Research Article

Circumcision Revision: A Systematic Review On Indications Of Revision And Complications Of Surgery

Amani N.Alansari*[1], Santiago Vallasciani[2], Ahmed A. Sofy[3]

[1] Department of Pediatric Surgery, Hamad Medical Corporation, Doha, Qatar
[2] Division of Urology, Surgery Department, Sidra Medicine, Qatar
[3] Faculty of Medicine, Fayoum University, Fayoum, Egypt

Abstract

Objective: Circumcision revision may be required if patients experienced complications after the primary surgery. This systematic review aims to identify the indications for circumcision revision in children, the specialties of the physicians who performed the initial circumcisions, the types and incidences of complications after surgery.

Methodology: We searched for relevant articles in PubMed/MEDLINE, Cochrane Library, Scopus, and Web of Science. We studied the following outcome: Indications for circumcision revision, the specialty of the physicians who performed the initial circumcision, incidence of complications after surgery, and Simultaneous Additional Procedures.

Results: We reviewed six studies with 9,924 males met our inclusion criteria. The primary indications for revision included redundant foreskin, meatal stenosis, and concealed penis. Medical practitioners performed most primary circumcisions. The overall complication rate ranged from 1.5% to 3.4%. Additional procedures, such as herniotomy and orchiopexy, may be required in 8.9% to 30.4% of revisions. Older age at primary circumcision and non-medical practitioners' involvement were associated with higher complications and revision rates.

Conclusion: Circumcision is a common procedure, which may require revision due to complications like redundant skin or meatal stenosis. Optimal outcomes depend on precise surgical techniques, adequate foreskin excision, and proper suturing, along with preoperative counseling and postoperative care.

Keywords: Circumcision, Revision Surgery, Specialty, Complications.

Introduction

Circumcision is the world's most common surgical procedure performed in boys. (1). This procedure is performed for both medical and religious as well as cultural reasons for a long, long time (2). In recent years, it has become increasingly recognized that circumcision, especially revision surgery, is a medical, emotional and psychological complexity. Although the clinical outcomes of circumcision revision are well-documented, less attention has been paid to the lived experiences of the children undergoing the revision, as well as the perspectives of their parents and healthcare providers. In the USA, the incidence of circumcision of newborns varies from 57 to 61% (3,4).

Circumcision is also linked to some health benefits, including a decrease in the risk of urinary tract infections, penile cancer, and sexually transmitted infections (5). However, with all surgical procedures, circumcision comes with the risk of complications, with reported rates ranging from 0.2% to 16% (6,7). Despite the diverse expertise of the professionals performing this procedure, parents may sometimes be unsatisfied with the results, leading to referrals to physicians for revision. The incidence of complications varies based on factors such as the specific anatomical anomaly, the presence of clinical comorbidities, the surgical technique employed, and the age of the patients. The incidence of bleeding in recent retrospective studies was the most common complication, with an incidence reaching 1%. However, in most cases, this complication can be prevented. If thorough attention is given to achieving hemostasis during the procedure and proper compression is applied (3). Generally, late complications include incomplete removal of the prepuce and remaining skin inclusions, which may cause wound contraction and scarring of the distal portion of the prepuce and, finally, stenosis. Other complications include infections and problems with the cosmetic outcome, such as skin adhesions, hidden penis or redundant residual tissue. Up to 10% of cases will require revision circumcision following these complications (6).

This systematic review aims to identify the indications for circumcision revision in children, the specialities of the physicians who performed the initial circumcisions, and the types and incidences of complications after surgery.

Methods

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (8).

Inclusion Criteria

- **Population:** Male children (0-18 years) who underwent circumcision revision.
- **Intervention:** Revision of circumcision.
- **Comparators:** Not applicable.
- **Outcomes:** Indications for circumcision revision, the speciality of the physicians who performed the initial circumcision, incidence of complications after surgery, and Simultaneous Additional Procedures
- **Study Design:** Randomized controlled trials (RCTs), cohort studies, case-control studies, case series, and observational studies.

Search Strategy and Screening

Electronic searches were conducted in PubMed/MEDLINE, Cochrane Library, Scopus, and Web of Science. The search strategy involved a combination of Medical Subject Headings (MeSH) terms and free text words, such as “circumcision revision”, "circumcision", "revision", "children", "complications," “specialty”, and "surgical outcomes."

The titles and abstracts of all identified studies were reviewed independently by two authors. Then, a full-text screening was performed, and disagreements among reviewers were resolved by discussion and consensus with a third author.

