



ORIGINAL RESEARCH PAPER

A PROSPECTIVE RANDOMIZED CONTROLLED STUDY OF COMPARISON OF COMPLICATIONS BETWEEN SLEEVE TECHNIQUE VERSUS CONVENTIONAL DORSAL SLIT TECHNIQUE FOR CIRCUMCISION IN CHILDREN

General Surgery

KEY WORDS: Circumcision, Children, Sleeve Technique, Dorsal Slit Technique, Postoperative Pain, Complications

Dr Hamikchandra Patel*

Senior Resident, Dept Of Surgery, Govt Medical College, Vadodara.
*Corresponding Author

Dr Ronak Kadia

Senior Resident, Dept Of Surgery, Govt Medical College, Vadodara.

ABSTRACT

BACKGROUND: There are several methods of circumcision with its own merits and demerits. Dorsal slit technique is practised all over the world most commonly. The sleeve technique introduced later on which helps in preventing common complications of open technique. **AIM:** To compare complications of sleeve technique versus conventional dorsal slit technique for circumcision in children. **MATERIAL AND METHODS:** Total 64 patients were studied by doing comparison of complications between sleeve technique and dorsal slit technique of circumcision allocated randomly. Post-operative pain was evaluated by Visual Analogue Scale (VAS) at 1, 3, 6 and 24 hour. Blood loss, healing time were assessed. Patient was examined on follow up at 1, 2 and 6 week. **RESULTS:** For Dorsal slit technique, the mean of gauze pieces used was 2.12 pieces and for sleeve technique, the mean of gauze pieces used was 1.71 pieces. For Dorsal slit technique, the mean VAS score was 2.90 and for sleeve technique, the mean VAS score was 2.40. For dorsal slit technique, the mean of healing time was 16 days and for sleeve technique, the mean of healing time was 15.43 days. Post-operatively, 14 and 9 patients of dorsal slit technique and sleeve technique had edema at local site, respectively. **CONCLUSION:** Sleeve technique produces a good postoperative result, less bleeding and less postoperative pain as compared to dorsal slit technique. Hence, sleeve technique is recommended for circumcision as compared to dorsal slit technique.

INTRODUCTION

Circumcision is the surgical removal of the prepuceal foreskin either in whole or in part. Circumcision is a common surgical operation in pediatric surgical practice.^{1,2} The most common indications are religious reasons, but it is also used for medical reasons. There are several methods and each of the methods has its merits and demerits.^{3,4} Dorsal slit technique is practised all over the world most commonly. The sleeve technique introduced later on which helps in preventing common complications of open technique for male circumcision. It is safe, mostly complication free and gives good cosmetic outcome. This prospective randomized study was conducted to compare sleeve technique versus conventional dorsal slit technique for circumcision in children.

MATERIAL AND METHODS

Type of trial-Prospective Randomized clinical trial.

Study design

A prospective randomized trial requiring 32 patients in group was instituted after approval of the local ethics committee, to compare the complications of Sleeve technique verses conventional dorsal slit technique for circumcision in children.

Sample size

According to reference study, patient of sleeve technique has 76% better post-operative outcome, but dorsal slit technique has not that much. With these assumptions, a study with a significance level (α) of 0.05 and a power (β) of 0.2 would require 64 patients (32 in each group). In this study, N Master 2.0 software was used and Mann Whitney U Test was applied.

Inclusion criteria

Age group: birth up to 18 years
Patients with intact prepuce requiring circumcision for religious or cultural reasons.
Medical indications of circumcision. (e.g., phimosis)

Exclusion criteria

Hypospadias
Bleeding Disorders

Method of randomization

Sealed envelopes containing a number indicative of the group assignment (even number= conventional dorsal slit technique, uneven =sleeve technique) was used to randomly allocate patients into two groups. At 1, 2 and 6 weeks of follow-up, an examiner, unaware of the treatment assignments, evaluated the outcome clinically and by use of a visual analogue pain score.

Methodology

Pre-operative preparation

Routine blood investigations showing below were done and child was prepared for general anaesthesia, combined with field block of the penis using plain lignocaine (2%). The child was positioned supine with legs little apart and cautery plate placed under the buttocks. The penis and the adjoining area was prepared with povidone iodine and draped, with a single long sterile sheet with central whole.

Operative steps

Narrow prepuce opening identified and dilated with 2% lignocaine jelly using the tip of a curved mosquito artery forcep. Then the prepuce was everted using gentle force, separating its adhesions from glans up to the corona glandis. All the smegmal deposits are cleaned using normal saline soaked wet gauze.

