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Original Article

Comparative Study of Stapler Circumcision versus Conventional Circumcision in Adult Males

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Abstract

Introduction: Male circumcision is one of the most commonly performed surgical procedures worldwide. Conventional circumcision, though effective, is associated with longer operative time, increased bleeding, and post-operative discomfort. Stapler circumcision devices have been introduced to overcome these limitations.

Aim: To compare the outcomes of stapler circumcision with conventional circumcision in adult males.

Materials and Methods: This prospective comparative study was conducted in the Department of General Surgery and Urology at Rajarajeswari Medical College and Hospital from December 2024 to September 2025. A total of 44 adult patients undergoing circumcision were included. Twenty patients underwent stapler circumcision, and 24 underwent conventional circumcision. Operative time, intraoperative bleeding, post-operative pain, complications, and patient satisfaction were evaluated and compared between the two groups.

Results: Stapler circumcision was associated with shorter operative time and minimal intraoperative bleeding compared to conventional circumcision. Post-operative pain and complication rates were lower in the stapler group. Patient satisfaction was higher in patients who underwent stapler circumcision.

Conclusion: Stapler circumcision is a safe and effective alternative to conventional circumcision in selected adult patients, offering advantages of reduced operative time, minimal bleeding, less post-operative pain, and improved patient satisfaction.

Key words: Adult male circumcision, Circumcision outcomes, Conventional circumcision, Stapler circumcision

INTRODUCTION

Male circumcision is one of the most commonly performed surgical procedures worldwide and is undertaken for medical, hygienic, cultural, and preventive reasons. The World Health Organization estimates that approximately 30% of males aged 15 years or older are circumcised globally.[1] Medical male circumcision has been shown to confer several health benefits, including a reduced risk of sexually transmitted infections, improved genital hygiene, and a lower incidence of balanitis and penile carcinoma.[2]

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Conventional surgical circumcision remains the most widely practiced technique in adults. Although effective, it is often associated with longer operative time, increased intraoperative blood loss, post-operative pain, delayed wound healing, and variable cosmetic outcomes.[3,4] These factors may adversely affect patient satisfaction and prolong recovery, particularly in adult patients.

In recent years, device-assisted circumcision techniques have been developed to overcome the limitations of conventional surgery. Stapler circumcision devices enable simultaneous excision and anastomosis of the prepuce, providing uniform wound approximation and effective hemostasis. Several studies have demonstrated that stapler circumcision is associated with reduced operative time, minimal blood loss, lower post-operative pain, faster healing, and improved cosmetic outcomes when compared with conventional circumcision.[5,6]

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Despite the increasing use of stapler circumcision devices, comparative data evaluating their outcomes against conventional circumcision in adult males remain limited in many clinical settings. Therefore, the present study was undertaken to compare stapler circumcision with conventional circumcision in adult males with respect to operative time, intraoperative bleeding, post-operative pain, healing time, complications, and cosmetic outcome.

Aim

To compare the outcomes of stapler circumcision and conventional circumcision in adult males.

Objectives

1. To compare the operative time between the stapler and conventional circumcision
2. To assess intraoperative bleeding in both techniques
3. To evaluate post-operative pain and complications
4. To assess patient satisfaction following circumcision.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective comparative study conducted in the Department of General Surgery at Rajarajeswari Medical College and Hospital. Eligible patients were randomly allocated to stapler or conventional circumcision groups using a computer-generated random number table.

Study Period

The study was carried out over a period of 10 months, from December 2024 to September 2025.

Study Population and Sample Size

A total of 64 adult male patients presenting for circumcision were assessed during the study period. After applying exclusion criteria, 44 patients were included in the study.

The study population was divided into two groups:

1. Stapler circumcision group: 20 patients
2. Conventional circumcision group: 24 patients.

Inclusion Criteria

1. Male patients aged 18 years and above
2. Patients undergoing circumcision for:
   a. Phimosis
   b. Tight foreskin after erection
   c. Recurrent balanoposthitis.

Exclusion Criteria

1. Balanitis xerotica obliterans
2. Dense adhesions between the glans and prepuce.

Pre-operative Assessment

All patients underwent a detailed clinical evaluation, including history and local genital examination. Baseline demographic data and indication for circumcision were recorded. Written informed consent was obtained from all patients before surgery.

