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FEWER KNOTS IN CIRCUMCISION
ARE ASSOCIATED WITH LESS
POSTOPERATIVE PAIN:
A RETROSPECTIVE
COMPARATIVE STUDY

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Summary

Male circumcision is the most frequently performed surgical procedure among Muslim and Jewish communities, mainly for medical, religious, and traditional reasons (1-4). In the USA, circumcision is frequently performed for cosmetic purposes. Although it is seen as a simple procedure, it is quite prone to complications like other surgical procedures. The early and long-term complications of circumcision are well known and the overall complication rate has been reported between 0.2% and 3.9%. Common complications associated with circumcision are acute bleeding, pain, edema, wound infection, and unnecessary foreskin. Rare complications include meatal stenosis, urethral fistula, partial and total glandular amputations, glandular necrosis, penile curvature, and penile rotation. In addition, keloid formation and scar hypertrophy are some rare complications that cause poor cosmetic appearance.

The aim of paper: *Our aim in this study was to investigate the effect of the number of sutures placed during circumcision on postoperative pain, infection, bleeding amount, and analgesic need in children.*

Materials and methods: *A total of 715 patients who applied to our hospital for circumcision requests between November 2019 and January 2022 were retrospectively analyzed. The patients were randomly divided into three groups according to the number of knots used during the surgical procedure: Group 1 (8 sutures), group 2 (6 sutures), and group 3 (4 sutures). The patients were evaluated in terms of whether they needed analgesics in the postoperative period (1-hour), bleeding status, and whether this bleeding needed re-intervention.*

Results: *The average age of the participants in the study was 4.06±2.51 years, and the average weight was 18.66±7.07 kg. The operation was completed using 8 sutures (group 1) in 47.5%, 6 sutures (group 2) in 27.7%, and 4 sutures (group 3) in 24.9% of the patients. Postoperative infection developed in 2.8% of the participants, and bleeding was observed in 25.1%. The number of participants who needed analgesia for the first hour after the operation was 66.8%. The median value of the postoperative pain scale was 5 (range: 1-9), and those with a pain scale of 5-9 were 65.5%. There was no significant difference between the groups in terms of age, weight, development of infection, and bleeding ($p>0.05$). Analgesia was needed in 88.7% of those in group 1, 69.9% of those in group 2, and 21.6% of those in group 3 ($p<0.001$). A score (MPOS) of 5 or higher was found in 86.8% of those in group 1, 71% of those in group 2, and 18.6% of those in group 3 ($p<0.001$).*

Conclusions: *our study showed that group 3 (4 sutures) achieved lower pain scores, less analgesic consumption, and lower agitation scores after circumcision compared to other groups.*

Keywords: *Children; Circumcision; Pain.*

Introduction

Male circumcision is the most frequently performed surgical procedure among Muslim and Jewish communities, mainly for medical, religious, and traditional reasons (1-4). In the USA, circumcision is frequently performed for cosmetic purposes (1,5). There are many circumcision techniques. In general, sleeve resection, dorsal slit, guillotine, Gomco clamp, Mogen clamp, plastibell, taraclamp, smart clamp are used according to the surgeon's preference (5). There are many studies showing the potential medical benefits of neonatal circumcision such as preventing urinary tract infections (6). A meta-analysis showed that urinary tract infections (UTIs) were present in the first 3 months of life in 2.4% of circumcised males and 20.1% of an uncircumcised males presenting with fever (7). In addition, this procedure may reduce penile cancer rates, improve penile topical hygiene, reduce the risk of HIV infection (8-11), and help reduce cervical cancer rates in female partners (12-14).

Although it is seen as a simple procedure, it

is quite prone to complications like other surgical procedures (15). The early and long-term complications of circumcision are well known and the overall complication rate has been reported between 0.2% and 3.9%. Common complications associated with circumcision are acute bleeding, pain, edema, wound infection, and unnecessary foreskin. Rare complications include meatal stenosis, urethral fistula, partial and total glandular amputations, glandular necrosis, penile curvature, and penile rotation (16-18). In addition, keloid formation and scar hypertrophy are some rare complications that cause poor cosmetic appearance (19).