For sleeve technique

A circumferential incision was made on the inner prepuceal skin leaving a sleeve of 0.25-0.5cm proximal to corona. Prepuce was returned over the glans penis. With slight traction on the prepuce, another circumferential incision was made over penile skin just proximal to corona. A longitudinal cut was made between the two circumferential cuts and strip of skin was removed. Any bleeding during the procedure was stopped with the use of bipolar diathermy. Both Edges were pulled together and stitches taken with plain catgut 5-0 on cutting needle. The wound was first covered with Jelonet (a gauze lubricated generously with petroleum jelly) and finally by a clean gauze on top of it.

For dorsal slit technique

Two artery forceps were applied on 11 o'clock and 1 o'clock

positions of prepuce skin. Prepuce skin was crushed at 12 o'clock position. Dorsal slit was made at 12 o'clock position, extending just proximal to corona. Slit was extended downwards and laterally on either side till frenulum. Frenular artery was tied with figure of 8 stitch.

Edges were pulled together and stitches taken with plain catgut 5-0 on cutting needle. The wound was first covered with Jelonet (a gauze lubricated generously with petroleum jelly) and finally by a clean gauze on top of it.

Post-operative care

Depending upon a randomization, immediate post operatively during hospital stay, bleeding, urinary retention and edema at local site was evaluated. Diclofenac suppository was placed in all patients at the procedure. Dressing was removed after 24 hours and neomycin ointment applied to wound daily for one week. Oral cefadroxyl was used for 5 days. Late complications like wound dehiscence and infection were assessed. Postoperative pain was evaluated by Visual Analogue Scale (VAS) at 1, 3, 6 and 24 hour. Operative time was a time from painting/draping to application of dressing. Blood loss was measured from number of 2×2 inches gauze pieces soaked. Healing time was disappearance of all stitches with no ulcer at local site. Patient was examined on follow up at 1, 2 and 6 week.

Statistical analysis

Microsoft excel (2010) programme was used for data entry. The quantitative data were calculated by Mean and Standard deviation. It was analysed by independent t-test. The qualitative data were calculated by Proportion and analysed by Chi-square test. Medcalc software was used for data analysis.

RESULTS

Patients were having an average age (Mean ± SD) of 6±4.28 years with range from 7 months- 17 years of age in dorsal slit technique group, whereas those in sleeve technique group had an average age of 4.77 ± 3.42 years with range from 1 months- 12 years of age.

Table 1: Age distribution in both groups

Age	Dorsal Slit Technique		Sleeve technique	
	N=32	%	N=32	%
0-2	10	31.25	11	34.37
3-6	9	28.125	11	34.37
7-10	7	21.87	7	21.87
11-14	3	9.37	3	9.37
15-17	3	9.37	0	0

Blood loss was measured by numbers of 2×2 inches gauze pieces soaked intraoperatively. For Dorsal slit technique, the mean of gauze pieces used was 2.12 pieces and for sleeve technique, the mean of gauze pieces used was 1.71 pieces. Post-operative pain was assessed by VAS (Visual Analogue Scale). For Dorsal slit technique, the mean VAS score was 2.90 and for sleeve technique, the mean VAS score was 2.40. Healing time was disappearance of all stitches with no ulcer at local site. For dorsal slit technique, the mean of healing time was 16 days and for sleeve technique, the mean of healing time was 15.43 days.

Table 2: Operative Characteristics comparison between dorsal slit and sleeve technique

Operative Characteristics	Dorsal Slit	Sleeve technique
Mean blood loss (pieces)	2.12	1.71
Mean healing time	16	15.43
Mean VAS score	2.9	2.4
Local edema	14	9

Post-operatively, after 24-hour duration, 14 patients of dorsal

slit technique had edema at local site and 9 patients of sleeve technique had edema at local site. Edema was found at suture site and proximal shaft region in both group. No other early complications like bleeding, urinary retention and late complications like wound dehiscence, infection were identified. At the follow up, no complication was observed at 1st, 2nd and 6th week observation.



Figure 1: After 24 Hours



Figure 2: At 1 week



Figure 3: At 2 week



Figure 4: At 6 weeks

DISCUSSION

In our study, maximum number of patients were between 0 to 2 years of age group with an average age of 6±4.28 years. In Karakoyunlu et al study, patients were having an average age of 5.8±1.9 years in dorsal slit technique group, whereas those in sleeve technique group had an average age of 6.3±2.0

