



A PROSPECTIVE STUDY ON STAPLER CIRCUMCISION

General Surgery

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ABSTRACT

Male circumcision is a common surgical procedure performed for medical, cultural, and religious reasons. This prospective observational study, conducted over 18 months in a tertiary care hospital, evaluated the outcomes of stapler circumcision in 54 male patients. Participants ranged in age from 2 to 70 years, with the majority (62.96%) being under 10 years old. Indications for circumcision included phimosis (37.04%), recurrent balanitis or balanoposthitis (31.48%), and religious reasons (25.93%). The procedure was completed under intravenous sedation and penile block, with a mean operative time of 6 minutes. Post-operative pain was assessed using the visual analogue scale, with children experiencing moderate pain on day 1 (mean score of 4.2) and adults reporting mild pain (mean score of 2.7), both significantly reducing by day 7. Complications were minimal, including minor bleeding (3.70%), urinary retention (3.70%), and edema (3.70%), with no cases of infection or stapler line disruption. The stapler device's efficiency in providing rapid, uniform closure minimized complications and reduced operative time. Overall, stapler circumcision proved to be a safe, efficient, and well-tolerated procedure, particularly suited for low-resource settings with limited surgical infrastructure.

KEYWORDS

stapler circumcision, short operative time, minimal intra and post-operative complications

INTRODUCTION-

Male Circumcision: Overview and Modern Developments

Male circumcision, one of the earliest human surgical procedures, involves the removal of the foreskin from the penis. The foreskin is a fold of tissue covering the glans and urethral opening. Circumcision is performed for various reasons, including medical, cultural, and religious purposes. Common medical indications include conditions like phimosis, paraphimosis, and balanoposthitis, which cause discomfort, infections, or complications in penile function.

Phimosis is the inability to retract the foreskin, leading to painful erections and increased susceptibility to infections. Paraphimosis, when the foreskin remains retracted, causes painful swelling of the glans. Circumcision is also linked to reduced risks of sexually transmitted infections (STIs), including HIV. The WHO and UNAIDS advocate voluntary medical male circumcision (VMMC) as a key HIV prevention strategy, particularly in regions with high HIV prevalence. Circumcision can also reduce the risk of human papillomavirus (HPV) infection, balanitis, and penile cancer, while promoting better hygiene. In addition to medical reasons, circumcision is culturally and religiously significant in Judaism, Islam, and several global regions, including the U.S., Canada, and parts of Africa and Asia.

Over the past two decades, circumcision devices have emerged as alternatives to traditional surgical methods. These devices, such as the Gomco clamp, Mogen clamp, and Plastibell, simplify the procedure by crushing the foreskin, allowing it to be excised or slough off via necrosis. Device-based methods are considered safer, quicker, and easier to replicate than standard techniques, providing protection to the glans and reliable haemostasis.

Adverse events (AEs) include bleeding, infection, and wound disruption, but are usually mild. Severe cases may require medical intervention, such as transfusion or hospitalization. Device-based circumcision, with reduced procedure time and complexity, is suitable for low-resource settings, provided devices are affordable, easy to use, and meet regulatory standards.

MATERIALS AND METHODS-

A prospective observational study was conducted in the Inpatient Department of Surgery at a tertiary care centre from March 2022 to November 2024 (29 months). The study, which lasted 18 months, involved collecting patient data only after obtaining informed consent, with the consent form provided in both English and the local vernacular. Patient details were recorded using a case report form. The

research was conducted in a teaching hospital's surgical department, with all procedures adhering to ethical guidelines.

Inclusion Criteria-

The inclusion criteria for the study consisted of all male patients, regardless of age, who were willing to undergo circumcision due to specific indications such as phimosis, paraphimosis, recurrent balanitis, recurrent posthitis, or for religious reasons.

Exclusion Criteria-

The exclusion criteria for the study included patients with hypospadias, epispadias, suspected or confirmed carcinoma of the penis involving the prepuce and glans, traumatic injury to the prepuce and those who, or whose relatives, refused to provide consent for the procedure.

