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ORIGINAL ARTICLE

Primary care of preputial adhesions in children – a retrospective cohort study

Varunkumar Maddileti, Suhasini Gazula, Praveena Dantala

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Authors:

Suhasini Gazula
(Corresponding author)
MCh
Department of Pediatric Surgery, ESIC medical college Hospital, sanath nagar, Hyderabad
Email: drgazulaesic@gmail.com

Varunkumar Maddileti
MCh
Department of Pediatric Surgery, ESIC medical college Hospital, sanath nagar, Hyderabad

Praveena Dantala
MCh
Department of Pediatric Surgery, ESIC medical college Hospital, sanath nagar, Hyderabad

Abstract

Introduction: Aside from religious circumcisions, the indications for circumcision are few. However, in the cultural context, many patients are unnecessarily referred for circumcision for physiological phimosis (adhesions). Due to parental concerns and misperceptions by general practitioners, non-retractile prepuce is one of the most common indications for referral to a paediatric surgeon in many countries. This study aimed to determine whether preputial adhesiolysis successfully managed symptomatic non-retractile foreskin and therefore prevented the need for circumcision.

Methods: A retrospective review was performed of the health records of children who presented with preputial adhesion. We included 65 symptomatic patients (ballooning of the prepuce in all cases and additional dysuria in three cases) who underwent preputial adhesiolysis. All cases were followed up for 2 years. Circumcision was subsequently carried out for patients who developed fibrous scarring resulting in difficult retraction due to the development of thick adhesions or skin fissuring with persistence of symptoms.

Results: Of the 65 boys, 58 (89.2%) achieved complete retraction of the prepuce. The remaining 7 boys (10.8%) presented with recurring symptoms and thick fibrosed prepuce, and they underwent circumcision due to the dense adhesions. Histopathological examination of the circumcised prepuces revealed balanitis xerotica obliterans in two cases.

Conclusion: Preputial adhesiolysis is a safe and effective treatment for symptomatic preputial adhesions in boys younger than 5 years old. The procedure avoids circumcision and its associated risks. Preputial adhesiolysis should be offered as a primary treatment instead of circumcision.

Introduction

Circumcision is one of the most performed procedures throughout history, with the most common indication being a non-retractile prepuce.[1] Apart from religious circumcisions, the indications for circumcision are few. One of the indications is dense fibrotic adhesions of the prepuce in vesicoureteral reflux and posterior urethral valve, and circumcision prevents urinary tract infection in these cases.[2] However, many circumcisions are performed for physiological phimosis without need in the cultural setting. Non-retractile prepuce is one of the most prevalent reasons for referring a child to a paediatric surgeon in many countries, owing to parental anxieties and general practitioner misperceptions.[3] Data from the American Association of Paediatrics regarding circumcision is not sufficient to conclude the true advantages of male circumcision.4 Most infants have a physiological non-retractile prepuce that resolves spontaneously by 4 or 5 years of age[5]; however, a subset of children develop symptoms, such as ballooning of prepuce with dribbling and dysuria. The release of preputial adhesions successfully relieves these symptoms, thereby avoiding a circumcision that would be unnecessary as this natural preputial separation can be achieved by 5 years of age in most children.[6] This study reviewed the practice of preputial adhesiolysis at a tertiary paediatric surgical centre. The study aimed to determine whether preputial adhesiolysis was successful in treating non-retractile foreskin, thereby preventing the need for circumcision.

Methods

A retrospective review was performed of the health records of children who presented with preputial adhesion. We included 65 symptomatic patients (ballooning of the prepuce in all cases and additional dysuria in three cases) who underwent preputial adhesiolysis. Asymptomatic cases, religious circumcision cases, and those with absolute indications for circumcision were excluded from this study. Asymptomatic cases with preputial adhesions were advised routine cleaning without any further intervention.

Absolute indications for circumcision included a thick fibrosed prepuce and religious indications.

Histopathological correlation was done for circumcisions involving thick fibrosed skin to assess for balanitis xerotica obliterans (BXO). After written informed consent was obtained from the parent or guardian, all symptomatic cases underwent gentle adhesiolysis to visualise the meatus. The patients were advised local hygiene and followed up weekly until resolution of the condition, which was determined when the parent could easily retract the prepuce to visualise the meatus and perform local cleaning. Circumcision was carried out for patients who developed fibrous scarring resulting in difficult retraction due to the development of thick adhesions or skin fissuring with persistence of symptoms.

Results

The 65 boys included in the study were aged between 2 months and 144 months old (mean 40 months); 17 boys were ≥5 years of age at presentation. Ballooning at voiding was observed in 65 patients, and 3 patients had dysuria with ballooning (**Figure 1**). Of the 65 patients, 53 (81.5%) had white smegma in the coronal sulcus (**Table 1**), and 58 (89.2%) required a single session of adhesiolysis (**Figure 2**).