Data Extraction and Qualitative Synthesis

Study characteristics (author(s), year, country, study design) and population characteristics (age) were extracted separately. Considering expected heterogeneity in study designs, populations and outcomes, a qualitative synthesis was undertaken to integrate and interpret findings. The qualitative synthesis involved the summarization of the key findings of the included studies and its presentation in the form of a narrative. This approach allowed a comprehensive description of the indication for circumcision revision, the specialities of physicians who did the original circumcision, types of complications requiring revision and their incidence.

This systematic review was exempt from review and approval from the institutional research ethics committee, as there was no involvement of patients or patient records.

Quality Assessment:

Our study included observational studies. Thus, the risk of bias assessment was measured utilizing the ROBINS-I tool (9).

Results

Summary of the Included Studies

The results of our search are illustrated in the PRISMA flow diagram (Figure 1). We eventually included six studies (5,10–14) that met our eligibility criteria. The total included sample size was 9924 males with an average age of 36.3 months. Table 1 shows the included studies characteristics.

Figure 1: shows a PRISMA flow diagram of our literature search

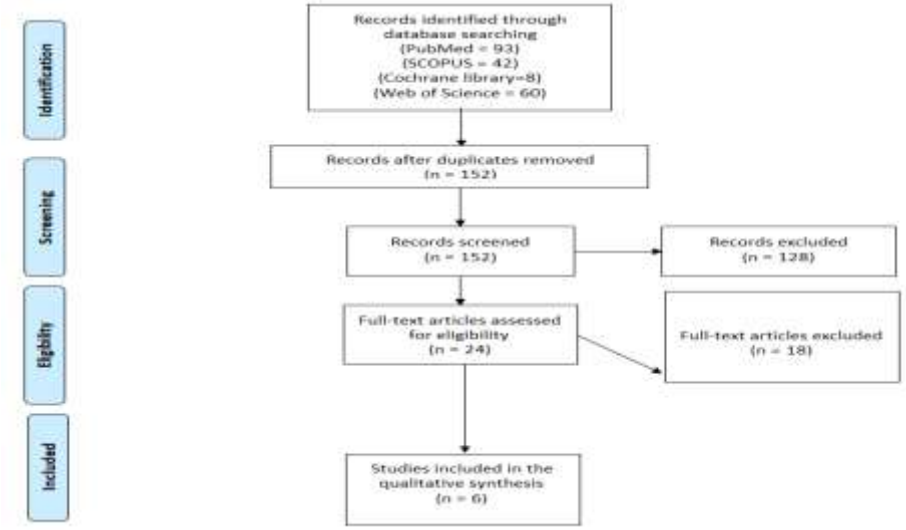

Table 1: shows the characteristics of the included studies

Study	Year	Country	Study design	The utilized procedure in revision	Sample size	Age, years (mean ± SD)
Redman 1995	1995	USA	retrospective case series	Conventional sleeve circumcision, distal cicatricial ring incision,	46	41.75±22.38
Brisson 2002	2002	USA	retrospective study	conventional sleeve technique (55), gomco clamp (1)	56	26.7
Al-Ghazo 2006	2006	Jordan	retrospective case series	conventional sleeve technique, penoplasty, External meatotomy	52	44±22.58
Kokorowski 2013	2013	USA	retrospective study of PHIS database	NR	5632	30±33.6
Chan 2018	2018	USA	retrospective study	Gomco (979), Mogen (718)	1697	0.28±0.15
Talini 2018	2018	Brazil	retrospective study	Plastibell (1940), classic technique (501)	2441	65.5±33.01

PHIS= Pediatric Health Information System, SD= standard deviation, NR= not reported

Risk of Bias Assessment Results

According to ROBINS-I risk of bias tool. The overall risk of bias in the observational studies was moderate in all studies. Table 2 shows an illustration of all domains

Table 2: shows risk of bias assessment of the included studies by ROBINS-I tool

Study	Bias due to confounding	Selection Bias	Bias in classification of interventions	Bias due to deviations from intended intervention	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of reported result
Al-Ghazo 2006	Moderate	Moderate	Low	Low	No information	Moderate	low
Brisson 2002	Moderate	Moderate	Moderate	Low	No information	Moderate	Low
Chan 2018	Moderate	Low	Low	Low	Low	Moderate	Low
Kokorowski 2013	Moderate	Low	Low	Low	Low	Moderate	Low
Redman 1995	Moderate	Low	Moderate	Low	No information	Moderate	Low
Talini 2018	Moderate	Moderate	Moderate	Low	No information	Moderate	low