Investigations-

The investigations for the study included haematological tests such as a complete blood count, kidney function test, liver function test, HIV screening, and HbsAg. Radiological investigations involved a chest X-ray, ultrasound of the prostate, and ultrasound of the abdomen and pelvis. Additionally, an electrocardiogram (ECG) was performed. Local examination findings were noted to establish a diagnosis and indication for undergoing circumcision.

Steps Of Stapler Circumcision-

In stapler circumcision, under intravenous sedation with a penile block, the preputial opening is identified and dilated, and smegma is removed. The frenular artery is then identified and coagulated with bipolar thermocoagulation. The anvil of the stapler is applied over the preputial skin and secured with a thread. The stapler is applied to the anvil, fired, and kept in place for one minute to ensure compression and haemostasis. Following removal of the stapler, the procedure is completed with no bleeding and a uniform stapler line, and a gauze dressing is applied.



Figure 1- Stapler circumcision device



Figure 2- Steps of stapler circumcision

RESULTS-

1) Age Distribution

In the present study on stapler circumcision conducted in the Department of Surgery at a government medical college and tertiary care hospital, a total of 54 cases were analysed. The age of patients ranged from 2 to 70 years. The majority of cases were in the 0-10 years age group, comprising 62.96% (34 cases). This was followed by the 51-60 years age group with 11.12% (6 cases), the 41-50 years age group with 9.26% (5 cases), the 31-40 years age group with 7.40% (4 cases), and the 61-70 years age group with 5.55% (3 cases). The 21-30 years age group had 3.71% (2 cases), while no cases were observed in the 11-20 years age group. The mean age of the patients was 20.5 years, with a modal age of 5 years.

Table 1. Age Wise Distribution Of The Study Population

AGE GROUP (in years)	CASE FREQUENCY	PERCENTAGE
0-10	34	62.96%
11-20	0	0%
21-30	02	3.71%
31-40	04	7.40%
41-50	05	9.26%
51-60	06	11.12%
61-70	03	5.55%
TOTAL	54 CASES	100%

2) Patient Distribution According To Religion

In the present study on stapler circumcision conducted in the Department of Surgery at a government medical college and tertiary care hospital, the study population of 54 cases included 37% Muslim patients (20 cases), 32% Hindu patients (17 cases), 24% Buddhist patients (13 cases), and 7% Jain patients (4 cases).

Table 2. Case Frequency Distribution According To Religion

RELIGION	CASE FREQUENCY	PERCENTAGE
ISLAM	20	37%
HINDU	17	32%
BUDDHISM	13	24%
JAINISM	04	07%
TOTAL	54 CASES	100%

3) Chief Presenting Complaints Of The Patients

Out of the 54 cases included, 48.15% (26 patients) presented with the chief complaint of inability to retract the preputial skin over the glans penis. Additionally, 14.81% (8 patients) had ballooning of the preputial skin during urination, 24.08% (13 patients) showed redness and pain over the glans and preputial skin indicative of balanoposthitis, 7.41% (4 patients) had purulent discharge from the urethra, and 5.55% (3 patients) presented with dry, whitish, and thickened preputial skin with inability to retract the prepuce.

Table 3. Chief Presenting Complaints Of The Study Patients

CHIEF COMPLAINTS	Case Frequency	Percentage
Inability to retract the prepuce over the glans penis	26	48.15%
Presence of redness, pain over the glans and prepuce, suggestive of balanoposthitis	13	24.08%
Ballooning of preputial skin during urination	08	14.81%

Peri-urethral soaking apart from urine	04	7.41%
Dry appearing, whitish thickened preputial skin with inability to retract it over the glans	03	5.55%
TOTAL	54 CASES	100%

4) Indication For Undergoing Stapler Circumcision

Out of 54 cases, stapler circumcision was indicated for phimosis in 37.04% of cases (20 patients), for religious reasons in 25.93% (14 patients), for recurrent balanitis and balanoposthitis in 31.48% (17 patients), and for acquired phimosis secondary to balanitis xerotica obliterans in 5.55% (3 patients).

