

Outcome of Continuous versus Interrupted Sutures for Circumcision

M M Masud Pervez^{*1}, Tamanna Narmeen², Amrita Lal Halder³, Mahjib Shahnaz⁴,
Saniath Ahmad Salehin⁵

Abstract

Introduction: Circumcision is the most common pediatric surgical procedure all over the world. Suturing techniques are of two ways and complications are minimum in both these procedure. But bleeding and infection are the major complications associated with interrupted sutured circumcision. Continuous sutures had better outcome and showed less wound dehiscence than interrupted sutures. Hence, continuous suturing techniques were explored to replace the interrupted absorbable sutures. This study was conducted to compare the outcome of continuous and interrupted absorbable suturing techniques. **Materials and Methods:** This prospective study was conducted at the department of pediatric surgery BIRDEM General Hospital and Khidma Hospital, Dhaka, Bangladesh, among 250 children undergoing circumcision between January 2023 and December 2023. Among them, 125 patients underwent circumcision with continuous absorbable suturing techniques (group I) and 125 patients with interrupted absorbable suturing technique (group II). Comparative outcome analysis of both the groups was done based upon the following parameters- bleeding, infection, surgical wound dehiscence, swelling in the penis, Visual Analog Score (VAS) for pain assessment and cosmesis. The comparison of quantitative variables between the groups was done using chi-square test. **Results:** The age was 6.4 ± 1.3 years in group I and 5.8 ± 1.4 years in group II. Religious region was the commonest indication for circumcision (72%). The average healing period was six days in group I and 8 days in group II. No major surgical complications were observed in both the groups. But fewer postoperative complications were encountered in group I with respect to group II. As wound infection (p -value=0.05) is more common in group II. Circumcision done in group I (very good: 90.4%) was cosmetically superior to the patients in group II (very good: 40.8%) in which sutured marks were usually observed ($p < 0.0001$). **Conclusion:** The present study demonstrated better postoperative outcomes, reduced surgical time, reduced suture material requirement and better cosmesis in circumcision using continuous absorbable suturing technique compared to the interrupted technique. Higher satisfaction levels were observed in the continuous suture technique.

Keywords: Circumcision; Continuous absorbable suture; complications; cosmesis.

Number of Tables: 04; Number of Figures: 02; Number of References: 25; Number of Correspondences: 03.

*1. Corresponding Author:

Dr. M M Masud Pervez

Associate Professor
Department of Pediatric Surgery
BIRDEM General Hospital & IMC
Dhaka, Bangladesh.
Email: shaheensb25@gmail.com
Mobile no: 01716-582294

2. Dr. Tamanna Narmeen

Associate Professor
Department of Surgery
BIRDEM General Hospital & IMC
Dhaka, Bangladesh.

3. Dr. Amrita Lal Halder

Associate Professor
Department of Pediatrics and Neonatology
BIRDEM General Hospital & IMC
Dhaka, Bangladesh.

4. Dr. Mahjib Shahnaz

Medical Officer
National Burn and Plastic Surgery Institute
Dhaka, Bangladesh.

5. Dr. Saniath Ahmad Salehin

Senior Medical Officer
Department of Pediatric Surgery
BIRDEM General Hospital & IMC
Dhaka, Bangladesh.

Introduction:

Circumcision is a surgical procedure mostly performed for religious and medical reasons. It involves the excision of the foreskin that covers the distal end of the penis¹ and around 1/6th of the world's male population is reported to have been circumcised². Although circumcision is not accepted by many people worldwide, there are several health benefits of it, such as reduction in the risk of acquiring HIV, urinary tract infections, herpes simplex, balanitis, phimosis, and penile cancer^{3,4}. Bleeding and infection are the major complications associated with circumcision. Hence, alternatively tissue adhesives and different suturing techniques are being explored to reduce the complications associated with traditional circumcision⁵. Interrupted absorbable sutures are commonly performed all over

the world to approximate the skin and the inner prepuce in circumcision⁶. Continuous sutures had better outcome and showed less wound dehiscence than interrupted sutures⁷. There is limited data available on outcome analysis of continuous versus interrupted suturing techniques for circumcision⁸. Therefore, there is a need to compare the outcomes of the continuous suturing technique with the traditional suturing technique for widespread adoption. Hence, the present prospective study was conducted with the aim to assess the outcomes and complications with continuous and interrupted absorbable suturing techniques in circumcision.