Qualitative Synthesis

Indications for Revision

Different studies reported different indications for circumcision revision, with Al-Ghazo (14) et al. providing specific details. In their study, out of 52 patients who were referred for revision surgery, redundant foreskin was the most common indication noted in 14 cases. External meatal stenosis was noted in 9 cases, while circumcision for patients with hypospadias was indicated in 8 cases. Also in 7 cases, the concealed penis was an indication. Five cases reported complete or partial degloving of the penis. The urethra-cutaneous fistula was an indication in 4 cases, preputial-glandular bridges in 3 cases, penile sebaceous cyst in 1

case, and buried penis in 1 case.
Brisson et al. [11] found that all 56 patients had a preoperative diagnosis of the redundant foreskin, with additional diagnoses including penile adhesions and phimosis. Redman et al. [12] indicated that in 6 cases, the penis was concealed by a circumferential cicatrix at the site of the previous circumcision, and in 23 cases, had marked preputial redundancy.

Physician Specialty in Primary Circumcision

The specialty of the physician performing the primary circumcision also varied. Al-Ghazo et al. [13] reported that primary circumcision was performed by pediatric surgeons, gynecologists, and pediatricians, in only 7 cases. In contrast, the majority (86.5%) of procedures were carried out by non-medical practitioners. According to Brisson et al (12), The most common specialty of the primary circumciser was pediatrician, followed by resident trainees, family medicine practitioners, and nurse midwives.. Chan et al. [10] limited their study to patients whose initial circumcision was performed exclusively by pediatricians, whether by attending physicians or residents in training.. The incidence of revision was similar in both groups. However, the incidence of revision using gomco clamp was higher in residents than attending physicians (P=.003). Furthermore, they reported that older age at primary circumcision was associated with significant higher rates of revision. Kokorowski et al (5) demonstrated that pediatric urologists performed the majority of cases (79%), with pediatric surgeons performing the remaining (21%). According to Talini et al. [12], 19 surgeons performed the procedures, six of whom were pediatric surgery residents still in training.

Complications

The type and incidence of reported complications were variable. According to Al-Ghazo et al (14), complications should be less severe if circumcisions were done by trained physicians rather than by laymen, and the complications observed were 6 cases with redundant skin and one case with partial degloving of the penis. Among 4,079 cases, Brisson et al (12) reported a 1.8% complication rate, including a case of bleeding that required a return to the operating room. The complication rate found by Chan et al (11) was similar between the attending physicians and residents, with a total complication rate of 1.53%. Redman et al (10) reported no instances of wound dehiscence or infection, with good cosmetic outcomes. Talini et al (13) provided detailed complication rates for circumcisions. Out of all the patients who experienced complications, 18.8% had traditional circumcision, while 81.2% underwent the procedure using the plastic ring method. The complication rates were 3% for the conventional method and 3.4% for the Plastibell method, with no statistically significant difference between the two approaches ($p = 0.79$). Specific complications observed were penile stenosis in 22.8% of cases, bleeding in 32.9%, paraphimosis due to dislodgement of the plastic ring in 41.8%, hematoma at the anesthetic injection site in 1.2%, and operative wound infection associated with retention of the Plastibell by the prepuce in 1.2%.

Simultaneous Additional Procedures

Additional procedures are frequently performed during circumcision revision. Al-Ghazo et al (14) reported concurrent surgical interventions, including herniotomy for inguinal hernia (2 cases), hydrocele (4 cases), orchiopexy (3 cases), and management of 17 penile conditions such as meatal stenosis, sebaceous cysts, urethrocutaneous fistula, and preputial-glandular bridges. . Similarly, Brisson et al (12) demonstrated that five patients (8.9%) required additional procedures at the revision time, including orchiopexy in one case, inguinal hernial repair in three cases, and meatotomy in one patient. Kokorowski et al (5) demonstrated that 24% of revisions involved simultaneous procedures, with hernia/hydrocele repair in 6%, orchiopexy in 4%, and scrotal surgery in 2% of cases. Redman (10) reported that 14 out of 46 boys (30.4%) required additional procedures at the time of the revision, such as inguinal hernia repair in six patients, orchiopexy in two patients, placement of pressure equilibrium tubes in four boys, adenoidectomy, and tonsillectomy in one patient.