Table 4. Indications For Undergoing Stapler Circumcision In The Study Population

INDICATION	Case Frequency	Percentage
Phimosis	20	37.04%
Religious indication	14	25.93%
Recurrent balanitis, balanoposthitis	17	31.48%
Acquired Phimosis- balanitis xerotica obliterans	03	5.55%
TOTAL	54 CASES	100%

Photographs:



Figure 3: Phimosis



Figure 4: Pinpoint Preputial Opening



Figure 5: Phimosis with inability to retract the preputial skin



Figure 6: Balanitis Xerotica Obliterans

5) Study Of Comorbidities In The Study Population

In the present study on stapler circumcision, among the 54 cases, 3.7% (2 patients) were known to have type-II diabetes mellitus and were on oral hypoglycaemic drugs (with HbA1c between 6.5% and 7.5%), 3.7% (2 patients) had systemic hypertension and were on antihypertensive medication, and 1.85% (1 patient) had ischemic heart disease and was on antiplatelet agents. Patients on dual antiplatelet agents underwent surgery after discontinuing the drugs for 7 days, while those on a single antiplatelet medication (Aspirin 75 mg) were operated on without interrupting their medication.

Table 5. Comorbidities In The Study Population:

Comorbidity	Case Frequency	Percentage
DIABETES MELLITUS	2	3.70%
HYPERTENSION	2	3.70%
ISCHAEMIC HEART DISEASE	1	1.85%
TOTAL CASES WITH COMORBIDITIES	13 CASES	24.07%

6) Intraoperative Complications

In 1.85% of cases (1 patient), the stapler ring failed to fire and secure circumferentially over the cut edge of the preputial skin. This patient required suturing of the cut edge with Vicryl Rapide 4-0 (intermittent sutures) to the penile skin just proximal to the coronal sulcus to achieve skin approximation and haemostasis. Additionally, 3.70% of cases (2 patients) experienced minor bleeding from the stapler line after the device was removed. In one case, bleeding was controlled with a simple compression dressing, while in the other, two sutures with Vicryl Rapide 4-0 were needed to achieve haemostasis.

Table 6. Intra-operative Complications In The Study Population:

Intra-operative complication	Case Frequency	Percentage
Failure to fire the stapler ring	01	1.85%
Immediate bleeding from the stapler line	02	3.70%

7) Operative Time For The Study Population

Operative time was measured from the infiltration of local anaesthesia to the removal of the stapler device and visualization of a circumferential even stapler ring along the cut edge of the preputial skin. For uneventful procedures, the stapler circumcision took between 3 to 6 minutes. However, in one case where the stapler ring failed to fire and skin approximation was achieved using intermittent sutures with Vicryl Rapide 4-0, the procedure lasted 20 minutes. Thus, the average operative time for the stapler circumcision in this study was 6 minutes.

8) Post Operative Pain

Post-operative pain was assessed using the universal visual analogue scale for 54 participants. Pain was evaluated on post-operative days 1, 7, and 14. For children, the mean pain score on post-operative day 1 was 4.2 (indicating moderate pain), managed initially with intravenous analgesics and then oral analgesics after 24 hours. Most children did not require analgesics after 3 days and were generally pain-free by the 5th post-operative day. On post-operative day 7, the mean pain score was 0.9, and by day 14, it dropped to 0.008. For adults (≥21 years), the mean pain score on post-operative day 1 was 2.7 (indicating mild pain), managed with oral analgesics, with most being symptom-free by day 3. On post-operative day 7, the mean pain score was 0.29, and by day 14, it was 0.

Table 7. Post-operative Pain Scores In The Study Population

	POD-1	POD-7	POD-14
Cases with mild pain (<3)	20 [37%]	18 [33%]	06 [11%]
Cases with moderate pain (3-6)	34 [63%]	0	0
Cases with severe pain (>6)	0	0	0
Cases with no pain	0	36 [67%]	48 [89%]
TOTAL	54 cases [100%]	54 cases [100%]	54 cases [100%]

9) Post Operative Complications

54 cases who underwent stapler circumcision were monitored for complications in the immediate 24 hours post-surgery, including bleeding from the stapler line, edema around the stapler line, urinary retention, and disruption of the stapler line. Two patients experienced

minor oozing from the stapler line, which was managed with a reapplication of the compression dressing. Two children (aged 0-10 years) developed urinary retention 6-8 hours post-surgery, but were able to urinate after receiving intravenous analgesia and standing in front of running water; neither required Foley's catheterization. Additionally, two patients developed oedema around the stapler line, which resolved within three days. There were no cases of stapler line disruption. After 24 hours, participants were monitored for infection and erythema. Two patients developed erythema around the stapler line, which lasted 4-5 days and resolved spontaneously. There was no incidence of wound infection in the study population.