Our aim in this study was to investigate the effect of the number of sutures placed during circumcision on postoperative pain, infection, bleeding amount, and analgesic need in children.

Materials and methods

Patients and surgical techniques

A total of 715 patients who applied to our hospital for circumcision requests between November 2019

and January 2022 were retrospectively analyzed. Since all surgical procedures were planned to be performed under anesthesia, the procedure was performed after the preoperative evaluation of the patients was completed.

In all patients, circumcision was performed by cutting the prepuce with cautery using the guillotine method. Retraction of the prepuce opened the mucosa. The smegma was cleared and then the glans penis was clamped under the clamp. Glans control was performed by looking inside the prepuce. Then, the prepuce tissue was cut with cautery and the skin and mucosa were stripped from the penis in one piece. Bipolar cautery hemostasis was achieved in all children. The skin and mucosa were primarily sutured.

The patients were randomly divided into three groups according to the number of knots used during the surgical procedure: Group 1 (a total of 8 sutures were placed. Sutures were placed at 3,6,9,12 o'clock and one more suture was placed between each of them), group 2 (a total of 6 sutures were placed. Sutures were placed at 2,4,6,8,10,12 o'clock), group 3 (a total of 4 sutures were placed. Sutures were placed at 3,6,9,12 o'clock).

Inclusion criteria

Patients who had no comorbidities and applied for circumcision only for religious reasons were included in the study (n=672).

Exclusion criteria

Children with penile anomalies (buried penis, micropenis, hypospadias, penile chordee), children with testicular abnormalities (hypogonadism, bilateral cryptorchidism, varicocele), children with a history of phimosis, paraphimosis or recurrent UTI that may affect postoperative pain, and a family history of malignant hyperthermia, mental retardation and potential children with any neurological disease associated with agitation symptoms were excluded from the study (n=43).

Evaluation of the complications

After the completion of the surgical procedure, postoperative analgesia was achieved with a dorsal penile nerve block (DPNB) using 0.3 ml/kg 0.5% bupivacaine (5 mg/ml Marcaine). All children were transferred to the post-anesthesia care unit (PACU). Postoperative pain was assessed using the Modified Objective Pain Scale (MOPS) (3), in which each criterion (ie crying, movement, agitation, posture, and verbal) was assessed using a 3-point scale, with a total score between 0 and 10. Table 1 shows the evaluation criteria based on MOPS. The pain was assessed first on arrival at the PACU and then at 1-hour post-surgery. The pain was performed and recorded by an anesthetist blinded to group distribution. For children with a MOPS score of 4, acetaminophen (paracetamol) (Parol 10 mg/ml vial, Atabay Kimya, Istanbul, Turkey) was used at a dose of 15 mg/kg for rescue analgesia. Children were discharged when they had stable vital signs, were able to tolerate oral fluids, and were urinated.

The patients were evaluated in terms of whether they needed analgesics in the postoperative period (1-hour), bleeding status, and whether this bleeding needed re-intervention.

Anesthesia management

Anesthesia was induced in all children by inhalation using 2-3 minimum alveolar concentration (MAC) sevoflurane in a 50/50 O₂eN₂O mixture or intravenously (IV) using 2 mg/kg propofol and 1 mcg/kg fentanyl. After providing adequate depth of anesthesia, a laryngeal mask airway was placed in all children. Anesthesia was maintained using 1 MAC sevoflurane in a 50/50 mixture of O₂eN₂O. Ringer lactate solution was given according to the child's weight. During anesthesia, children were monitored for mean arterial pressure (MAP), heart rate (HR), peripheral oxygen saturation (SPO₂), and capnography.

Ethical approval

Approval was obtained from the Local Ethics Committee on 28.01.2022 (number: E-22686390-050.01.04-11872).

Statistical analysis

The research is a retrospective comparative study. Percentage, mean, standard deviation, median, minimum and maximum were used as descriptive statistics. The chi-square test was used for categorical variables. Whether the data fit normal distribution was tested with the Shapiro-Wilk test. Student's t-test was used for continuous variables showing normal distribution, and Mann-Whitney-U and Kruskal Wallis tests were used for continuous variables not showing normal distribution. In the study, analyzes were made using the SPSS v24.0 package program. The significance level was accepted as p<0.05.