Materials and Methods:

This prospective study was conducted at the department of pediatric surgery BIRDEM General Hospital and Khidma Hospital, Dhaka, Bangladesh. Data were collected from January 2023 to December 2023. The written informed consent was obtained from every patient's guardian before enrollment in the study. Total 250 patients, aged between 3-12 years were enrolled in the study. Main reason for circumcision was religious issue. And other indications were phimosis, balanoposthitis, paraphimosis and urinary tract infection. Patients aged <3 years and >12 years, with bleeding diathesis, previous penile surgery were excluded from this study. Based on the suturing techniques, patients were divided into two groups; group I (n=125, patients who underwent circumcision followed by continuous absorbable suture technique by 6-0 vicryl) and group II (n=125, patients who underwent circumcision followed by interrupted absorbable suture technique by 6-0 vicryl). All the cases were operated by a single pediatric surgeon between January 2023 to December 2023 by sleeve method. The preoperative antibiotic regimen used was third generation cephalosporin (Ceftriaxone 50 mg/kg). All aseptic preparation and under general anesthesia caudal block was given. The skin was prepared using 10% povidone solution and draped sterile. Congenital preputial adhesions are divided and the glans is cleaned with antiseptic solution. The line of circumferential incision marked just proximal to the coronal sulcus, leaving a cuff of inner preputial skin below the glans. The incision is then made with a scalpel knife to sufficient depth to allow the penile skin to be retracted proximally. The foreskin is elevated by placing one artery forceps ventrally and one dorsally. A circumferential line of incision on the penile shaft skin is marked, allowing sufficient skin to cover the full length of penis without tension. The skin is incised along the line with a scalpel knife. The excess foreskin is removed by dividing the subcutaneous layer between the inner and outer skin layers with bipolar diathermy. The outer skin is retracted and any bleeding points are coagulated with bipolar diathermy. The wound is closed with continuous technique using 6-0 absorbable suture (vicryl) in group I and interrupted technique using 6-0 absorbable suture (vicryl) in group II. Postoperatively, a local antiseptic ointment Mupirocin 2% was applied over the surgical site thrice daily for 21 days. All the patients received a course of antibiotics

cefixime (8-10 mg/kg/day) for 7 days and analgesics for 3 days. Patients were allowed to bathe after the third postoperative day. All the patients were admitted for day care surgery and followed-up in the outpatient department in regular interval for three months. By comparing the two groups, outcomes were analyzed in view of postoperative pain, bleeding, infection, swelling, surgical wound dehiscence and cosmesis. Operative and recovery time were noted. Postoperative pain was evaluated by Visual Analogue Scale (VAS) at 4 hrs, 12 hrs, and 48 hrs, and graded as mild, moderate and severe according to the score^{9,10}. The postoperative pain was divided into mild (1-3), moderate (4-7) and severe (8-10). The wound was assessed for cosmesis using modified Hollander cosmesis scale^{11, 12} and assigned 0 or 1 (0 for yes, 1 for no) point each for the step off the borders, contour irregularities puckering, wound margin separation, wound edge inversion and excess inflammation. Overall appearance was graded as very good, good, acceptable and bad. Another assessment of cosmesis was carried out after two months by another surgeon, who had not performed the circumcision in this study. Data were processed manually and analyzed with the help of Statistical Package for Social Sciences (SPSS) software version 20.0. The collected data was analyzed using descriptive statistical tool. Continuous variables were expressed as mean and Standard Deviation (SD) whereas categorical variables were given as numbers (percentage). Quantitative data were analyzed by t-test and qualitative data was analyzed by chi-square test. The level of statistical significance was taken as p-value <0.05.

