

Outcome of Circumcision Using Bipolar Diathermy: An Observational Study

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ABSTRACT

Background: Circumcision is a common surgical procedure, and achieving optimal outcomes with minimal complications remains a priority. Bipolar diathermy is increasingly used for its precision and reduced bleeding risk, but limited prospective data exist on its efficacy in resource-constrained settings like Bangladesh. **Objective:** This study aimed to evaluate the postoperative outcomes of circumcision using bipolar diathermy. **Methods & Materials:** This retrospective observational study was conducted at the Department of Surgery, Delta Medical College & Hospital, Dhaka, Bangladesh. (Jan 2022- Dec 2023) Included 86 patients undergoing bipolar diathermy circumcision. We used purposive sampling to assess operative time, blood loss, postoperative pain (VAS), healing time, and complications at 24h, 7d, and 14d follow-ups. Data were analyzed using descriptive statistics in MS Excel. Ethical approval was obtained, with informed consent from all participants. **Results:** The study of 86 patients revealed a mean operative time of 18.7 minutes with minimal blood loss (5.2 mL). Postoperative pain scores decreased from 4.2 (Day 1) to 1.3 (Day 7) on VAS, with 88.4% achieving wound healing within 10 days. Complication rates were low (13.9%), primarily mild edema and infections. Patient satisfaction was high (93% good/excellent outcomes), supporting bipolar diathermy as an effective circumcision method. **Conclusion:** Bipolar diathermy circumcision demonstrated excellent safety and efficacy, with minimal blood loss, rapid healing, and high patient satisfaction. The technique appears particularly suitable for resource-limited settings. Further comparative studies are recommended to establish its advantages over conventional methods.

Keywords: Bipolar diathermy, Circumcision, postoperative outcomes, Pain, VAS score

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INTRODUCTION

Male circumcision is one of the oldest and most commonly performed surgical procedures worldwide, with cultural, religious, and medical significance [1]. It is estimated that approximately one-third of males globally have undergone circumcision, with varying prevalence across regions [2]. The procedure is often indicated for phimosis, recurrent infections, and as a preventive measure against sexually transmitted infections, including HIV [3,4]. While conventional techniques such as the dorsal slit, Guillotine method, and suture ligation remain widely used, advancements in electrosurgical tools have introduced newer methods to improve precision and reduce complications [5]. Bipolar diathermy, a form of electrosurgery, has gained attention in recent years for its ability to provide focused coagulation with minimal thermal spread, reducing the risk of unintended tissue damage [6]. Unlike monopolar diathermy, which requires a grounding pad and carries a higher risk of burns, bipolar diathermy confines electrical current between the instrument's tips, enhancing safety [7]. Studies have demonstrated its efficacy in various surgical procedures, including tonsillectomies and dermatologic excisions, due to its hemostatic efficiency and reduced postoperative pain [8,9]. However, its application in circumcision, particularly in low-resource settings, remains

understudied. In Bangladesh, circumcision is frequently performed in outpatient settings, often with limited access to advanced surgical tools [10]. Traditional techniques, though effective, are associated with complications such as bleeding, infection, and delayed wound healing [11]. Given the high patient turnover in Bangladeshi hospitals, a method that shortens operative time while minimizing complications could significantly improve clinical outcomes. Preliminary reports suggest that bipolar diathermy may offer faster wound sealing and reduced intraoperative blood loss compared to conventional scalpel-based techniques [12]. However, prospective data on its postoperative outcomes—such as pain scores, healing duration, and complication rates—are scarce in this demographic. This study aimed to evaluate the outcomes of circumcision using bipolar diathermy at a tertiary care hospital in Dhaka, Bangladesh. By assessing operative parameters, postoperative recovery, and complication rates, we seek to determine whether this technique offers a viable alternative to traditional methods in resource-constrained settings. The findings may contribute to evidence-based surgical practices, optimizing patient care in similar healthcare environments.

METHODS & MATERIALS

This retrospective observational study was conducted at the Department of Surgery, Delta Medical College & Hospital, Dhaka, Bangladesh, from January 2022 to December 2023. Through purposive sampling, 86 male patients undergoing elective circumcision with bipolar diathermy were included. Participants were selected from male patients aged between 5 and 40 who required circumcision due to conditions such as phimosis, recurrent infections, or parental preference. Patients with bleeding disorders or active infections at the surgical site were excluded from the study. All procedures were performed under either local or general anesthesia based on patient age and clinical assessment. The bipolar diathermy machine used was a Valleylab Force FX, set at a standard coagulation mode of 20 to 30 watts. The surgical technique involved a dorsal slit followed by circumferential excision of the foreskin, with meticulous hemostasis achieved using bipolar diathermy. Operative details, including procedure duration and intraoperative bleeding, were documented. Postoperative follow-up was conducted at 24 hours, 7 days, and 14 days to assess pain levels using a visual analog scale, wound healing progression, and any complications such as infection, edema, or delayed hemorrhage. Data were compiled and analyzed using Microsoft Excel for

descriptive statistics. Written informed consent was obtained from all participants or their legal guardians prior to inclusion in the study.