Results

The average age of the participants in the study was 4.06±2.51 years, and the average weight was 18.66±7.07 kg. The operation was completed using 8 sutures (group 1) in 47.5%, 6 sutures (group 2) in 27.7%, and 4 sutures (group 3) in 24.9% of the patients. Postoperative infection developed in 2.8% of the participants, and bleeding was observed in 25.1%. The number of participants who needed analgesia for the first hour after the operation was 66.8%. The median value of the postoperative pain scale was 5 (range: 1-9), and those with a pain scale of 5-9 were 65.5%.

There was no significant difference between the groups in terms of age, weight, development of infection, and bleeding (p>0.05).

In Group 1, 244 (77%) of 319 patients did not have bleeding, 59 (18%) had bleeding in the form of leakage and ended without any intervention, and simple intervention was performed in 16 (5%) patients and the bleeding was controlled. In Group 2, 134 (72%) of 186 patients did not have bleeding, 46 (25%) had bleeding in the form of leakage and ended without any intervention, and simple intervention was performed in 6 (3%) patients and the bleeding was controlled. In Group 3, 125 (75%) of 167 patients did not have bleeding, 39 (23%) had bleeding in the form of leakage and ended without requiring any intervention, and bleeding was controlled by simple intervention in 3 (2%) patients. In our study, no statistically significant difference was found between the groups in terms of bleeding (p=0.196).

Local infection was observed in 7 (2.2%) patients in group 1, 6 (3.2%) patients in group 2, and 6 (3.6%) patients in group 3, and we did not find a significant statistical difference between the groups in terms of local infection development ($p=0.6$).

There was a significant difference between the groups in the postoperative 1-hour analgesia needs ($p<0.001$). Analgesia was needed in 88.7% of those

in group 1, 69.9% of those in group 2, and 21.6% of those in group 3 ($p<0.001$).

There was a significant difference between the groups with postoperative pain scale scores between 5-9 and those with less than 5 ($p<0.001$). A score of 5 or higher was found in 86.8% of those in group 1, 71% of those in group 2, and 18.6% of those in group 3 ($p<0.001$) (Table 2).

Table 1

Modified Objective Pain Scale (MOPS)

Criteria	Finding	Points
Crying	none	0
	consolable	1
	not consolable	2
Movement	none	0
	restless	1
	thrashing	2
Agitation	asleep/calm	0
	mild	1
	hysterical	2
Posture	normal	0
	flexed	1
	holds injury site	2
Verbal	asleep/no complaint	0
	complaints/cannot localize	1
	complaints/can localize	2
Total		10
>5 need for analgesia		

Table 2

Characteristics of the patients

	Group 1 (N=319)		Group 2 (N=186)		Group 3 (N=167)		Total (N=672)		P-value
Age*	3.97	2.7	4.08	2.3	4.24	2.3	4.06	2.51	0.280
WEIGHT*	18.35	7.5	18.82	6.7	19.10	6.6	18.66	7.07	0.180
Local infections**									
No	312	97.8	180	96.8	161	96.4	653	97.2	0.628
Yes	7	2.2	6	3.2	6	4.4	19	2.8	
Bleeding**									
No	244	76.5	134	72.0	125	74.9	503	74.9	0.196
Yes, no need for intervention	59	18.5	46	24.7	39	23.3	144	21.4	
Yes, need for intervention	16	5.0	6	3.3	3	1.8	25	3.7	
MOPS Score**									
<5	42	13.2	54	29.0	136	81.4	232	34.5	<0.001
5--9	277	86.8	132	71.0	31	18.6	440	65.5	
Need for analgesia at postoperative 1-hour**									
No	36	11.3	56	30.1	131	78.4	223	33.2	<0.001
Yes	283	88.7	130	69.9	36	21.6	449	66.8	

Discussions

Male circumcision, the surgical removal of unnecessary prepuce or phimosis from the penis, is one of the oldest surgical procedures in the world. Traditional male circumcision is generally considered the gold standard surgery (20-22). The number of sutures to be placed in traditional circumcision remains unclear. However, some complications such as bleeding, wound infection, pain and unsatisfactory cosmetic results may be seen in these procedures (22,23).