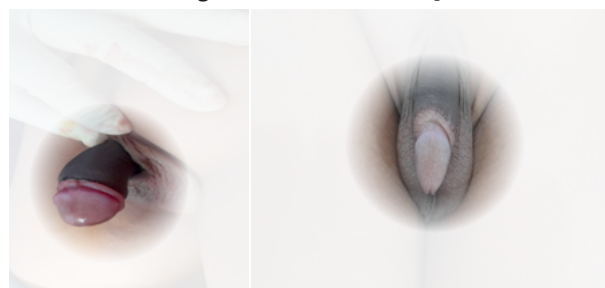


Fig-1: Images of continuous suture

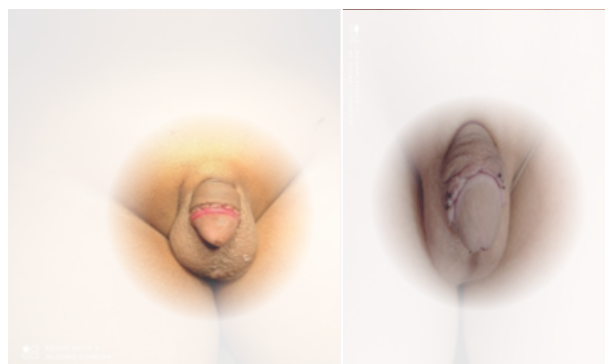


Fig-2: Images of interrupted suture

Results:

Among the 250 patients mean age was 6.4 ± 1.3 years in group I and 5.8 ± 1.4 years in group II. The average time

taken for the procedure was less in group I (14 minutes) than group II (20 minutes) and healing time was also less in group I (6 days) than group II (8 days). The most common indication for circumcision was religious region (72%) and others were phimosis, balanoposthitis, Urinary Tract Infections (UTIs), paraphimosis [Table I]. No major surgical complications were observed in both the groups.

Table I: Indication for circumcision.

Indication for circumcision	n (%)
Religious	180(72)
Phimosis	40(16)
Paraphimosis	3(1.2)
Balanoposthitis	15(6)
Urinary tract infections	12(4.8)

Incidence of bleeding was comparatively lower among patients from group I (2.4%) than group II (4 %). Wound infections were lesser among group I compared to group II. However, surgical site oedema was found to be higher in patients from group I (25.6%) compared to group II (14.4%). Minimal swelling was observed in group II in early postoperative period but later it was retroceded with oral analgesic and topical antiseptic cream. All patients with mild and moderate infections were treated with antiseptic cream and oral antibiotics and recovered well within 10-16 days.

Table II: Comparison of complications in continuous versus interrupted suture for children circumcision.

Postoperative complication	Group I (n=125), n (%)	Group II (n=125), n (%)	p-value
Bleeding	3(2.4)	5(4)	0.0876
Surgical site oedema	32(25.6)	18 (14.4)	0.01
Wound infection	1(0.8)	4(3.2)	0.05
Wound dehiscence	-	1(0.8)	-

Postoperative pain assessment was done using a visual analog pain scoring system. The visual analog score was mild pain in majority of the patients in group I than group II [Table III].

Table III: Visual analogue score of postoperative pain.

Postoperative pain	Mild (1-3) n (%)	Moderate (4-7) n (%)	Severe (8-10) n (%)
VAS after 4 hours			
Group I	104 (83.2)	19 (15.2)	2 (1.6)
Group II	95 (76)	24 (19.2)	6 (4.8)
p-value	0.2192	0.5062	0.1976
VAS after 12 hours			
Group I	113 (90.4)	12 (9.6)	-
Group II	105 (84)	18 (14.4)	2 (1.6)
p-value	0.1024	0.1916	-
VAS after 48 hours			
Group I	119 (95.2)	6 (4.8)	-
Group II	115 (92)	10 (8)	-
p-value	0.2541	0.3412	-

Circumcision done in group I (very good: 90.4%) was cosmetically superior to the patients in group II (very good: 40.8%) in which sutured marks were usually observed ($p < 0.0001$). Higher satisfaction levels were observed in the continuous suture technique [Table IV].