RESULT

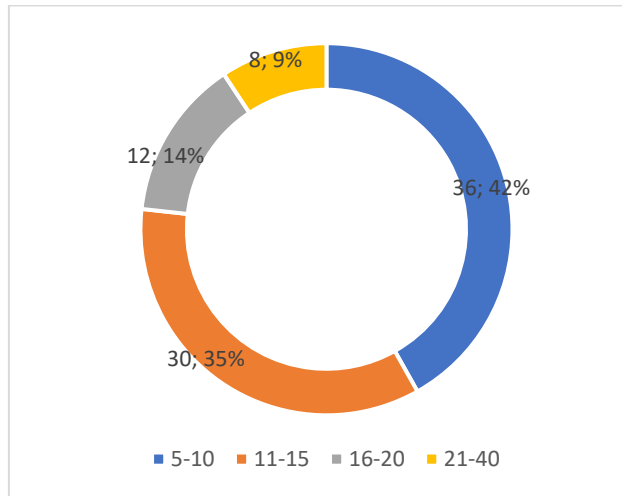


Figure 1 Pie chart shows the age distribution of participants (n=86).

The distribution of the measured variable among the studied patients (N=86) showed that the majority of patients were in the 5–10 range, comprising (42%) (Figure 1). The most common indication was phimosis, observed in 50 cases (58.1%) Table I.

Table I

Indications for circumcision (n=86).

Indication	n	%
Phimosis	50	58.1%
Recurrent Infections	24	27.9%
Parental Preference	12	14%

The procedure duration ranged from 12 to 25 minutes, with a mean duration of 18.7 ± 3.2 minutes. Estimated intraoperative blood loss was minimal, ranging from 2 to 10 mL, with a mean blood loss of 5.2 ± 2.1 mL (Table II).

Table II

Intraoperative parameters among study participants (n=86).

Parameter	Mean ±SD	Range
Procedure duration (min)	18.7± 3.2	12-25
Estimated blood loss (mL)	5.2 ± 2.1	2-10

On postoperative day 1, the mean pain score was 4.2 ± 1.1. By day 3, the score reduced to 2.8 ± 0.9. Further reduction was observed by day 7, where the mean VAS score decreased to 1.3 ± 0.6 (Table III).

Table III

Postoperative pain scores (VAS) (n=86).

Postoperative day	Mean score ± SD
Day 1	4.2 ± 1.1
Day 3	2.8 ± 0.9
Day 7	1.3 ± 0.6

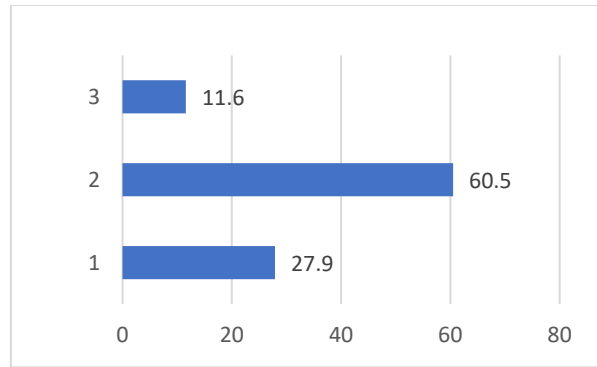


Figure 2 Bar chart showing wound healing timeline (n=86).

The majority of cases, 60.5%, fall within the 8–10 category. A smaller proportion, 27.9%, are within the ≤7 category, while the least proportion, 11.6%, are observed in the

11–14 category (Figure 2). The most common complication was edema, observed in 6 patients (7.0%). Superficial infection was noted in 4 patients (4.7%), while

delayed hemorrhage occurred in 2 patients (2.3%) (Table IV).

Table IV

Postoperative complications (n=86).