Surgical Technique

Stapler circumcision

Stapler circumcision was performed using a disposable circumcision stapler, consisting of an inner bell, outer bell, regulating screw, and safety lock. The appropriate stapler size was selected based on the glans diameter. After positioning the device, the foreskin was excised and anastomosed simultaneously using the stapling mechanism [Figures 1-3].

Conventional circumcision

Conventional circumcision was performed using standard surgical techniques under local or spinal anesthesia [Figure 4]. The foreskin was excised manually, and hemostasis was achieved using sutures.

All procedures were performed by surgeons experienced in both techniques.

Outcome Measures

The following parameters were assessed:

1. Operative parameters
   a. Operative time (min)
   b. Intraoperative blood loss (mL).
2. Post-operative outcomes
   a. Post-operative bleeding
   b. Surgical site infection
   c. Edema
   d. Wound dehiscence.
3. Post-operative pain
   a. Pain was assessed using the Visual Analog Scale (VAS) at:
      i. 24 h
      ii. 3 days
      iii. 5 days postoperatively.
4. Healing time
   a. Time to complete wound healing (days).
5. Cosmetic outcome
   a. "Cosmetic outcome was assessed subjectively using patient-reported satisfaction (satisfactory/unsatisfactory) at follow-up."

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences software.

- Continuous variables were expressed as mean ± standard deviation.
- Categorical variables were expressed as frequency and percentage.

Tests of Significance

- Student's independent t-test was used to compare continuous variables between the two groups (operative time, blood loss, pain scores, and healing time).
- Chi-square test or Fisher's exact test was used for categorical variables (post-operative complications and cosmetic outcome), as appropriate.

$P < 0.05$ was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before inclusion in the study.

RESULTS

The mean age was 35.6 years in the stapler group and 37.37 years in the conventional group. Indications for circumcision included balanoposthitis, a tight foreskin after erection, and phimosis. The distribution of clinical indications was comparable between the two groups, showing no significant baseline difference [Table 1].

The mean operative time was significantly shorter in the stapler group (9.1 ± 1.68 min) compared to the conventional group (26.12 ± 2.62 min, $P < 0.001$) [Table 2].

Similarly, mean intraoperative blood loss was significantly lower in the stapler group (3.1 ± 1.16 mL) compared to the conventional group (13.16 ± 3.55 mL, $P < 0.001$).

Surgical site infection occurred in 1 patient (5%) in the stapler group and 2 patients (8.3%) in the conventional group, with no statistically significant difference ($P = 0.68$).

Post-operative edema was seen in 2 patients (10%) in the stapler group and 5 patients (20.8%) in the conventional group ($P = 0.40$).

No cases of wound dehiscence were seen in either group.

Post-operative bleeding occurred in one patient in each group and was managed conservatively.

Pain scores were significantly lower in the stapler group at all time points:

- 24 h: 3.6 ± 1.46 versus 5.0 ± 1.17 ($P = 0.001$)
- 3 days: 2.35 ± 0.81 versus 4.0 ± 1.10 ($P < 0.001$)
- 5 days: 1.45 ± 0.51 versus 2.66 ± 0.76 ($P < 0.001$) [Table 3].

The mean healing time was shorter in the stapler group (8.6 ± 1.58 days) compared to the conventional group (13.29 ± 1.35 days), with statistical significance (P <0.001)

Table 1: Baseline demographic and clinical characteristics

Parameter	Stapler group (*n*=20)	Conventional group (*n*=24)
Mean age (years)	35.6	37.37
Balanoposthitis, *n* (%)	7 (35)	12 (50)
Tight foreskin after erection, *n* (%)	10 (50)	6 (25)
Phimosis, *n* (%)	3 (15)	6 (25)

Table 2: Operative parameters and complications

Parameter	Stapler group	Conventional group	*P*-value
Mean operative time (min)	9.1±1.68	26.12±2.62	<0.001
Mean intraoperative blood loss (mL)	3.1±1.16	13.16±3.55	<0.001
Surgical site infection, *n* (%)	1 (5)	2 (8.3)	0.68
Post-operative edema, *n* (%)	2 (10)	5 (20.8)	0.40
Wound dehiscence	0	0	—