Figure 1. Indications for the release of preputial adhesions

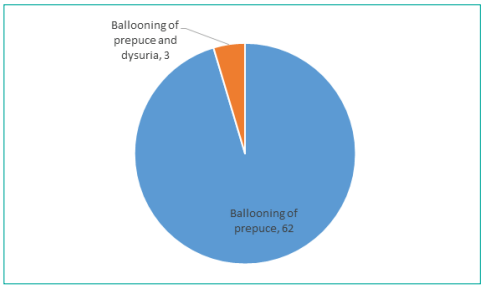
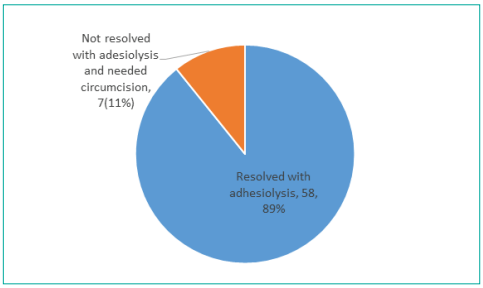


Figure 2. Treatment received for symptomatic preputial adhesions



The follow-up period was 1 year in person and 1 year by telephone consultation due to social restrictions caused by the COVID-19 pandemic. Of the 65 cases, 7 were non-respondents; these patients developed thick adhesions, and skin abrasion occurred on attempted adhesiolysis. These children underwent circumcisions at various times from initial adhesiolysis, as shown in **Table 1**. All children who underwent circumcision after an adhesiolysis attempt were older than 5 years of age (5–12 years). Circumcision was performed at a mean time of 7.4 months (6–10 months) post-preputial adhesiolysis. Among the seven circumcised cases included in the study, two had histopathological changes consistent with BXO and were 82 and 126 months old, respectively.

Table 1. Findings of adhesiolysis and circumcision

Adhesiolysis	Preputial pearls (white smegma) in 53 cases
	Mucosal tears due to dense adhesions in 7 cases
Circumcision	White scaly glans in 2 cases (BXO)
	Normal glans in 5 cases

Table 2. Data of children who underwent circumcision

Sl. No.	Age at circumcision (months)	Length of time between last adhesiolysis and circumcision (months)	Histopathology
1	70	6	Non-specific inflammation
2	71	7	Non-specific inflammation
3	82	6	Balanitis xerotica obliterans
4	80	8	Non-specific inflammation
5	110	10	Non-specific inflammation
6	120	9	Non-specific inflammation
7	126	6	Balanitis xerotica obliterans

The remaining five children who underwent circumcision had chronic non-specific inflammatory changes on histopathology. No development of meatal stenosis was observed in the BXO cases. There were no recurrences in children who successfully underwent adhesiolysis and maintained strict local hygiene. However, long-term follow-up is needed given the recurrent nature of adhesions and to evaluate the long-term effects of BXO. No complications of the circumcision procedure occurred during the study.

Discussion

Most of the children in the present study were younger than 5 years of age. The majority (89.2%), after gentle adhesiolysis, did not require a further treatment because their symptoms resolved. Only symptomatic children (ballooning of prepuce in the majority) underwent gentle preputial adhesiolysis to visualise the meatus. Asymptomatic cases do not require any treatment, as preputial adhesions in children are physiological and only local hygiene is encouraged because the foreskin will eventually retract as the child ages, in a majority by 5 years of age. However, preputial retraction can occur at different ages, with the mean age being approximately 10.4 years.[6] The adhesiolysis procedure is used less often with the increased awareness of normal physiology by parents and general practitioners.[7]

Symptoms recurred in 7 children who underwent circumcision due to a thick fibrosed prepuce, where adhesiolysis was not possible. Adhesiolysis is difficult with a tight prepuce and may lead to skin abrasions, tears, and can result in scarring. It is also difficult to practice local hygiene in such cases, which results in recurrence of adhesions and symptoms.

The prepuce initially forms on the dorsal aspect of the glans at approximately 12 weeks of gestation. After sequential proximal-to-distal remodelling of the ventral urethral plate along with the ventral aspect of glans, the prepuce, which is of epidermal origin, fuses in the ventral midline. Separation of the prepuce from the glans occurs around 24 weeks of gestation.[7,8] There are numerous preputial adhesions between the glans and the foreskin in the neonatal period, so it is non-retractable at this time (physiological phimosis).[8] These adhesions break down as the child ages, and there may be ballooning of the foreskin. Preputial pearls are foci of smegma build-up that consist of sebaceous secretions and shed skin that collects underneath the prepuce due to preputial adhesions; these are benign and do not need to be treated by circumcision. As shown in the present study, the majority of cases (89.2%, 58/65) required only a gentle retraction, and only 10.2% (7/65) required circumcision due to persistence of symptoms. Adhesions became denser and skin excoriations occurred after unsuccessful attempts of re-adhesiolysis. The foreskin eventually becomes fully retractile, a process that occurs by 5 years of age, though it may rarely take longer.[9]