Table IV: Cosmesis score in continuous and interrupted absorbable sutures after circumcision.

Cosmesis score	Group I (n=125), n (%)	Group II (n=125), n (%)	p-value
Very good	113 (90.4)	51(40.8)	<0.0001
Good	8 (6.4)	63 (50.4)	<0.0001
Acceptable	4 (3.2)	10 (8)	0.0504
Bad	-	1 (0.8)	-

Discussion:

The present study implies a shorter operative time with less postoperative pain, less healing period and better cosmesis in continuous absorbable suturing technique as compared to interrupted absorbable suturing technique. Religious region is the most common indication for circumcision followed by phimosis, balanoposthitis, UTIs, and paraphimosis. A study reported by Weiss HA et al., the most common indications for circumcision are phimosis, balanoposthitis, recurrent balanoposthitis, Balanitis Xerotica Obliterans, recurrent UTIs and religious¹³. Extensive literature showed that data comparing the continuous and interrupted technique using absorbable suture in terms of clinical outcomes, complications and cosmesis are scarce^{8,14}. Studies have reported the use of these techniques in circumcision and also in other conditions such as obstetrics, surgery of abdomen or groin and mass closure of transverse incisions in paediatrics^{15,16,17}. Dorsal slit and sleeve method are the two common techniques in circumcision. Guillotine method was performed in pediatric populations with surgical equipments including Gomco, Mogen, Plastic Bell, Tara Ring and Shang clamps used for better results¹⁹. The sleeve method was used in the present study groups with the only difference between the two groups being the use of continuous absorbable suturing technique vs. interrupted absorbable suture technique. In the present study, the average healing period was faster in patients with continuous technique than in sutured group patients (6 vs. 8 days). Literature reports that the frequency of complications associated with circumcision increases with the age of the patient²⁰. Early complications of circumcision include bleeding, haematoma, infection, lacerations of the penis, injury to the glans penis, meatal stenosis, urinary retention, and buried penis¹³. A delayed complication includes suture granuloma, foreign body reaction, and disfiguration. The common surgical complications of circumcision observed in the present study were oedema, bleeding, and wound infection. These complications were greater in group II than in group I. Ravindraanandan M et al., did not report any major postoperative complications with continuous suturing circumcision¹⁸. However, a clinical trial in paediatrics,

reported less wound dehiscence rate with interrupted absorbable suture than the mass closure of transverse incision in children¹⁷. Thermocautery-assisted circumcision has become a practical and rapid method for circumcision in regions where circumcision is a common procedure with minimal complications²². The cosmetic result of a classic circumcision is not easily acceptable in a community. Minimal excision of the prepuceal skin which includes the fibrous tissue in order to achieve a redundant outer layer of the skin and reapproximation of the traumatic edges with 5-0 absorbable interrupted sutures give more cosmetic than the classic circumcision²³. The use of interrupted sutures with octyl cyanoacrylate offers several advantages of faster skin closure and the application of octyl cyanoacrylate is less painful and less invasive than standard suturing techniques. Moreover, it yielded comparable cosmetic results to standard suturing techniques²⁷. Patients who underwent circumcision without sutures had better cosmesis postoperatively and during follow-up periods⁸. Similarly, in the present study, higher satisfaction levels were observed in continuous suture technique. Researchers have been suggesting that continuous repair technique is better than interrupted suture methods in terms of perineal pain²⁴. Previous comparative study comparing the postoperative pain scores between continuous and interrupted circumcision technique. The results showed that mild pain was more common in interrupted suture technique as compared to continuous suture technique with no need for analgesics in any of this patients⁸. Similarly, in the present study majority of patients from continuous suture technique group had less pain as compared to interrupted suturing technique group. The stitch marks were more in patients with continuous suture technique groups as compared to interrupted absorbable sutures. This method helps to get rid of the use of traditional dressings which are incorporated within sutures, and hence cause pain during their removal. Absence of interrupted sutures gives better cosmetic results. Limitation of this study was the small sample size in both groups, therefore further studies with larger sample sizes are required to support these findings.

