this method. The technique shows potential as a reproducible and reliable alternative for pediatric circumcision.**

**KEY WORDS:** Circumcision; Male; Phimosis; Child; Postoperative complications; Operative time.

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## INTRODUCTION

Circumcision is a common surgical procedure performed worldwide (1) for medical and traditional cultural or religious purposes (2). The World Health Organization (WHO)

recommends the dorsal slit incision technique, which is widely used and valued for its safety as it is performed under direct observation (3, 4). This approach allows for the immediate identification and resolution of any intra-operative issues.

However, despite its prevalence and established techniques, there remains an acknowledged potential for improvement. Existing methods are associated with several complications, including anatomic abnormalities, patient comorbidities, surgeon's technique and skill, and age (5). Complications include hemorrhage, which is the most common with an incidence of up to 1% (6), infection, excessive or inadequate skin excision, and unsatisfactory cosmetic outcomes that may necessitate surgical revision (7, 8). The incidence of these complications can increase when the procedure is performed by less experienced surgeons or during mass circumcision events, underscoring the need for techniques that are simpler and more easily reproducible.

This context highlights a clear gap in current practice. While the conventional dorsal slit method is safe, there is a need for a modification that enhances operative efficiency without compromising safety or cosmetic results. A technique that is faster, equally safe, and easier to perform consistently would be a valuable addition to the field, particularly in high-volume clinical settings. To address this gap, this study introduces and evaluates a novel modification called the "dorsal buttonhole slit" circumcision. The objective was to assess the safety and efficacy of this new technique. The evaluation compared its operative time, healing time, complication rates, and parental satisfaction against the conventional dorsal slit method.

## MATERIALS AND METHODS

This retrospective, descriptive study was conducted at a single center and designed to align with the principles of the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) guidelines. The study retrospec-

tively analysed the medical records of paediatric patients who underwent circumcision between January 2022 and May 2022.

### Study population

Patients included in this study were identified from medical records and met the following criteria: pediatric patients aged between 1 and 10 years who underwent circumcision for either religious reasons or a diagnosis of phimosis. The cohort consisted of all patients who met these criteria within the specified timeframe. Patients were then allocated into one of two groups for comparative analysis based on the surgical technique they had received: the conventional dorsal slit technique or the dorsal buttonhole slit technique.

### Outcomes and definitions

The following outcome variables were retrospectively collected and assessed:

**Operative time:** Defined as the interval in seconds from the initial skin incision to the application of the final suture.

**Healing time:** Defined as the number of days until the wound was considered fully healed upon assessment at the 1-month follow-up visit.

**Complications:** The presence of any of the following pre-specified adverse events, assessed during the 1-month follow-up period: frenulum haemorrhage, painful post-operative erection, chordae, meatal stenosis, the presence of residual preputial skin requiring revision, or urethral cutaneous fistula.

**Parents' satisfaction:** This was assessed during the follow-up visit. For this retrospective analysis, satisfaction was recorded as a binary outcome (satisfied or not satisfied) based on direct parental reporting noted in the clinical records. A specific, validated assessment tool for cosmetic satisfaction was not utilized in the routine data collection for these procedures.

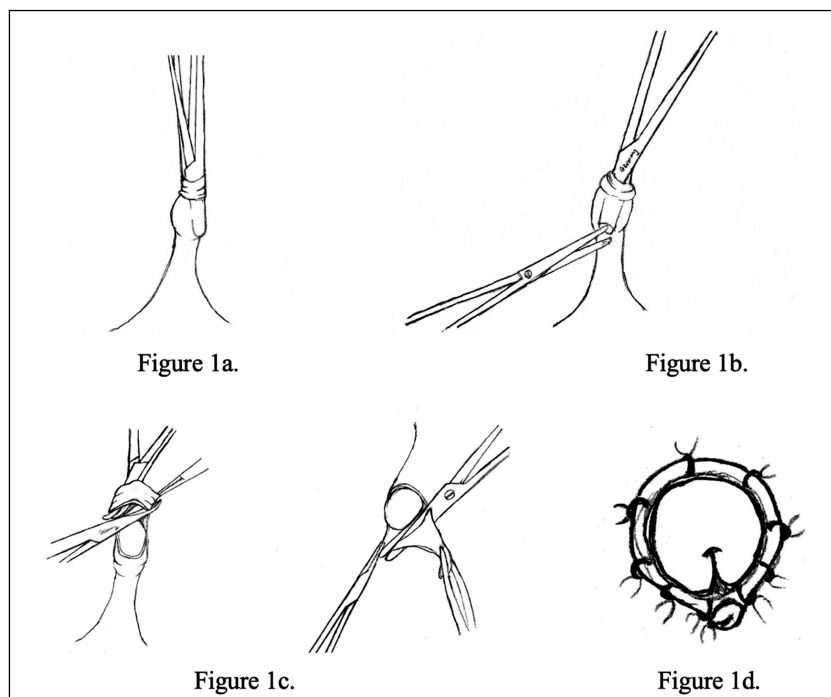
The assessment included intra-operative hemorrhage, operation time, wound healing, satisfaction with penile appearance, and the impact of side effects.

