นิพนธ์ต้นฉบับ

การผ่าตัดและผลการผ่าตัดขริบหนังหุ้มปลายองคชาต ด้วยเทคนิค outside-in สำหรับเด็ก

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บทคัดย่อ

วัตถุประสงค์: การขริบหนังหุ้มปลายองคชาต ทำโดยแพทย์หลายสาขาและหลายเทคนิค ผู้วิจัยมีความประสงค์จะแสดงเทคนิคและผลการผ่าตัดขริบหนังหุ้มปลายองคชาต วิธีใหม่ที่เรียกว่า outside-in (OSI) ในผู้ป่วยเด็ก

ผู้ป่วยและวิธีการศึกษา: เป็นการศึกษาแบบไปข้างหน้า (prospective descriptive) โดยมีผู้ป่วย จำนวน 57 รายได้รับการผ่าตัดขริบหนังหุ้มปลายองคชาตด้วยเทคนิค OSI ในช่วงระหว่างเดือนกรกฎาคม พ.ศ. 2556 และเดือนมิถุนายน พ.ศ. 2558 โดยหลังการผ่าตัดผู้ป่วยจะได้รับการตรวจติดตามที่ 1 และ 4 สัปดาห์เพื่อทำการประเมินทางคลินิก

ผลการศึกษา: อายุเฉลี่ยของผู้ป่วยเท่ากับ 5.2 ปี (พิสัย 0.1-14.1 ปี) เวลาเฉลี่ยการผ่าตัดเท่ากับ 31 นาที (พิสัย 14 -45 นาที) ไม่พบภาวะแทรกซ้อนที่สำคัญหลังผ่าตัด ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติของระยะเวลาในการผ่าตัดเมื่อเทียบระหว่างชนิดของการผ่าตัดหรือผู้ผ่าตัด ผู้ปกครองเกือบทั้งหมดมีความพึงพอใจต่อผลการผ่าตัดและมีความต้องการที่จะแนะนำเทคนิคนี้แก่ผู้อื่น ไม่มีผู้ป่วยรายใดต้องการการผ่าตัดขริบหนังหุ้มปลายองคชาตซ้ำ

สรุป: การขริบหนังหุ้มปลายองคชาตแบบ OSI เป็นเทคนิคที่ง่าย ปลอดภัย มีประสิทธิภาพ และได้รับความพึงพอใจสูงจากผู้ป่วยและผู้ปกครอง

คำสำคัญ: outside-in, การขริบหนังหุ้มปลายองคชาต, เด็ก, เทคนิคการผ่าตัด, ผลการรักษา

Original article

Outside-in circumcision for children: Surgical technique and treatment outcomes

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Abstract

Objective: Circumcision is a procedure performed by various specialists using a number of techniques. We aimed to describe a new technique called outside-in (OSI) circumcision and the clinical outcomes in children.

Material and methods: The research design was prospective, descriptive study. Fifty-seven patients underwent OSI circumcision between July 2013 and June 2015. The patients were followed up at 1 and 4 weeks for clinical evaluation.

Results: The average age was 5.2 years old (range: 0.1-14.1). The average operative time was 31 minutes (range: 15-45). There was no major complication. There were no statically significant differences in operative time in terms of types of phimosis and surgeons. Most parents were very satisfied with the operative outcomes and they wanted to recommend this technique to others. None of the parents requested the circumcision revised.

Conclusion: OSI circumcision is simple, safe, effective, and has high satisfaction among patients and parents.

Keywords: outside-in, circumcision, children, technique, outcomes

Introduction

Around one-sixth of the world's male population is reported to have been circumcised[1]. The risk of complications after circumcision is 0.2-5%[2,7]. Complications can occur immediately or months to years after a circumcision. The most common complication is bleeding, which occurs in 0.1% and is more common in older children. Circumcision is a procedure performed by various specialists[3] using a number of techniques, including conventional dissection surgery or with devices such as a Plastibell[4,5] and Gomco clamp[2], there can also be differences in suture material[6]. The sleeve incision technique is used in adults and children older than infants. This technique can control bleeding, but the skin has to be stretched while removing the collar, which may require more manipulation of the glans penis.

An alternative technique is the freehand technique, which may be used in small children and in those whose prepuce cannot be retracted easily, however, in this method it is hard to keep equal tension when holding the prepuce to avoid spiraling the cut. Some differences in child and adult circumcision, children have smaller penises that are more difficult to handle and children are less cooperative and more difficult to manage post-operatively than adults.