years.⁸ In Çelikkaya et al study, patients were having an average age 3.09 years (2 months - 12 years) in dorsal slit technique group, whereas those in sleeve technique group had an average age of 3.24 (1 month - 11 years).⁸ But according to study by Altokhais TI, monopolar diathermy should be avoided for circumcisions. Bipolar diathermy is safe if performed under the following conditions: small electrode tips, minimum energy generator settings, and minimum application time to the tissues.⁹ During circumcision, the frenular artery can be injured, potentially causing ischemia in the distal urethra and glans penis. Due to this ischemia, pain and meatal stenosis can occur. Dorsal slit is commonly used method of circumcision; during this procedure, the frenulum frequently cannot be preserved at the 6-o'clock position of the mucosa, because of traction applied to the skin and mucosa. As a result, the frenular artery is injured. In contrast, the sleeve technique protects the frenulum and the anatomic structures of the glans. In the sleeve technique, providing hemostasis and preventing partial ischemia by protecting the frenular artery reduces postoperative pain and complications. In Persad et al study suggested that the preservation of the frenular artery during circumcision would reduce ischemia and meatal stenosis.¹⁰ This study demonstrated that the sleeve technique, which preserved the frenular artery, caused less bleeding, reduced electrocautery use and less ischemia than the dorsal slit technique. In Hughes et al study, it concluded that a completely soaked 2x2 inches gauze has an average carrying capacity of 3.25 cc±1.25 cc. In Miao et al study, the intraoperative blood loss (1.51±0.72) ml in sleeve technique group was significantly lower than (9.52±3.29) ml in dorsal slit technique group (p<0.05).¹¹ In Huo et al study, the mean intraoperative blood loss 2.3±1.3 ml in sleeve technique group was significantly lower than 15.6±2.9 ml in dorsal slit technique group.¹² In Li et al study, the mean intraoperative blood loss 1.07±1.29 ml in sleeve technique group was significantly lower than 8.72±2.15 ml in dorsal slit technique group.¹³ In Wang et al study, the mean intraoperative blood loss 3.5±2.7 ml in sleeve technique group was significantly lower than 7.6±4.5 ml in dorsal slit technique group.¹⁴ In this study use of bipolar electrocautery was done in sleeve technique of circumcision, whereas it was not used in dorsal slit technique of circumcision. In the measurement of intraoperative bleeding, dorsal slit technique has mean 2.12 gauze piece usage and sleeve technique has mean 1.71 gauze piece usage, which shows a clinically significant difference with the p value of 0.008. (p<0.05) Thus our study shows significant haemostasis achieved intraoperatively in sleeve technique of circumcision. In this study, postoperative operative pain was assessed by VAS score. Post-operative analgesia is given same in both group. In the sleeve technique, the skin and mucosa are incised separately; during this incision, the frenular artery is spared by an incision approximately 0.5 cm away from the frenulum, which reduces ischemic pain. In the Karakoyunlu et al study, dorsal slit technique group had achieved higher postoperative pain score than sleeve technique of circumcision.⁵ In Jin et al study, the intraoperative and postoperative pain scores were significantly lower in the sleeve technique group than in the dorsal slit technique group (0.8±0.5 vs 2.4±0.8 and 4.0±0.9 vs 5.8±1.0, respectively; p<0.01 for both).¹⁵ In Li et al study, the 24-hour postoperative pain score was remarkably higher in sleeve technique 1.84±1.02 than in dorsal slit technique 4.99±1.36.¹³ In this study, for the measurement of postoperative pain, dorsal slit technique has mean VAS score 2.90 and sleeve technique has mean VAS score 2.40, which shows a clinically significant difference with the p value of 0.04. (p<0.05). The sleeve technique effectively reduces early postoperative pain after circumcision, provided that adequate postoperative analgesia has been achieved. In the measurement of postoperative complications, dorsal slit

technique has 14 patients having edema and sleeve technique has 9 patients having edema, which shows no clinically significant difference with the p value of 0.107. (p>0.05). In this study, no other early complications like bleeding, urinary retention and late complications like wound dehiscence, infection were identified. In Çelikkaya et al study, early complications like bleeding was seen in one patient (0.6%) in sleeve technique of circumcision group.⁸ They believed that the bleeding was due to lack of attention provided at home rather than the circumcision technique. In Miao et al study, there was no significant differences between dorsal slit and sleeve technique in postoperative complications (p>0.05).¹¹ In Jin et al study, postoperative complications were 2.7% in sleeve technique group and 7.8% in dorsal slit technique which included complications like bleeding, severe edema, wound dehiscence, infection.¹⁵ In this study, postoperative findings were measured in both the group. In dorsal slit technique, the healing time was 16 days. In sleeve technique, the mean healing time was 15.43 days. These showed a no clinical significance with p value 0.249. Thus both the surgical techniques took almost similar healing time as per this study. In Jin et al study, for Dorsal slit technique, the mean of Healing time is 14.4±2.1 days and for sleeve technique, the mean of Healing time is 12.5±1.8 days.¹⁵ In Huo et al study, for Dorsal slit technique, the mean of Healing time is 16.3±3.1 days and for sleeve technique, the mean of Healing time is 12.0±2.9 days.¹² In Li et al study, for Dorsal slit technique, the mean of Healing time is 17.48±3.49 days and for sleeve technique, the mean of Healing time is 13.99±9.06 days.¹³ Thus in this study, sleeve technique of circumcision had a significant advantage of less bleeding and less postoperative pain in compare to dorsal slit technique of circumcision. Sleeve technique had shown better postoperative outcome with less complication than dorsal slit technique.