Table 3: Post-operative pain, healing, and cosmetic outcome

Parameter	Stapler group	Conventional group	*P*-value
Post-operative bleeding, *n* (%)	1 (5)	1 (4.2)	—
Pain score at 24 h (VAS)	3.6±1.46	5.0±1.17	0.001
Pain score at 3 days (VAS)	2.35±0.81	4.0±1.10	<0.001
Pain score at 5 days (VAS)	1.45±0.51	2.66±0.76	<0.001
Healing time (days)	8.6±1.58	13.29±1.35	<0.001
Satisfactory cosmetic outcome, *n* (%)	20 (100)	18 (75)	—

VAS: Visual Analogue Scale

Table 4: Comparison of operative outcomes: Stapler versus conventional circumcision

Parameter	Jin *et al.*	Jadhav *et al.*	Our study
Mean operative time (min)	Stapler: 6.8±3.1 Conventional: 24.2±3.2 *P*=0.001	Stapler: 6.8±1.5 Conventional: 24.2±3.41 *P*=0.0001	Stapler: 9.1±1.68 Conventional: 26.12±2.62 *P*=0.0001
Mean intraoperative blood loss (mL)	Stapler: 1.8±1.8 Conventional: 9.4±1.5 *P*=0.0001	Stapler: 1.8±0.68 Conventional: 9.46±1.19 *P*=0.0001	Stapler: 3.1±1.16 Conventional: 13.16±3.55 *P*=0.0001
Mean post-operative pain score (VAS)	Stapler: 4.0±0.9 Conventional: 5.8±1.0 *P*=0.001	Stapler: 4.0±0.70 Conventional: 5.84±0.80 *P*=0.0001	Stapler: 2.35±0.81 Conventional: 4.0±1.10 *P*=0.0001

VAS: Visual Analog Scale

Cosmetic Outcome and Patient Satisfaction

Satisfactory cosmetic outcome was achieved in all patients (100%) in the stapler group, whereas 18 patients (75%) in the conventional group reported satisfactory cosmetic appearance.

Figure 1: Stapler circumcision device with safety lock

Figure 2: Glans size measurement

Figure 3: Stapler circumcision

The comparative analysis presented in the table reinforces existing evidence that stapler circumcision offers advantages over conventional circumcision in terms of reduced operative time, minimal intraoperative blood loss, and lower post-operative pain, without compromising safety. The consistency of these findings across different studies and settings strengthens the external validity of the present study.

Figure 4: Conventional circumcision

DISCUSSION

In this prospective comparative study of 44 adult patients, stapler circumcision was associated with significantly shorter operative time, markedly less intraoperative blood loss, lower post-operative pain scores at 24 h, 3 days, and 5 days, and higher rates of satisfactory cosmetic outcome when compared with conventional circumcision. Complication rates (surgical site infection, post-operative edema, wound dehiscence, and post-operative bleeding) were low in both groups and did not differ significantly.

Operative Time and Blood Loss

Our finding of reduced operative time with the stapler technique (9.1 ± 1.68 min vs. 26.12 ± 2.62 min, $P < 0.001$) mirrors results reported in multiple published series and randomized trials. Jin and colleagues, in a multicenter randomized trial, reported that circular stapler circumcision markedly reduced procedure time compared with conventional techniques.[3] Likewise, randomized and large observational studies of disposable circumcision suture devices (DCSDs) demonstrated clinically meaningful reductions in operative time and blood loss relative to standard surgical circumcision.[5,6] These consistent results across studies suggest that device-assisted circumcision reliably shortens operating theater resource use and reduces intraoperative bleeding.

Post-operative Pain

We recorded lower pain scores in the stapler group at all time points assessed (24 h, 3 days, and 5 days), with highly significant differences at 3 and 5 days. Several trials of disposable device techniques have reported similar early pain benefits, particularly within the first 24–72 h.[5,6] The Cochrane systematic review concluded that device use probably reduces early post-operative pain (first 24 h) compared with standard surgery, although the certainty of

evidence for some outcomes was low to moderate.[7] Our results extend this observation by showing sustained lower pain through day 5, which may be attributable to reduced tissue handling, shorter operative time, and the suture-less nature of the stapler device [Table 4].