Complication from circumcision is a common and avoidable problem, some examples are penile adhesions, skin bridges, meatal stenosis, redundant foreskin, recurrent phimosis, buried penis, and penile rotation[7]. Redundant foreskin has been reported to be the most common cause of revision of circumcision[8]. The authors have modified the freehand technique and the sleeve technique into the outside-in (OSI) circumcision for children. When using this modified technique (OSI) the surgeon require less manipulation of the glans penis, can perform the procedure on a small glans penis or a hard to retract prepuce with good cosmetic function and better control over bleeding.

The primary objective of the study was to reveal and evaluate the OSI circumcision technique for children using intra and post-operative data such as operative time, estimated blood loss, complications, pain score, cosmetic, and satisfaction of patient and parent.

The secondary objective of the study was to identify the differences in operative time, comparing the types of prepuce[9] and surgeons (urological residents and staff).

Material and methods

The research design was prospective, descriptive study. The data of newborn to 15-year-old boys with an indication for circumcision, including persistent primary phimosis, genitourinary anomaly prone to urinary tract infection (UTI) or recurrent balano-posthitis, who attended the Division of Urology, Faculty of Medicine, Chiang Mai University and were operated on from July 2013 to June 2015 were collected. The exclusion criteria were patients who had hypospadias, penile curvature, dorsal hood deformity or buried penis. Patients who had uncorrected coagulopathy or severe underlying disease were also excluded from the study. Types of prepuce were classified by Kayaba's classification[9].

Routine blood and urine tests were performed and consent for surgery was granted. Preoperative evaluation included demographic data, indications for surgery, and prepuce types. The operation was performed under local anesthesia (dorsal penile nerve block) in the older patients, while general anesthesia with caudal epidural block was employed in younger children.

OSI circumcision technique

1. Retract the foreskin. If the foreskin is phimotic and does not retract easily, make a dorsal slit[10]. Then, take down any adhesions and clean out any accumulated smegma deposits. A blunt-tipped curved hemostat and a gauze soaked with iodine prep-solution frees up most adhesions without tearing the surface of the glans. Carefully examine the glans

and the location of the meatus (Fig 1).

2. Then mark with methylene blue and make an incision at 12 o' clock on the inner layer of the prepuceal skin at the dorsal side below the coronal sulcus about 0.5 cm (Fig 2). This step can be skipped if the surgeon is sufficiently experienced in OSI circumcision.

3. Stretch the prepuce by clamping at 6 and 12 o'clock. Using a fine-tipped marking pen, draw a mark above the site of the coronal sulcus about 5 mm onto the stretched prepuce (Fig 3).

4. An incision is made on the outer layer of the prepuceal skin and coagulated with a bipolar cautery to avoid tissue damage from the dorsum to frenulum (Fig 4).

5. Identify the mark that was made earlier at the dorsal side and incise (Fig 5).

6. An incision is made to the inner layer of the prepuce skin and each side is cut parallel from the corona sulcus about 5 mm from the dorsum to frenulum (Fig 6).

7. The edges of the outer and inner layers are approximated with absorbable material by horizontal mattress. Dressing is done (Fig 7).

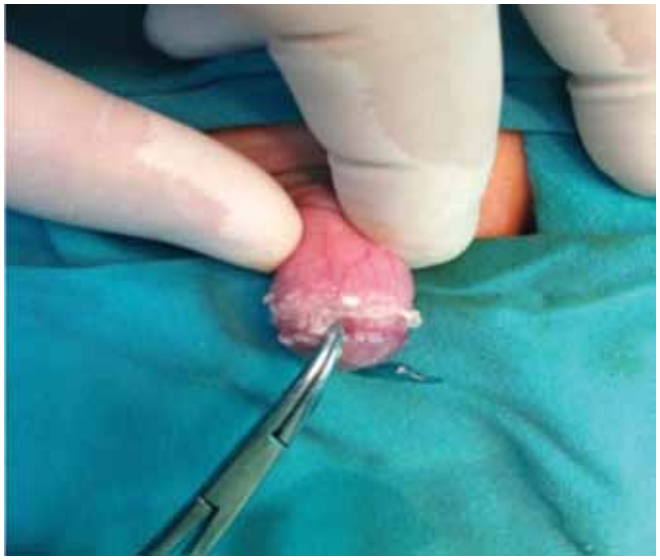

Fig 1. The inner foreskin was separated from glans penis by mosquito clamp.

Fig 2. The inner foreskin was marked by incising and methylene blue.

