Anatomic variants associated with newborn circumcision complications

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MAYER E, CARUSO DJ, ANKEM M, FISHER MC, CUMMINGS KB, BARONE JG. Anatomic variants associated with newborn circumcision complications. The Canadian Journal of Urology. 2003;10(5):2013-2016.

Objective: *Circumcision is one of the commonly performed procedures on males in the United States, Canada, Australia, and the United Kingdom. The association of minor anatomic variations of the newborn genitalia in patients with minor circumcision complications has not been previously examined. In this study, we looked for an association between subtle genital anatomic variations and newborn circumcision complications.*

Materials and methods: *Over an 18-month period, children presenting for circumcision revision were examined for minor variations in genital anatomy. Children referred for other urological problems during the same period comprised the control group. The same physician evaluated all of the children.*

Results: *During this period, 68 children were evaluated for possible circumcision complications. A confirmed complication was present in 57 infants. Patients with a minor circumcision complication were found to have a 9-fold higher incidence of a prominent suprapubic fat pad, penoscrotal webbing, or being a premature infant as compared to the control group.*

Conclusions: *Subtle anatomic variations may be associated with a higher incidence of circumcision complications. Physicians performing newborn circumcisions should thoroughly examine the genitalia for these anatomic variations prior to the procedure in order to reduce potential complications.*

Key Words: circumcision, complications, newborn, pediatric

Introduction

Neonatal circumcision is one of the most commonly performed surgical procedures. For example, approximately 1.2 million newborn males are circumcised yearly in the United States.[1] Circumcision rates were estimated in 1970 to be 69% to 97% of boys and men in the United States, in comparison with 70% in Australia, 48% in Canada, and 24% in the United Kingdom.[2] More recent data indicate that the Canadian rate was 24.5% for the 1993-1994 fiscal year.[3] The Canadian Institute for Health Information reported that <17% of Canadian neonate males underwent a circumcision as a primary procedure during the 1996-1997 fiscal year.[4]

Major complications resulting from newborn circumcision are rare. Minor complications are more common and have been reported to occur in approximately 2% to 6% of newborn circumcisions.[5-9]

Accepted for publication June 2003

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TABLE 1. **Circumcision complications in patient groups**

Complications	Circumcision complication group (n=57)*	Control group (n=72)	P value
Non-retractile foreskin	30 (52.6%)	0	< .0001
Adhesions	13 (22.8%)	14 (19.4%)	0.8
Poor cosmesis	51 (89.4%)	4 (5.6%)	< .0001

* The percentage totals exceed 100% due to the observation of more than one anatomical finding in some children.

The rate of minor circumcision complications can be partially attributed to the skill and experience of the surgeon. Undoubtedly, good technique is vital to a successful outcome. All circumcisions require attention to surgical detail including the appropriate marking of the coronal sulcus on the outer prepace, releasing adhesions between the inner prepuce and glans penis, removing the appropriate amount of prepuce, and careful attention to hemostasis.

Most newborn circumcisions are performed before the infant is discharged from the hospital, unless there is an obvious genital abnormality such as hypospadias. Minor genital variations may not be detected since physical findings are subtle. The association between minor anatomic variations in the newborn genitalia and circumcision complications has not been examined. The purpose of this study is to determine if subtle anatomic genital variants are associated with newborn circumcision complications.

Materials and methods

Over an 18-month period, children who presented with a possible circumcision complication were evaluated for minor variations of the genital anatomy. These children comprised the prospective and consecutive series. The control group consisted of a group of boys who had undergone a routine neonatal circumcision and then presented with other urological problems including: hernia or hydrocele, undescended testis, and hydronephrosis. One physician (JGB) from a university-based practice examined all patients for any anatomical variations. A circumcision complication was considered to be present if one or more of the following was found: 1) inability to retract the foreskin secondary to residual phimotic foreskin, 2) presence of adhesions between the glans penis and foreskin, and 3) poor cosmetic result due to foreskin covering more than 80% of the glans penis or an asymmetrical circumcision. Patients were only assessed for possible complications after the initial neonatal circumcision. Data collection included the patient's age at the time of the visit. The experience of the surgeon who performed the circumcision was not determined.

To ensure clinical significance, results were analyzed using the Continuity Adjusted Chi Square test and odds ratio calculations with 95% confidence intervals on the SAS Statistical System.