Discussion

Circumcision entails surgically removing the prepuce, which is the foreskin overlying the glans of the penis. It has been widely performed on male neonates for thousands of years for religious and cultural purposes (15). It has been estimated that more than 40% of adult males worldwide are circumcised, with religious factor contributing to 70% (16). Circumcision has been associated with many benefits, such as decreasing the risk of urinary tract infections, sexually transmitted infections, and improving male genital hygiene (17). A recent risk-benefit research demonstrated that circumcision benefits outweighed the risks by more than 200:1, which was supported by the American Academy of Family Physicians (AAFP) and the American Academy of Pediatrics (AAP) (18–20). The 2012 policy statement by the American Academy of Pediatrics (AAP) advocated for educating parents about the benefits of circumcision and recommended incorporating elective infant circumcision into public health strategies, similar to vaccination programs [20]. While numerous studies highlight the benefits of elective circumcision, there is a notable gap in research addressing the

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educating parents about the benefits of circumcision and recommended incorporating elective infant circumcision into public health strategies, similar to vaccination programs [20]. While numerous studies highlight the benefits of elective circumcision, there is a notable gap in research addressing the complications associated with the procedure and the frequency of circumcision revisions following the initial surgery. Circumcision surgery has been associated with various complications, including bleeding, inflammation, hematoma, infection, insufficient removal of the foreskin, persistent phimosis, urethrocutaneous fistula formation, meatal stenosis, and inadequate residual shaft skin for proper wound closure (21,22).

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Previous studies identified a complication rate ranging from 0.2% to 3.1% when performed by surgeon (23,24). A large retrospective study of 5,882 males who underwent circumcision by Gomco and the Plastibell techniques reported that the most commonly encountered complications were bleeding, infection, and trauma (25). A previous 6-year consecutive case series of 52 cases who underwent circumcision revision demonstrated that redundant skin was the most prevalent indication for revision as its appearance does not improve with age (14). The second most prevalent indication of revision in that study was external meatal stenosis, which is supposed to occur due to scarring and fibrosis (26). Another systematic review demonstrated that the incidence of complications was higher if circumcision was conducted in older children and by non-experienced operators. This is consistent with Chan et al which reported that circumcision revision was significantly higher if primary circumcision was performed in older age (11). Talini et al. conducted a retrospective analysis to compare conventional circumcision with circumcision using the Plastibell device, focusing on postoperative complications that necessitated reoperation. They found no considerable variation between both techniques concerning the incidence of complications. Although preputial stenosis was the commonest complication requiring revision among boys in the conventional cohort, paraphimosis due to plastic ring dislodgment followed by bleeding due to improper ligation of the ring (27) were the most commonly encountered complications requiring reoperation among patients in the plastibell cohort (13). Contrary to the previous findings in Chan et al (11), Talini et al reported no effect of the age of patients on the incidence of complications. Previous research recommended early surgical revision for cases with redundant prepuce or preputial stenosis to avoid balanoposthitis arising from the excess remaining foreskin and the development of local scarring (27,28).

In 2010, Fekete et al studied 48 adult men who were circumcised after puberty within one year before presentation with complications for revision surgery (29). In contrast to circumcision in children, the most common indications for circumcision revision in adults were hypertrophic scar (21.4%), scar wrinkling (13.2%), followed by redundant foreskin due to incomplete circumcision (11.2%), and paraphimosis (6%). After the first circumcision revision, 96% of patients were satisfied with the final cosmetic and sexual functional outcomes. This is the first systematic review highlights the diverse and heterogeneous nature of indications for circumcision revision. The authors note, based on their personal experience, that parental preference for a fully uncovered glans is a common but underreported factor. Additionally, there is a significant lack of data on this subject, particularly within the pediatric population. To address these gaps, systematic data collection, whether retrospective or prospective, is essential. Such efforts would provide clearer guidance on the justifiable indications for the procedure and identify the appropriate medical professionals to perform it, facilitating the development of evidence-based recommendations. Our study was limited by the inclusion of observational studies with various study designs which may cause heterogeneity of the final results. In addition to the moderate risk of bias among all included studies.

Conclusion

Male circumcision represents one of the most prevalent surgical procedures worldwide for various indications. Circumcision revision may be required to manage complications arising from the primary surgery such as redundant skin and meatal stenosis. To ensure achieving optimal cosmetic and functional outcomes, sufficient foreskin excision, meticulous atraumatic techniques, and specific suturing approaches are required. Additionally, providing preoperative counselling and postoperative instructions are also essential.

Declaration of Interest

All authors declare that they have no conflict of interest.

Data availability

Data will be available to all readers upon request.

Author contributions

Study concept and design: Amani Nasser Alansari, and Santiago Vallasciani.
Data acquisition: Ahmed Adel Sofy.
Data analysis: Ahmed Adel Sofy.
Drafting of manuscript: Amani Nasser Alansari and Ahmed Adel Sofy.
Critical revision of the manuscript: Amani Nasser Alansari and Santiago Vallasciani.

Ethical considerations

This article does not require ethical approval

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