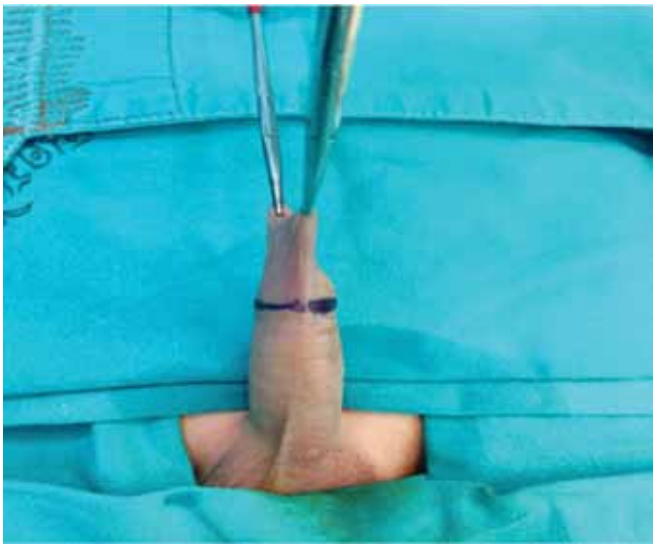

Fig 3. The outer foreskin was clamped at 6 and 12 o'clock and marked with a marking pen.

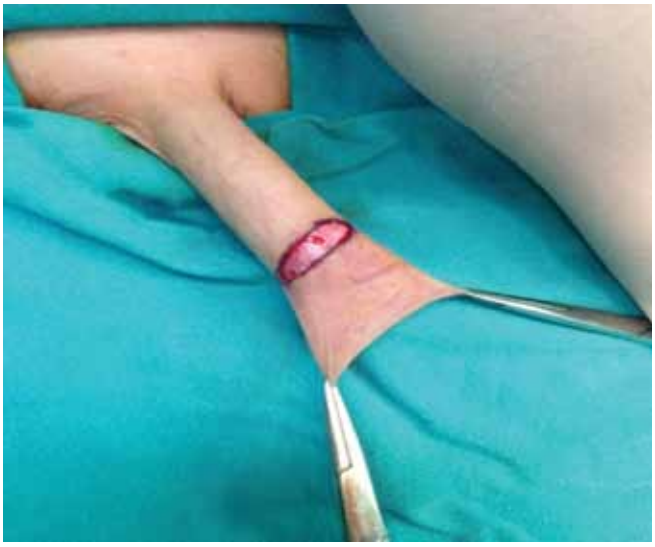

Fig 4. The outer foreskin was incised with surgical scalpel along the marking line.

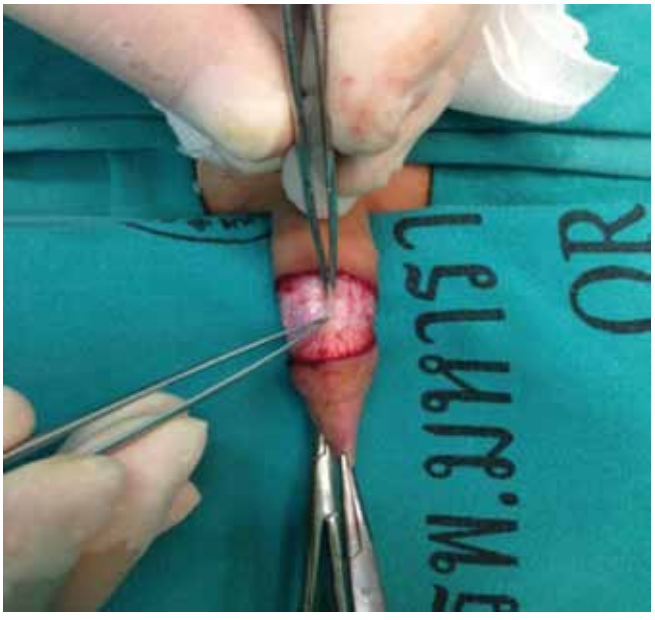

Fig 5. The bipolar cauterization was used to dissect the subcutaneous tissue until reaching the inner foreskin.