Results

Sixty-eight children were seen in consultation for a possible circumcision complication with a mean age of 5.7 months (range 1-14 months). A circumcision complication was confirmed in 57 children. Seventy-two children comprised the control group with a mean age of 6.2 months (range 1-14) months. Table 1 presents the circumcision complications and associated statistical significances seen amongst children with a confirmed circumcision complication versus the control group. Table 2 demonstrates the

TABLE 2. **Anatomic variants in patient groups**

Anatomic abnormality	Circumcision complication group (n=57)*	Control group	P value
Penoscrotal webbing	10 (17.5%)	0	< .0001
Suprapubic fat pad	20 (35%)	4 (5.6%)	< .0001
Prematurity	11 (19.2%)	4 (5.6%)	< .04
Overall	41 (72%)	8 (11.2%)	< .0001

TABLE 3. **Recommendations to reduce circumcision complications**

If the following anatomic abnormality/variation is identified:	**Then:**
Prominent suprapubic fat pad	Firmly compress the fat pad to ensure accurate marking of the outer prepuce
Penoscrotal web	Avoid clamp circumcision and perform penoscrotal web repair with circumcision at 6 months of age by a qualified surgeon
Premature infant	Delay circumcision until the premature infant has achieved the size and weight of a normal 1-month old infant born at full-term

presence of anatomic abnormalities and corresponding statistical significances.

Children with a confirmed prominent suprapubic fat pad, penoscrotal webbing or a premature infant had an odds ratio of 9.0 (3.99-20.25) of presenting with a circumcision complication compared to the control group. When these anatomic variants were evaluated individually, children presenting with a circumcision complication were found to have a 3.28 odds ratio (1.04-10.37) of being premature, and a 7.04 odds ratio (2.53-19.82) of having a prominent suprapubic fat pad. An odds ratio could not be calculated for the penoscrotal web variant, as this was not observed within the control group.

Discussion

In our patients, subtle anatomic variations of the newborn genitalia were associated with minor circumcision complications. Minor variations included penoscrotal webbing and presence of a prominent suprapubic fat pad. We identified premature boys as an anatomic variation subgroup, as they are at an increased risk of having a smaller penis size. Though the control group consisted of children presenting with other urologic complaints, the incidence of minor genital variations in this sample best represents the pediatric population at-large.

The most common anatomic variation detected in the group with a confirmed complication was an unrecognized penoscrotal web. Penoscrotal webbing occurs when scrotal skin is attached to the tip of the penile shaft skin. This abnormal attachment produces a web of skin that is best seen when the penis is outstretched and can be a congenital finding or a post-operative complication secondary to an overzealous circumcision on the ventral aspect. Because of the abnormal skin insertion, a typical newborn clamp circumcision could result in improper removal of prepuce or scrotal skin. Before performing a newborn circumcision, the surgeon can determine if a penoscrotal web is present by stretching the penis. If a web is present, clamp circumcision is best avoided and formal circumcision with penoscrotal web repair under general anesthesia can be performed at 6 months of age. Repair involves incising the web transversely and closing it longitudinally.

Others have demonstrated the incidence of prominent suprapubic fat pads in children presenting for circumcision revision to be as high as 63%.[8] Although not an anatomic abnormality, the presence of a prominent suprapubic fat pad may result in complications if the penis heals within the fat pad causing a hidden penis. Another potential problem associated with a prominent suprapubic fat pad is the difficulty determining the precise amount of foreskin to be excised. In this situation, it is helpful to firmly compress the fat pad prior to marking the coronal sulcus.

Since premature infants were circumcised before hospital discharge, it is possible that the smaller size of the premature infant increased the technical difficulty of the circumcision. Smaller anatomy makes it more difficult to lyse preputial adhesions, to determine the proper amount of foreskin to be excised, and to properly apply the circumcision clamp. Since circumcision can safely be performed in the office setting until approximately 2 months of age, consideration should be given to delaying circumcision in premature infants until they have achieved the size and weight of a normal 1-month old infant born at full-term.

In conclusion, this study reveals that subtle anatomic variations may be associated with circumcision complications. These variants include: penoscrotal webbing, a prominent suprapubic fat pad, and infant prematurity. To reduce circumcision complications, physicians should carefully examine the genitalia before performing a newborn circumcision. If an anatomic variant is discovered, precautions can be taken to reduce potential complications. Table 3 gives a succinct summary of our recommendations. □

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