Conclusions:

It is obvious that continuous absorbable suturing technique was the better option than interrupted technique for circumcision as this procedure demonstrated better postoperative outcomes, reduced surgical time, reduced suture material requirement and better cosmesis. However, multicenter studies are needed to conclude which suturing technique is better.

Conflict of Interest: None.

Acknowledgement:

The authors are grateful to all doctors and staffs of the Department of Pediatric surgery, BIRDEM General Hospital, Dhaka for their cooperation during study period.

References:

1. Ince B, Dadaci M, Altuntas Z, Bilgen F. Rarely seen complications of circumcision, and their management. *Turk J Urol*. 2016;42:12-15.
<https://doi.org/10.5152/tud.2016.78972>
2. Waszak SJ. The historic significance of circumcision. *ObstetGynaecol*. 1978; 51:499-501.
<https://doi.org/10.1097/00006250-197804000-00023>
3. Reed JB, Njeuhmeli E, Thomas AG, Bacon MC, Bailey R, Cherutich P, et al. Voluntary medical male circumcision: an HIV prevention priority for PEPFAR. *J Acquir Immune Defic Syndr*. 2012;60Suppl 3:S88-95.
<https://doi.org/10.1097/QAI.0b013e31825cac4e>
4. Eisenberg ML, Galusha D, Kennedy WA, Cullen MR. The Relationship between Neonatal Circumcision, Urinary Tract Infection, and Health. *World J Mens Health*. 2018;36:176-182.
<https://doi.org/10.5534/wjmh.180006>
5. Tiwari P, Tiwari A, Kumar S, Patil R, Goel A, Sharma P, et al. Sutureless [4] circumcision-An Indian experience. *Indian J Urol*. 2011;27(4):475-78.
<https://doi.org/10.4103/0970-1591.91435>
6. Kettle C, Hills RK, Ismail KM. Continuous versus interrupted sutures for [6] repair of episiotomy or second degree tears. *Cochrane Database Syst Rev*. 2007;4:CD000947.
<https://doi.org/10.1002/14651858.CD000947.pub2>
7. Gurusamy KS, Toon CD, Allen VB, Davidson BR. Continuous versus interrupted [11] skin sutures for non-obstetric surgery. *Cochrane Database Syst Rev*. 2014;14(2):CD010365.
<https://doi.org/10.1002/14651858.CD010365.pub2>
8. Raut A. Sutureless versus sutured circumcision: A comparative study. *Urol Ann*. [12] 2019;11(1):87-90.
https://doi.org/10.4103/UA.UA_12_18
9. Haefeli M, Elfering A. Pain assessment. *Eur Spine J*. 2006;15(1):S17-S24.[14]
<https://doi.org/10.1007/s00586-005-1044-x>
10. Aitken RC. Measurement of feelings using visual analogue scales. *Proc R Soc [15] Med*. 1969;62(10):989-93.
<https://doi.org/10.1177/003591576906201005>
11. Hollander JE, Singer AJ, Valentine S, Henry MC. Wound registry: Development [16] and validation. *Ann Emerg Med*. 1995;25(5):675-85.
[https://doi.org/10.1016/S0196-0644\(95\)70183-4](https://doi.org/10.1016/S0196-0644(95)70183-4)
12. Quinn JV, Drzewiecki AE, Stiell IG, Elmslie TJ. Appearance scales to [17] measure cosmetic outcomes of healed lacerations. *Am J Emerg Med*. 1995;13(2):229-31.
[https://doi.org/10.1016/0735-6757\(95\)90100-0](https://doi.org/10.1016/0735-6757(95)90100-0)