### Procedure

Conventional circumcision method was performed using dorsal slit technique as described in previous studies (9-11). The following describes the surgical procedure used for dorsal buttonhole slit circumcision: the patients were under local or general anesthesia; the attachment and smegma in the coronary sulcus were cleaned, after which a mark was made on the skin at the border of the coronary sulcus; the frenulum was clamped and traction was applied; a mosquito clamp was inserted between the skin and the glans of the penis at twelve o'clock (Figure 1a); then, a buttonhole slit was made at the lower limit of the clamp using Metzenbaum scissors (Figure 1b); then, circumcision was carried out according to the marker (Figure 1c); bleeding control was then performed, and then the skin and the inner layer of the prepuce were sutured (Figure 1d).

### Statistical analysis

All statistical analyses were performed to compare the outcomes between the dorsal buttonhole slit and conventional dorsal slit groups. A p-value of less than 0.05 was considered statistically significant. Continuous variables with normal distribution, including patient age and operative time, were compared using an independent samples t-test. Categorical variables, such as the indication for surgery (phimosis vs. religious reasons), were compared using the Chi-squared test. To assess for baseline comparability and potential confounding, patient age and indication for surgery were compared between the two groups. Data are presented as mean  $\pm$  standard deviation for continuous variables and as frequency (percentage) for categorical variables.



**Figure 1.**

The attachment and smegma in the coronary sulcus were cleaned, after which a mark was made on the skin at the border of the coronary sulcus.

The frenulum was clamped, and traction was applied.

A) A mosquito clamp was inserted between the skin and the glans of the penis at twelve o'clock.

B) A buttonhole slit was made at the lower limit of the clamp using Metzenbaum scissors.

C) Circumcision was carried out according to the marker.

D) Bleeding was controlled, and the skin and inner layer of the prepuce were sutured.

**Table 1.**  
Patient characteristic.

Variable	Dorsal buttonhole slit n (%)	Conventional n (%)	P-value
Participant	56 (100)	51 (100)	
Age (years)	5.03 (1-10)	5.33 (1-10)	> 0.05 *
Indication			
Phimosi	23 (41)	25 (49)	> 0.05
Religious	33 (59)	26 (51)	
Operative time (seconds)	293.79 ± 46.71	320.67 ± 44.64	0.028 *
Healing time (days)	3.6 (3-5)	3.7 (3-5)	> 0.05 *
Complication	0 (0)	0 (0)	
Parents' satisfaction	56 (100)	51 (100)	

\* Independent samples t-test.  
\*\* Chi-squared test; A p-value < 0.05 was considered statistically significant.

## RESULTS

The demographic characteristics were comparable between the two groups (Table 1). There was no statistically significant difference in the mean age of patients between the dorsal buttonhole slit and conventional dorsal slit groups ( $p > 0.05$ ).

The primary outcome of operative time showed a statistically significant difference between the techniques. The mean operative time was significantly shorter for the dorsal buttonhole slit group (293.79 ± 46.71 seconds) compared to the conventional dorsal slit group (320.67 ± 44.64 seconds). This represented a mean difference of 26.88 seconds. The finding was statistically significant ( $p = 0.028$ ). There were no statistically significant differences observed in the average healing time between the two groups (3.6 days vs. 3.7 days,  $p > 0.05$ ). Furthermore, no postoperative complications were recorded in either group, and parental satisfaction was 100% for both techniques.

All patients' surgeries were successful, and the outcomes were satisfactory. All parents were satisfied with the results of the operations. No significant complications, such as frenulum hemorrhage, painful postoperative erection, chordea, meatal stenosis, residual preputial skin, or urethral cutaneous fistula, were observed in any patient after a 1-month follow-up. The cosmetic results were satisfactory.