Many factors such as the patient's age, skin type,

genetic and hormonal factors, anatomical features related to the wound site and surgical operation type, inflammation, infection in the wound area, wound tension, and repair techniques affect wound healing (24,25). In our study, we conducted a retrospective study to evaluate the number of sutures placed during circumcision to repair the mucosa and residual preputium tissue, and the risk of postoperative pain, bleeding, and infection.

Despite advances in algorithmic and surgical techniques, postoperative pain remains a major

problem after surgeries. Although simple and easy to perform, male circumcision is associated with significant postoperative pain. Postoperative pain management in children is a must for both medical and ethical reasons. Pain control after circumcision is provided by the use of topical analgesics, systemic administration of nonsteroidal anti-inflammatory drugs, opioid analgesics or local anesthetic techniques (26). Local anesthetic techniques used together with general anesthesia for postoperative analgesia after circumcision are deep penile nerve block (DPNB), caudal block, pudendal block, and topical lidocaine-prilocaine gel application. DPNB is an effective technique that is frequently used together with the anatomical sign technique (27,28). Bellieni et al reviewed 14 studies and reported that the use of DPNB and acetaminophen derivatives or topical analgesic cream dramatically reduced pain, but these authors emphasized that no method completely eliminated pain (29). DPNB was applied to all circumcised children in our study, and the Modified Objective Pain Scale (MOPS) was evaluated by the anesthesiologist in postoperative 1-hour as a pain scale after circumcision. There was a significant difference between the groups in the postoperative 1-hour analgesia needs ($p < 0.001$). Analgesia was needed in 88.7% of those in group 1, 69.9% of those in group 2, and 21.6% of those in group 3 ($p < 0.001$). There was a significant difference between the groups with postoperative pain scale scores between 5-9 and those with less than 5 ($p < 0.001$). A score of 5 or higher was found in 86.8% of those in group 1, 71% of those in group 2, and 18.6% of those in group 3 ($p < 0.001$).

During suturing, the needle enters the dermis and epidermis at right angles and exits at right angles from the opposite side. In the meantime, there may be partial ruptures in the vessels, which may cause bleeding. For this reason, short-spaced and taut sutures may be preferred to control bleeding, or taut sutures may be the continuation of the habit of closing wounds in other incisions (30-32). Bleeding can stop spontaneously during circumcision, or it can be controlled with cautery, compression, and suture during the procedure. In addition to heavy bleeding, we see in daily practice that light bleeding is tried to be controlled with copious stitches for fear of malpractice (30).

There are still different results regarding blood

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loss during and after circumcision; according to some studies, there are more intraoperative blood loss and a few cases of serious postoperative bleeding (33,34). In our study, similar to the literature, most of the bleeding developed intraoperatively and was controlled with cautery or compression. In Group 1, 244 (77%) of 319 patients did not have bleeding, 59 (18%) had bleeding in the form of leakage and ended without any intervention, and simple intervention was performed in 16 (5%) patients and the bleeding was controlled. In Group 2, 134 (72%) of 186 patients did not have bleeding, 46 (25%) had bleeding in the form of leakage and ended without any intervention, and simple intervention was performed in 6 (3%) patients and the bleeding was controlled. In Group 3, 125 (75%) of 167 patients did not have bleeding, 39 (23%) had bleeding in the form of leakage and ended without requiring any intervention, and bleeding was controlled by simple intervention in 3 (2%) patients. In our study, no statistically significant difference was found between the groups in terms of bleeding ($p = 0.196$).

Wiswell et al. investigated postoperative infections in 100,157 children who underwent circumcision; reported 193 (0.19%) complications, including 62 (0.06%) local infections, 8 (0.007%) bacteremia cases, and 20 (0.02%) urinary tract infection episodes (35). Less common infectious complications include partial necrosis of the penis, osteomyelitis, and staphylococcal septicemia with pulmonary abscesses, Fournier's gangrene, group B beta-hemolytic streptococcal septicemia, necrotizing fasciitis, and staphylococcal scalded skin syndrome (36-38). In our study, local infection was observed in 7 (2.2%) patients in group 1, 6 (3.2%) patients in group 2, and 6 (3.6%) patients in group 3, and we did not find a significant statistical difference between the groups in terms of local infection development ($p = 0.6$).