Table 8. Mean Post-operative Pain Scores In The study Population (According To Universal Visual Analogue Scale)

	CASE FREQUENCY	MEAN PAIN SCORE POD-1	MEAN PAIN SCORE POD-7	MEAN PAIN SCORE POD-14
CHILDREN	34	4.2 (moderate)	0.9 (mild)	0.008
ADULTS (>=21 YEARS)	20	2.7 (mild)	0.29 (mild)	0.00
TOTAL	54 CASES			

Table 9. Post-operative Complications:

COMPLICATION	INCIDENCE	PERCENTAGE
Bleeding from the stapler line	2	3.70%
Urinary retention	2	3.70%
Oedema around the stapler line	2	3.70%
Erythema of the penile skin	2	3.70%
Disruption of the stapler line	0	-
Infection around the stapler line	0	-



Figure 5: Evenly Cut Circumferential Preputial Skin With An Even Stapler Line



Figure 6: Follow up on post operative day 7



Figure 7: Follow Up On Post-operative Day 14- Post-self Separation Of Stapler Ring

DISCUSSION-**1) Age Distribution-**

In the present study on stapler circumcision, conducted with a mean patient age of 20.5 years and a modal age of 5 years, the highest frequency of cases (62.96%) was in the 0-10 years age group, followed by 11.12% in the 51-60 years age group. This contrasts with findings from other studies: X.D. Jin et al. (2015) reported a mean age of 26.9 years for adult male circumcision with a circular stapler; Zhuocheng Jiang et al. (2018) found a mean age of 6.8 years for children with phimosis and redundant prepuce; R.M. Jadhav et al. (2022) and Purushotham G. et al. (2023) both reported a mean age of 33.84 and 34.16 years, respectively, with the majority of their cases in the 26-35 years age group. The results of the present study align more closely with X.D. Jin et al. regarding mean age but differ from Zhuocheng Jiang et al., who focused solely on children. Additionally, the present study's age distribution contrasts with Jadhav and Purushotham's findings, which reflect a higher prevalence in adults, possibly due to varying cultural and religious practices influencing the timing of circumcision.

2) Religious Parameters-

The World Health Organization (WHO) study from 2007 estimates that globally, 30% of males aged 15 and over are circumcised, with nearly 70% of these being Muslims. In the present study on stapler circumcision, conducted with 54 participants, 37% were Muslims (20 cases), 32% were Hindus (17 cases), 24% were Buddhists (13 cases), and 7% were Jains (4 cases). The religious distribution in this study aligns with WHO estimates, with Muslims representing the largest group. Notably, 70% of the Muslim patients (14 out of 20 cases) underwent circumcision for religious or cultural reasons. This reflects the high value Muslims place on circumcision as a significant religious and cultural practice, often performed at a young age, though the exact timing can vary by family and region.

3) Indication For Undergoing Stapler Circumcision-

In the present study on stapler circumcision, the procedure was performed for congenital phimosis in 37.04% of cases, religious reasons in 25.93%, recurrent balanitis and balanoposthitis in 31.48%, and acquired phimosis secondary to balanitis xerotica obliterans in 5.55% of cases. Comparatively, R.M. Jadhav et al. (2022) reported stapler circumcision for congenital phimosis in 15.38% of cases, recurrent balanitis and balanoposthitis in 30.77%, and balanitis xerotica obliterans in 7.69%. Purushotham G. et al. (2023) found that stapler circumcision was done for congenital phimosis in 16.66% of cases, recurrent balanoposthitis in 25%, and balanitis xerotica obliterans in 8.33%. The present study's results align with those of R.M. Jadhav et al. concerning recurrent balanoposthitis and balanitis xerotica obliterans as significant indications for circumcision. Additionally, the findings are nearly comparable with Purushotham G. et al. regarding the incidence of recurrent balanoposthitis.