## DISCUSSION

This study showed that the dorsal buttonhole slit technique had a significantly shorter operative time compared to the conventional technique ( $p = 0.028$ ). These findings indicate that the dorsal buttonhole slit technique may be more efficient in terms of operative time, which may be an important consideration in clinical practice, especially in settings with high patient volumes. Although there was a significant difference in operative time, there was no significant difference in healing time between the two groups ( $p > 0.05$ ). Both techniques showed similar mean healing time of 3.7 days, with a range of 3-5 days. This suggests that although the dorsal buttonhole slit technique is faster in terms of operative time, there is no difference in the rate of wound healing compared to the conventional technique. One of the most important findings of this study is that there were no

complications reported in either group. This suggests that both circumcision techniques are safe and well tolerated by patients. In addition, parental satisfaction rates reached 100% in both groups, indicating that both techniques produce satisfactory cosmetic and functional results.

Male circumcision is the surgical removal of some or the entire foreskin of the penis. It is one of the most commonly performed procedures (12). *Lei et al. (2016)* reported that phimosis is the main indication beyond non-medical, social, ethnic, and religious reasons (3). In this study, religious reasons were the most common indication for parents to request circumcision for their child.

There are many methods of circumcision. The dorsal slit incision technique is recommended by the WHO and is the most commonly used method of circumcision. This technique is effective and safe because it is done by direct observation; any damage that occurs can be immediately identified and resolved intra-operatively, and the results are satisfactory (3, 4). The dorsal buttonhole slit technique slightly modifies this technique by cutting a buttonhole in the dorsal frenulum with mosquito clamps from the gap between the glans and the inner side of the frenulum. Complications of circumcision are reported to be nearly 5%; complications increase when the surgery is performed by inexperienced surgeons or during mass circumcision events (13). The most common complication is hemorrhage (14). In this study, there were no visible hemorrhage complications owing to the careful inspection and hemo-

## DECLARATIONS

**Ethical approval and consent for participate:** The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All patients included in this study were provided with informed consent prior to participation, which was carried out in accordance with the Principles of the Declaration of Helsinki.

This study was approved by the Ethics Committee of Hasanuddin University (no. 209/UN4.6.4.5.31/PP36/2023) with protocol no. UH23030185 on April 4, 2023.

**Availability of data and material:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

**Competing interests:** The authors declare no conflict of interest.

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**Authors' contributions:** Study concept and design: MAP and MF; Data acquisition: MRM, AMC, AAS, and NT; Drafting of manuscript: MRM, AMC, AAA, and NT; Critical revision of the manuscript: MAP, MF, and AA.

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stasis that were performed during circumcision. Another complication that can occur is redundant foreskin, owing to the prepuce skin being too short or too long, which may require revision (15). Severe problems, such as partial amputation of the glans, complete loss of the penis, sepsis, or Fournier's gangrene, can also occur (16).

This study has several clinical implications. First, there was no difference in healing time and no complications were reported, and the dorsal buttonhole slit technique was shown to be as safe as the conventional technique. Second, the dorsal buttonhole slit technique can be an effective alternative to the conventional technique in circumcision, especially when efficiency of surgical time is a major consideration. Third, the high level of parental satisfaction in both groups suggests that both techniques produce satisfactory results.

This study has several limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Further studies with larger sample sizes are needed to confirm these results. Second, this study was conducted in a single center, which may not reflect the broader population. Multicenter studies are needed to increase the external validity of the findings. Future studies should focus on long-term comparisons of the two techniques, including evaluation of long-term cosmetic and functional outcomes. In addition, cost-effectiveness studies may help determine which technique is more efficient in different clinical settings.

## CONCLUSIONS

The dorsal buttonhole slit technique is a novel procedurally straightforward method for paediatric circumcision with excellent clinical outcomes. Our findings indicate a favourable clinical outcome, including a significantly shorter operative time compared to the conventional method and a notable absence of postoperative complications. Furthermore, the procedure was associated with high levels of parental satisfaction regarding functional and cosmetic results, with no need for surgical revision. While promising, claims regarding the definitive safety and efficacy of this technique cannot be firmly established from this study alone. Therefore, future prospective, randomized controlled trials are warranted to confirm these preliminary results and to rigorously evaluate the safety and efficacy of the dorsal buttonhole slit technique against standard procedures.

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