Conclusions

In conclusion, our study showed that group 3 (4 sutures) achieved lower pain scores, less analgesic consumption, and lower agitation scores after circumcision compared to other groups.

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МЕНША КІЛЬКІСТЬ ВУЗЛІВ ПРИ ОБРІЗАННІ ПОВ'ЯЗАНА З МЕНШИМ ПІСЛЯОПЕРАЦІЙНИМ БОЛЕМ: РЕТРОСПЕКТИВНЕ ПОРІВНЯЛЬНЕ ДОСЛІДЖЕННЯ

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Резюме

Чоловіче обрізання є найбільш часто виконуваною хірургічною процедурою серед мусульманських і єврейських громад, головним чином з медичних, релігійних і традиційних причин. У США обрізання часто виконується з косметичною метою. Хоча це вважається простою процедурою, вона досить схильна до ускладнень, як і інші хірургічні процедури. Ранні та віддалені ускладнення обрізання добре відомі, і загальна частота ускладнень становить від 0,2% до 3,9%. Поширеними ускладненнями, пов'язаними з обрізанням, є гостра кровотеча, біль, набряк, інфекція рани та непотрібна крайня плоть. Рідкісні ускладнення включають стеноз м'яса, уретральну фістулу, часткові та повні ампутації залоз, некроз залоз, викривлення статевого члена та ротацію статевого члена. Крім того, утворення келоїдів і гіпертрофія рубців є деякими рідкісними ускладненнями, які спричиняють поганий косметичний вигляд.

Мета: Мета цього дослідження полягала в тому, щоб дослідити вплив кількості швів, накладених під час обрізання, на післяопераційний біль, інфекцію, кількість кровотечі та потребу в знеболювальних у дітей.

Матеріали та методи. Ретроспективно проаналізовано 715 пацієнтів, які звернулися до нашої лікарні з проханням про обрізання в період з листопада 2019 року по січень 2022 року. Пацієнти були випадковим чином розділені на три групи відповідно до кількості хірургічних швів, використаних під час оперативного втручання: група 1 (8 швів), група 2 (6 швів) і група 3 (4 шви). Пацієнтів оцінювали з точки зору того, чи потребували вони використання знеболювальних препаратів у післяопераційному періоді (перша година), статус кровотечі та чи потребує ця кровотеча повторного втручання.

Результати: Середній вік учасників дослідження склав $4,06 \pm 2,51$ року, а середня вага – $18,66 \pm 7,07$ кг. Операцію виконано з використанням 8 швів (1 група) у 47,5 %, 6 швів (2 група) — 27,7 %, 4 швів (3 група) — 24,9 % хворих. Післяопераційна інфекція розвинулася у 2,8% учасників, а кровотеча спостерігалася у 25,1%. Кількість учасників, які потребували знеболення протягом першої години після операції, склала 66,8%. Середнє значення шкали післяопераційного болю становило 5 (діапазон: 1-9), а тих, хто мав шкалу болю 5-9, було 65,5%. Достовірної різниці між групами за віком, масою тіла, розвитком інфекції та кровотечами не було ($p > 0,05$). Застосування анальгезії потребували 88,7% пацієнтів 1 групи, 69,9% пацієнтів 2 групи та 21,6% пацієнтів 3 групи ($p < 0,001$). Оцінка (MPOS) 5 або вище була виявлена у 86,8% пацієнтів у групі 1, 71% у групі 2 та 18,6% у групі 3 ($p < 0,001$).

Висновки: Проведене дослідження показало, що діти 3 групи (використання 4 швів) мали нижчі показники болю, рідше потребували споживання анальгетиків і мали нижчий рівень показників збудження після обрізання порівняно з іншими групами.

Ключові слова: Діти; обрізання; біль.

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