Limitations of the study

The limitation of this study was a single institutional study. So, the multi institutional study can provide proper outcome. Sleeve technique of circumcision has a learning curve. It is fraught with more complications in hands of non-experts. The ultimate aim of any method of circumcision is that it should be safe and complication free. Therefore it should be done by trained persons only.

CONCLUSION

Sleeve technique for male circumcision emphasizes on meticulous hemostasis, including that of Frenular Artery. It avoids certain conventional steps of Dorsal slit technique like figure of 8 stitch for ligating frenular artery. Injury to glans penis and urethra are almost preventable. Overall it produces a good postoperative cosmetic result, less bleeding and less postoperative pain as compared to dorsal slit technique. Hence, overall less complication rate as compare to dorsal slit technique so sleeve technique is recommended for circumcision as compared to dorsal slit technique.

Source of Support: None Declared

Conflict of Interest: None Declared

REFERENCES

- Hyns CF, Kriegler JN. Circumcision. In: Schill WB, Comhaire FR, Hargreave TB, editors. *Andrology for the clinician*. Springer-Verlag: Berlin; 2006. pp. 203-12.
- Task force on circumcision. Male circumcision. *Pediatrics*. 2012;130:e756-85.
- Holman J, Lewis E, Ringlar R. Neonatal circumcision techniques. *Am Fam Physician*. 1995;52:511-8.
- Harahap M, Siregar AS. Circumcision: A review and a new technique. *J Dermatol Surg Oncol* 1988;14:383-6.
- Karakoyunlu N, Polat R, Aydin GB, Ergil J, Akkaya T, Ersoy H. Effect of two surgical circumcision procedures on postoperative pain: A prospective, randomized, double-blind study. *Journal of Pediatric Urology Company*. 2015;1477-5131.
- Çelikkaya ME, Atıcı A, Cigdem El, Akçora B. Comparison of Sleeve Surgery and Guillotine Technique in Circumcision. *Uludağ Medical Journal* 2018;4(3):148-151.

7. Buwembo DR, Musoke R, Kigozi G, Ssempijja V, Serwadda D, et al. Evaluation of the safety and efficiency of the dorsal slit and sleeve methods of male circumcision provided by physicians and clinical officers in Rakai, Uganda. *BJU Int.* 2012 Jan;109(1):104-8.
8. Decastro B, Gurski J, Peterson A. Adult template circumcision: a prospective, randomized, patient-blinded, comparative study evaluating the safety and efficacy of a novel circumcision device. *Urology.* 2010 Oct;76(4):810-4.
9. Altokhais TI. Electrosurgery use in circumcision in children: Is it safe?. *Urology Annals* 2017 Jan-Mar;9(1):1-3.
10. Persad R, Sharma S, McTavish J, Imber C, Mouriquand PDE. Clinical presentation and pathophysiology of meatal stenosis following circumcision. *Br J Urol* 1995;75:91.
11. Miao HD, Lu JW, Lu FN, Shen F, Yuan XL, Liu HY. Clinical effects of the circumcision stapler, foreskin cerclage, and traditional circumcision: A comparative study. *Zhonghua Nan Ke Xue.* 2015 Apr;21(4):334-7.
12. Huo ZC, Liu G, Wang W, He DG, Yu H, et al. Clinical effect of circumcision stapler in the treatment of phimosis and redundant prepuce. *Zhonghua Nan Ke Xue.* 2015 Apr;21(4):330-3.
13. Li S, Zhang L, Wang DW, Yang S, Mu HQ, et al. Clinical application of the disposable circumcision suture device in male circumcision. *Zhonghua Nan Ke Xue.* 2014 Sep;20(9):816-9.
14. Wang J, Zhou Y, Xia S, Zhu Z, Jia L, et al. Safety and efficacy of a novel disposable circumcision device: A pilot randomized controlled clinical trial at 2 centers. *Med Sci Monit.* 2014;20:454-62.
15. Jin XD, Lu JJ, Liu WH, Zhou J, Yu RK, et al. Adult male circumcision with a circular stapler versus conventional circumcision: A prospective randomized clinical trial. *Braz J Med Biol Res.* 2015 Jun;48(6):577-82.