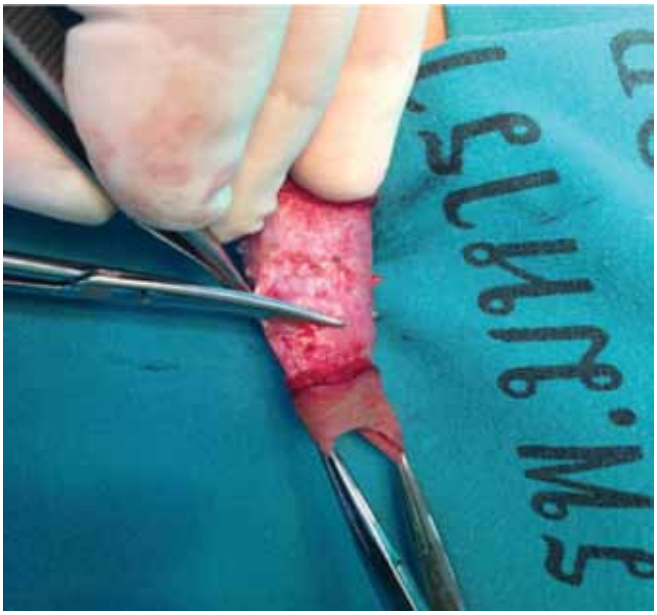

Fig 6. The inner foreskin was cut at 12 o'clock position and 5 mm distal to coronal sulcus then the inner foreskin was cut bilaterally until reaching the frenulum. The frenulectomy was done by bipolar cauterization.

Fig 7. The circumcised wound was sutured with absorbable suture and horizontal mattress fashion

All patients were prescribed antibiotics for 5-7 days and analgesic drugs. Intraoperative evaluation was collected, such as surgeon, technique of circumcision, type of anesthesia, penile nerve block, dorsal slit, operative time, type of suture material, technique of suturing, estimated blood loss, and mode of cauterization. Complications were evaluated intra and post operation, such as excessive bleeding, skin or glans necrosis, skin or glans burn, excessive skin loss, glans injury, or urethral injury. The first follow up was performed at one week after operation to evaluate bad night's rest, painful urination, analgesic taken, and pain score at the day of follow-up. The second follow up was performed at 4 weeks after the operation to evaluate complications, surgical results, and cosmetic result.

Results

OSI circumcision was performed on 57 patients. The average age was 5.2 years (range: 0.1-14.1). The average BMI was 17.13 (range: 8.57-36.93). Of 57 patients, 13 (22.8%) had underlying diseases; 36 (63.2%) had genitourinary anomalies, including 10 cases of undescended testis, 5 cases of hydrocele, 5 cases of ureteropelvic junction obstruction, 5 cases of vesicoureteral reflux, 3 cases of posterior urethral valve, 2 cases of ureterovesical junction obstruction, and 8 cases of other anomalies (Table 1).

According to Kayaba's classification, the prepuces were classified as type 1 in 26 cases (45.6%), type 2 in 18 cases (31.6%), type 4 in 8 cases (14.0%), respectively (Table 2). Indications for surgery were genitourinary system anomalies prone to UTI in 18 cases, persistent primary phimosis in 17 cases, parental preference in 9 cases, recurrent balano-pothitis in 7 cases, recurrent UTI in 6 cases, redundant prepuce in 4 cases, ballooning of prepuce during urination in 3 cases, acute urinary retention in 1 case, and straining in 1 case. The patients had co-surgery in the same session of circumcision in 26 cases (43.34%), including 6 cases of orchidopexy, 5 cases of ureteral reimplantation, 5 cases of hydrocelectomy, 2 cases of posterior urethral valve ablation, 1 case of pyeloplasty, and 5 cases of other 5 operations.

Thirty-seven (64.91%) OSI circumcisions were performed by one urologic staff doctor while the rest were performed by urologic residents. General

Table 1 Patients' characteristics.

Demographic data	
Age (years)	
Mean (SD)	5.28 (4.05)
Range	0.1 - 14.1
BMI (kg/m^2)	
Mean (SD)	17.13 (4.01)
Range	8.57 - 36.93
Medication (N (%))	
Yes	6 (10.53)
No	51 (89.47)
Underlying disease (N (%))	
Yes	13 (22.80)
No	44 (77.20)
Genitourinary anomaly (N (%))	
Yes	36 (63.16)
No	21 (36.84)
Kayaba classification (N (%))	
Type I	26 (45.61)
Type II	18 (31.58)
Type III	4 (7.02)
Type IV	8 (14.04)
Type V	1 (1.75)

anesthesia was used in 53 cases (93%) and local anesthesia was used in 4 (7%). Dorsal slit was done in 1 cases (1.7%). The average operative time was 31 minutes (range: 15-45). Almost all suture material was chromic catgut, and the technique used in most cases for suturing was horizontal mattress. Estimated blood loss was minimal. Mode of cauterization was bipolar in 49 cases (86%) and monopolar in 8 cases (14%). There was no intra-operative or early post-operative complication (Table 2).