Complications and Cosmetic Outcome

In our series, complication rates were low and comparable between groups: surgical site infections were 5% versus 8.3%, and post-operative edema 10% versus 20.8% (stapler vs. conventional). No wound dehiscence occurred. These safety findings are concordant with larger device trials that report low rates of serious adverse events, although some studies and pooled analyses have signaled a modest increase in certain moderate complications such as delayed staple removal, localized inflammation, or the need for minor interventions in device arms.[7,8] Importantly, our stapler group reported 100% satisfactory cosmetic outcome compared with 75% in the conventional group; earlier reports, including randomized trials of DCSDs and stapler devices, have similarly described improved or equivalent cosmetic results with device-assisted circumcision, likely due to uniform circular excision and consistent hemostasis.[3,5] Taken together, the available literature suggests that device-assisted circumcision offers at least equivalent safety and often superior cosmetic outcomes when used in appropriately selected patients.

How Our Findings Fit with Device Literature

Several device types, including circular staplers, DCSDs, and disposable suture rings, have been evaluated across heterogeneous clinical settings. Trials such as those by Lv *et al.* and other circular stapler randomized studies consistently demonstrate reductions in operative time and early post-operative pain, along with favorable cosmetic perceptions, findings that are similar to our observations.[5,6] The Cochrane review synthesizing multiple trials concluded that circumcision devices probably reduce operative time and early pain, although evidence regarding differences in adverse events remains uncertain and may suggest a slight increase in moderate complications for some devices.[7] Our dataset aligns with the overall trend favoring device-assisted circumcision for procedural efficiency and early patient comfort, while showing no signal of increased major complications in this cohort.

Strengths

- Prospective design with clearly defined inclusion/exclusion criteria and standardized outcome measurement (VAS for pain, explicit healing time).
- Direct comparison of stapler and conventional techniques performed by experienced surgeons, reducing operator-dependent bias.
- Presentation of both objective (operative time, blood loss, and healing time) and patient-reported (pain and cosmetic satisfaction) outcomes.

Limitations

- Modest sample size ($n = 44$) – while differences in key outcomes (time, blood loss, and pain) were large and statistically significant, the study is underpowered to detect smaller differences in uncommon complications.
- Cosmetic outcome was assessed subjectively without a validated cosmetic scoring tool; future studies should include validated patient-reported outcome measures and blinded independent cosmetic assessment.
- Follow-up duration may not capture late complications (scar revision and persistent sensitivity) – longer follow-up is desirable.

Clinical Implications

For appropriately selected adult patients (excluding those with balanitis xerotica obliterans, dense adhesions, or other contraindications), stapler circumcision appears to be a safe and efficient alternative to conventional circumcision. The procedure's shorter operative time and lower early pain burden may enable faster turnover in high-volume settings and improve early patient comfort. However, clinicians should weigh device costs, availability, and the learning curve, and remain vigilant for device-specific complications (e.g., retained staples, need for minor device-related interventions).

Recommendations for Future Research

- A sufficiently powered randomized controlled trial comparing stapler circumcision, DCSDs, and conventional circumcision with stratification by indication (phimosis, balanitis, and cosmetic) would provide higher-certainty evidence on safety and effectiveness.
- Cost-effectiveness analyses in different healthcare settings are needed to determine whether procedure time savings offset device costs.
- Standardized reporting of complications, objective cosmetic scales, and longer follow-up (≥6–12 months) will help understand late outcomes and patient satisfaction trajectories.
- Studies examining the learning curve, device sizing algorithms, and operator variability would aid safe implementation.

CONCLUSION

Our study supports existing evidence that stapler-assisted circumcision reduces operative time, intraoperative blood loss, and early postoperative pain, while providing excellent

cosmetic results in selected adult patients. These findings are consistent with previously published randomized and observational studies and with pooled conclusions from systematic reviews that devices reduce procedure time and early pain. Careful patient selection and awareness of device-specific considerations remain essential. Larger randomized trials and cost analyses would further clarify the role of stapler devices in routine clinical practice.

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