Complication	n	%
Edema	6	7.0%
Superficial infection	4	4.7%
Delayed hemorrhage	2	2.3%

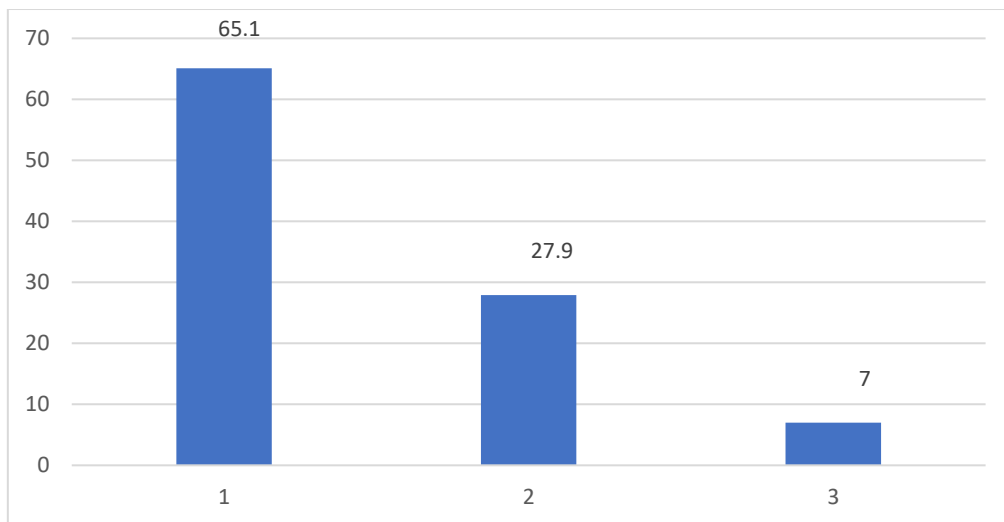


Figure 3 Column chart shows patient satisfaction outcomes (n=86).

The majority of cases showed an excellent outcome, accounting for 65.1% of participants. A further 27.9% had a good outcome, while only 7% demonstrated a fair outcome (Figure 3).

DISCUSSION

The findings of this prospective observational study demonstrate that circumcision using bipolar diathermy is a safe and effective procedure with favorable outcomes in terms of operative efficiency, postoperative recovery, and patient satisfaction. The mean operative time of 18.7 minutes compares favorably with previous studies using conventional techniques, which typically report 25–35

minutes [13]. This reduction in surgical time can be attributed to the precise hemostatic control offered by bipolar diathermy, minimizing the need for additional hemostatic measures during the procedure [14]. The minimal intraoperative blood loss observed in our study (mean 5.2 mL) supports the growing evidence that bipolar diathermy provides superior hemostasis compared to traditional scalpel techniques [15]. Only two cases (4.7%) required supplemental hemostasis, a rate significantly lower than the 15–20% reported in studies using conventional methods [16]. This advantage is particularly relevant in pediatric populations where blood volume is limited, and in resource-

constrained settings where blood products may not be readily available [17]. Postoperative pain management remains a critical aspect of circumcision care. Our results, showing a mean VAS score reduction from 4.2 on day 1 to 1.3 by day 7, are consistent with other studies evaluating electrosurgical techniques [18]. The thermal sealing effect of bipolar diathermy on nerve endings may contribute to this favorable pain profile, though further neurophysiological studies would be needed to confirm this mechanism [19]. The rapid decline in pain scores suggests that bipolar diathermy may facilitate earlier return to normal activities compared to conventional methods. Wound healing outcomes in our

series were excellent, with 88.4% of patients achieving complete epithelialization within 10 days. This healing timeline compares favorably with the 10–14-day range typically reported for conventional circumcision techniques [20]. The controlled thermal effect of bipolar diathermy appears to create a favorable wound environment while minimizing tissue necrosis, which may explain these results [21]. The low complication rate (13.9% overall, with most being minor) further supports the safety profile of this technique. The high patient satisfaction rate (93% reporting good to excellent outcomes) likely reflects the combination of these favorable operative and postoperative characteristics. Cosmetic outcomes were particularly praised by patients and parents, possibly due to the precise tissue cutting and minimal charring associated with modern bipolar devices [22]. These satisfaction metrics are important in elective procedures where patient expectations are high [23]. While our study demonstrates several advantages of bipolar diathermy circumcision, certain limitations must be acknowledged. The single-center design and relatively small sample size may limit generalizability. Additionally, the lack of a control group prevents direct comparison with other techniques. Future multicenter randomized controlled trials with larger cohorts would help validate these findings [24].

LIMITATIONS

This study has several limitations, including its single-center design and relatively small sample size of 86 patients. The lack of a control group prevents direct comparison with other techniques. Additionally, the short-term follow-up may not capture late complications. These factors could affect the generalizability of the findings.

CONCLUSION

The study demonstrates that circumcision using bipolar diathermy is a safe and efficient technique with minimal blood loss, reduced operative time, and favorable postoperative outcomes. High patient satisfaction and low complication rates suggest it is a viable option, particularly in resource-limited settings. Further randomized controlled trials with larger cohorts are warranted to validate these findings.

RECOMMENDATION

Based on the results, bipolar diathermy can be recommended for routine circumcision procedures. Hospitals should consider training surgeons in this technique. Future studies should include comparative groups and long-term follow-up to assess late outcomes and cost-effectiveness in different healthcare settings.

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