The first follow-up after surgery was at 11.7 days. The average pain score was 0.49 (total pain score is 10). The average bad night of rest was 1.2 nights. Patients could take a bath in an average of 6.9 days after the operation. Average painful urination lasted for 1.18 day. The average analgesic used was for 2 days, and the average analgesic time was 3.5 times.

The second follow-up after surgery was at 56.6 days. Most patients had completely freed glans penis. There were minor complications in 2 cases (3.5%), which were both skin adhesion. One case of skin adhesion was corrected by surgical separation while the other case underwent conservative treatment. Most parents were very satisfied with the outcomes of OSI and did not want to have circumcision revision. They also wanted to recommend this technique of circumcision to others.

Table 2 Clinical outcomes of OSI circumcision.

Result	
Operative time(minutes)	
Mean (SD)	31.31 (7.04)
Range	15 - 45
First follow up day (days)	
Mean (SD)	11.69 (8.24)
Range	3 - 40
Pain score at first follow up day(days)	
Mean (SD)	0.49 (1.35)
Range	0 - 6
Bad night rest (days)	
Mean (SD)	1.2 (0.82)
Range	0 - 4
First bathing (days)	
Mean (SD)	6.92 (1.60)
Range	4 - 14
Second follow up day	
Mean (SD)	56.57 (36.89)
Range	14 - 180

In the co-surgery group, patients had a longer post-operative hospital stay, time to first bathing, analgesic day, and analgesic time than the group who underwent circumcision only. However, there was no difference in operative time comparing both groups (31.7 and 30.2 minutes). The average operative time of Kayaba type 1-2 patients and 3-5 patients were 30.9 and 33.1 minutes, respectively. There was no difference in the average operative time in the 2 groups (p=0.34). The average operative time of OSI circumcision performed by urologic staff was 30 minutes, while the average operative time performed by urologic residents was 33.7 minutes. Interestingly, there was no difference in operative times between both groups of surgeons (p=0.34). There was no malignancy in the pathologic reports in the study (Table 3 and 4).

Discussion

Many circumcision techniques have been reported in the literature and each technique has different advantages and disadvantages. For example, plastible circumcision is a quick operation but it requires a special instrument that may not be available in some countries[11]. Sutureless circumcision is one of the cosmetic operations but we need to apply 2-Octyl cyanoacrylate to support wound healing[12]. There is no gold standard technique of circumcision for all types of prepuces and medical conditions.

OSI circumcision for children is a technique that was modified from the freehand and sleeve techniques. We make a mark with methylene blue and an incision at 12 o'clock on the inner layer of the prepuce skin at the dorsal side below the coronal sulcus about 5 mm Stretch the prepuce by clamping it at 6 and 12 o'clock. Using a fine-tipped marking pen, draw a mark above the site of the coronal sulcus about 5 mm on the stretched prepuce. An incision is made on the outer layer of the prepuce skin and coagulated with a bipolar cautery to avoid tissue damage.

We mainly used bipolar cauterization due to it causing a less traumatic injury to the surrounding tissue. With this technique, monopolar cauterization could also be used. While cutting we did not have to manipulate the glans penis. We used the clamp to hold the tension, perhaps, reducing the trauma and pain. We could adjust the symmetry, avoiding spiraling while cutting and hemostasis was easier and quicker.

Table 3 Operative time and Kayaba's Classification.

Parameter	Kayaba's classification		P-value
	high grade	low grade	
Operative time (Minutes (SD))	33.07 (5.60)	30.93 (7.42)	0.341

Table 4 Operative time and types of surgeons.

Parameter	Surgeon		P-value
	Resident	Staff	0.341
Operative time (Minutes (SD))	33.75 (7.04)	30 (6.77)	

Horizontal mattress suture was done in most cases because the end of the knot would not irritate the glans penis, and we could control the bleeding better, but it took longer when compared with a simple suture. In the co-surgery group, there were more operations, thus longer postoperative hospital stays, time to first bathing, analgesic day and analgesic time. However, there was not any difference in operative time compared with the circumcision only group. Two cases had complications of skin adhesion. In one case we used polyglactin 4-0 and the prepuce was covered above the corona sulcus; then this case was re-operated in order to release the skin adhesion, and after the follow-up the glans penis was completely free. The other case of mild skin adhesion was managed with conservative treatment. There was no difference in time of operation in surgeons. Therefore, this technique could be used by less experienced surgeons. Most parents were satisfied.

Conclusion

Outside-in circumcision is simple, safe, effective, and has a high level of satisfaction among patients and parents.

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