Histopathologically, BXO is characterised by moderate lymphocytic infiltration of the superficial dermis and basal epidermis and is associated with epidermal basal vacuolar changes.[10] BXO is rare in children, with a prevalence of 0.01% to 0.07% in the pre-pubertal age group.[11] Circumcision is the treatment of choice in cases of BXO, with or without adjuvant topical steroids. The most concerning complications of BXO are meatal stenosis and urethral stricture. In the present study, the two children with BXO did not have such complications. There is no evidence of penile carcinoma within the paediatric population with BXO.[11] In the present study, the two children with BXO were 82 and 126 months old, respectively. Those with chronic inflammation on histology, which may be an early finding of BXO, were also over 5 years old at the time of circumcision.

Aworanti et al. published a similar study in which 534 preputial adhesiolysis procedures were performed, and circumcision was subsequently required in 45 (8.4%) children. The children who underwent circumcision were older than 5 years of age, which was also the case in the present study. In Aworanti et al.'s study, two children had BXO-associated changes on histology, although many specimens were not sent for histopathological evaluation. Histopathological analysis of the 44 excised prepuces revealed BXO in two patients (4.5%), chronic inflammation in 11 (25%), normal histology in 26 (59%), and no histopathology report in 6 patients (13%) respectively. The median age at the time of circumcision for children with BXO and chronic inflammation was 65 months old (28–135 months). In these children,

circumcision was performed at a mean age of 15.7 months (1.8–40.4 months) after adhesiolysis. The two children with BXO were 83 and 125 months old at the time of circumcision.[12] The results were comparable with the present study. Kumar et al. published a study on the outcomes of circumcision for presumed phimosis. Only 4 (4.5%) out of 92 children required circumcision due to failed adhesiolysis. The remaining children responded to preputial adhesiolysis, with few requiring multiple sessions; two children did not respond to the adhesiolysis and were circumcised after two sessions of adhesiolysis within 3 weeks of follow-up. Two other children, who were lost to follow-up after initial adhesiolysis, reported fibrotic foreskins after 2 years and were circumcised without further trials of adhesiolysis.[13] Due to these findings, long-term follow-up is needed.

Many studies support a trial of topical steroid-based cream before considering circumcision. A Cochrane systematic review in 2014 reported that topical steroids significantly increased partial or complete clinical resolution of phimosis.[14] Topical steroids were not considered in the present study because most children were younger than 5 years of age and symptoms were relieved by the first follow-up visit, and fibrotic changes occurred in a few children who eventually underwent circumcision. Topical steroids should have been considered in children over 5 years of age, and may have prevented the need for circumcision. Studies by Shankar et al.[15] and Osters et al.[16] reported the onset of pathological phimosis by 15 years of age, with an incidence of 0.5%. Balanitis occurs in children in whom toilet training starts at around 3 years of age; patients with balanitis in this age group would probably benefit from topical steroids, especially when parents are concerned about the condition.

Preputioplasty could not be considered in the present study in place of circumcision because the patients who underwent circumcision had thick fibrotic skin, which was associated with suspicion of BXO. Several studies recommended preputioplasty followed by topical steroids in BXO, but only mild cases respond to steroids, and mild cases cannot be diagnosed without histopathology, thus favouring circumcision as a definitive treatment.[17]

The natural history of the prepuce and its adhesions should be understood by the parents of the patients as well as by fellow physicians and colleagues to avoid the unnecessary surgical intervention of circumcision and its associated complications.[18] Circumcision should be restricted to religious and other absolute medical indications. Preputial adhesiolysis for symptomatic physiological phimosis and encouragement of local hygiene is key to facilitating its natural course.

Preputial adhesiolysis is a safe and effective treatment for symptomatic physiological phimosis in children younger than 5 years old as it avoids circumcision and its associated risks. Preputial adhesiolysis should be offered as primary treatment instead of circumcision. The normal physiology of preputial adhesions in children should be understood. Circumcision is the treatment of choice for BXO.

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Conflicts of interest

The authors declare that there were no conflicts of interest.

How does this paper make a difference in general practice?

- Due to parental concerns and misperceptions by general practitioners, the non-retractile prepuce is one of the most common indications for referral to a paediatric surgeon in many countries.
- Asymptomatic cases do not require treatment as preputial adhesions in children are physiological. Only local hygiene is encouraged because foreskins will eventually retract as the child ages and, in a majority, by 5 years of age.
- Preputial adhesiolysis is a safe and effective treatment for symptomatic preputial adhesion in boys and avoids circumcision and its associated risks. Preputial adhesiolysis should be offered as primary treatment instead of circumcision.

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