13. Weiss HA, Larke N, Halperin D, Schenker I. Complications of circumcision [18] in male neonates, infants and children: A systematic review. *BMC Urol.* 2010;10:02.
<https://doi.org/10.1186/1471-2490-10-2>
14. Bawazir OA, BanajaAM. Sutureless versus interrupted sutures techniques for [19] neonatal circumcision; a randomized clinical trial. *J Pediatr Urol.* 2020;16(4):493.e1-493.e6.
<https://doi.org/10.1016/j.jpuro.2020.06.025>
15. Maged AM, Moheesen MN, Elhalwagy A, Abdelaal H, Almohamady M, Abdellatif [20] AA, et al. Subcuticular interrupted versus continuous skin suturing in elective cesarean section in obese women: A randomized controlled trial. *J Matern Fetal Neonatal Med.* 2019;32(24):4114-19.
<https://doi.org/10.1080/14767058.2018.1481950>
16. Gurusamy KS, Toon CD, Allen VB, Davidson BR. Continuous versus interrupted [21] skin sutures for non-obstetric surgery. *Cochrane Database Syst Rev.* 2014;2:CD010365.
<https://doi.org/10.1002/14651858.CD010365.pub2>
17. Khan S, Saleem M, Talat N. Wound dehiscence with continuous [22] versus interrupted mass closure of transverse incisions in children with absorbable suture: A randomized controlled trial. *World JnlPed Surgery.* 2019;2(2):e000016.
<https://doi.org/10.1136/wjps-2018-000016>
18. Ravindraanandan M, Fernando H, Aslam S. Continuous suturing as a wound closure technique for circumcisions. *J Clin Urol.* 2019;12(6):470-73.
<https://doi.org/10.1177/2051415819849319>
19. Abdulwahab-Ahmed A, Mungadi IA. Techniques of male circumcision. *J Surg [24] Tech Case Rep.* 2013;5(1):01-07.
<https://doi.org/10.4103/2006-8808.118588>
20. Krill AJ, Palmer LS, Palmer JS. Complications of circumcision. *Sci World J.* [25] 2011;11:2458-68.
<https://doi.org/10.1100/2011/373829>
21. Lane V, Vajda P, Subramaniam R. Paediatricsutureless circumcision: A systematic [26] literature review. *PediatrSurg Int.* 2010;26(2):141-44.
<https://doi.org/10.1007/s00383-009-2475-y>
22. Ölçücü MT, Teke K. Evaluation of short-term postoperative complications [27] according to the Clavien-Dindo classification system in Thermocautery-assisted Circumcision Cases. *J Urol Surg.* 2020;7(3):218-26.
<https://doi.org/10.4274/jus.galenos.2020.3266>
23. Tsikopoulos G, Asimakidou M, Smaropoulos E, Farmakis K, Klokkaris A. [28] Circumcision-A new approach for a different cosmetic result. *Hippokratia.* 2014;18(2):116-19.
24. Van Haute C, Tailly T, Klockaerts K, Ringoir Y. Sutureless circumcision using [31] 2-Octyl cyanoacrylate results in more rapid and less painful procedures with excellent cosmetic satisfaction. *Journal of Pediatric Urology.* 2015;11(3):147.e1-e5.
<https://doi.org/10.1016/j.jpuro.2015.02.013>
25. Morano S, Mistrangelo E, Pastorino D, Lijoi D, Costantini S, Ragni N, et al. A [32] randomized comparison of suturing techniques for episiotomy and laceration repair after spontaneous vaginal birth. *J Minim Invasive Gynaecol.* 2006;(5):457-62.
<https://doi.org/10.1016/j.jmig.2006.06.006>