4) Operative Time-

In the present study on stapler circumcision, the mean operative time was 6 minutes, measured from the infiltration of local anesthesia to the removal of the stapler device and visualization of a uniform stapler ring. This is comparable to the findings of X.D. Jin et al. (2015), Zhuocheng Jiang et al. (2018), R.M. Jadhav et al. (2022), and Purushotham G. et al. (2023), who reported mean operative times of 6.8 minutes, 5.35 minutes, 6.8 minutes, and 6.8 minutes respectively. The consistency in operative times across these studies highlights the efficiency of the stapler circumcision procedure. The stapler device's ability to cut and seal the foreskin simultaneously streamlines the procedure, reducing the overall surgery time by minimizing the number of steps compared to traditional methods. This efficiency results in quicker operations and consistent outcomes across different studies.

5) Comorbidities In The Study Population-

In the present study on stapler circumcision involving 54 cases, 3.7% of the patients had Type II Diabetes Mellitus (Type II DM) and were on oral hypoglycaemic drugs (with HbA1c levels between 6.5-7.5%), 3.7% had Systemic Hypertension (HTN) and were on oral antihypertensive medications, and 1.85% had Ischaemic Heart Disease (IHD). Despite extensive research and review of global studies on stapler circumcision, no comparable data on comorbidities in the study population was found in the literature.

6) Pain Score-

In this prospective study on stapler circumcision, post-operative pain was assessed using the universal visual analogue scale (VAS) on postoperative day 1, day 7, and day 14. For children, the mean pain score on day 1 was 4.2, while for adults (≥ 21 years), it was 2.7. Pain management included oral analgesics for adults, with symptom resolution by day 3. These results are comparable to other studies: X.D. Jin et al. (2015) and Purushotham G. et al. (2023) both reported a mean pain score of 4.0 on day 1 for children. Dongsheng Zhu, MD, and Hongqi Zhu, MD (2022) also noted a similar score of 4.05 ± 0.37 for children. The slight variance in pain scores for adults could be attributed to the stapler's ability to provide consistent and uniform closure, minimizing tissue trauma and inflammation, which helps reduce post-operative pain and promote quicker recovery.

7) Post Operative Complication-

In the present study on stapler circumcision, post-operative complications were monitored, including bleeding, edema, erythema, disruption of the stapler line, and infection. Out of the 54 cases, 3.70% experienced bleeding from the stapler line, managed with compression dressing, and 3.70% developed edema around the stapler line, which resolved within 3 days. No infections around the stapler line were observed. Comparatively, X.D. Jin et al. (2015) reported 0.90% bleeding, controlled with sutures, 1.13% edema resolving in 3-5 days, and 0.45% infections managed with antibiotics and local dressing. R.M. Jadhav et al. (2022) found no post-operative complications. The findings of the present study are consistent with X.D. Jin et al. regarding post-operative edema and with both X.D. Jin et al. and R.M. Jadhav et al. concerning wound dehiscence and infection rates.

8) Healing Time And Patient Discharge

In the present study on stapler circumcision, patients were discharged within 24 hours for those aged 0-10 years, and within 12 hours for adults over 21 years, with post-operative care instructions and follow-up counseling provided. The mean healing time post-stapler circumcision, including self-separation of the stapler ring, was 14 days.

This healing time is comparable to the findings of X.D. Jin et al. (2015), R.M. Jadhav et al. (2022), and Purushotham G. et al. (2023), all of which reported a mean healing time of 12.5 days for stapler circumcision. The slight increase in healing time in the present study may reflect variations in patient factors or procedural details but aligns closely with other studies.

CONCLUSION-

Therefore, from the present study titled "A prospective study on stapler circumcision", it can be concluded that the circular stapler circumcision technique is a simple and user-friendly tool for executing male circumcision. It is due to:

Shorter operative duration.

Easy learning curve.

Uniformity in the results irrespective of being done by a surgeon or a nurse.

It has lesser intra operative and post operative complications with less blood loss and decrease in length of hospital stay.

This innovative technology has the potential to significantly simplify and standardize circumcision operations, therefore its widespread use would be beneficial. With additional refinement, it may become the standard male circumcision method.

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