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A Prospective Study of a Cohort of Hypospadias in London- Incidence, Prognostic Indicators, Risk Factors and their Impact in Hypospadias Surgery

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Abstract

Purpose: We aimed to evaluate the safety and efficacy of two commonly performed hypospadias repair techniques for distal and proximal types, to identify prognostic factors and to delineate an accurate complication rate. We prospectively collected data on all the 242 children who had undergone hypospadias surgery over a six-year period in a single pediatric urology centre from 2001 to 2006.

Patients and Methods: All patients were prospectively examined by a pediatric urologist. Data collected consisted of the position of the meatus, the depth of the glandular groove, presence of chordee, operation type, age at surgery, dressing usage, catheter placement, post-operative appearance, the fistula rate and other complications.

Results: Single stage Snodgrass repair was carried out in 196 and 46 patients had two stages Bracka repair. Out of 46 patients who had two stage procedures, meatal positions were glanular (n=2), distal (n=2), midpenile (n=6), proximal penile (n=8) and penoscrotal in (n=28) patients. The meatal positions were glanular in 21, distal (coronal and subcoronal) in 121, midpenile in 43, proximal penile in 24 and penoscrotal/scrotal or perineal in 33 patients. Glanular groove was good in 150, moderate in 14 and poor in 78 children. Chordee was mild in 34, moderate in 20 and severe in 49 patients. The overall fistula rate was 12% with 9% rate for single stage and 24% for two stage repairs (p = 0.01 by Fisher's exact test). The fistula rate was 10.6% in good urethral groove group, 14.2% in moderate and 14.1% in poor urethral groove groups (p = 0.73 by X² test). In the group without chordee or mild chordee, the fistula rate was 12.1% whereas moderate to severe chordee group had 11.6% fistula rate (p = 1.00 by Fisher's exact test). Analysing the patients with proximal and penoscrotal hypospadias, fistula rate was 33.3% for one stage procedures and 11.6% for two stage procedures (p = 0.1 by Fisher's exact test). Fistula rate was unaffected by the type of dressing used. Other problems encountered were meatal stenosis in 6, skin breakdown in 4, graft contracture in 4 and poor cosmesis in 4.

Conclusion: The overall fistula rate was 12% with 9% rate for single stage and 24% for two stage repairs and was not affected by the type of urethral groove, severity of chordee or type of dressing or catheter used.

Introduction

The aim of hypospadias repair is to obtain a good functional and cosmetic reconstruction with the lowest complication rate [1]. Retrospective studies of risk factors after repair of hypospadias has been reported but very few with prospective studies are there in the literature [2,3]. Due to the variations in results in the hypospadias literature, predicting the outcome of surgery is extremely challenging for the pediatric urologist.

To identify prognostic factors and to delineate an accurate complication rate, we prospectively collected data on all the 242 children who had undergone hypospadias surgery over a six-year period in a single pediatric urology center at Evelina Children's Hospital, London from 2001 to 2006. The pediatric urologists were all trained at one centre of excellence and of same seniority using same techniques.

The purpose of our prospective cohort study was to evaluate prognostic indicators and risk factors for hypospadias in a single urology center in London and to specify their impact on the severity of the hypospadias type. In 2001 our study group initiated a prospective cohort study to evaluate and possibly improve the outcomes of hypospadias surgery. The aim of our study was to evaluate the short-term complications and prognostic factors in the various types of hypospadias.

Patients and Methods

All patients were prospectively examined by a pediatric urologist. Data collected consisted of the position of the meatus, the depth of the glandular groove, presence of chordee, operation type, age of surgery, dressing usage, catheter placement, post-operative appearance and the fistula rate.

Data of the patient, disorder, surgical technique, pictures of cosmetic appearance and complications are prospectively documented in a "web based" database. Complication rates, type of urethroplasty complications and possible prognostic factors of the subgroup sub coronal, distal- and mid-shaft type hypospadias were evaluated six months postoperatively.

Keywords: Hypospadias; Glanular Groove; Urethroplasty; Snodgrass Repair; Bracka's Repair; Fistula; Meatal Stenosis; Urethral Stricture

Statistical methods

Data were collated and analysed with Excel® (Microsoft, US) and are given as percentages, medians (interquartile range, IQR) or mean (standard deviation, SD). Statistical tests were performed with online software (VassarStats.net). Categorical variables were described by frequency and percentage, and numerical variables were described by mean and standard deviation or median and min-max values. Relationship between categorical variables was analysed by Chi Square, and the relationship between numerical variables was analysed by Fisher's exact test. Independent factors influencing full response were examined by logistic regression analysis. $P < 0.05$ was regarded as statistically significantly different.

Results

Single stage Snodgrass repair was carried in 196 and 46 patients had two stages Bracka repair (Figure 1A). The meatal positions were glanular in 21, distal (coronal and subcoronal) in 121, midpenile in 43, proximal penile in 24 and penoscrotal in 33 patients (Figure 1B). Glanular groove was good in 150, moderate in 14 and poor in 78 children (Figure 1C). Chordee was mild in 34, moderate in 20 and severe in 49 patients (Figure 1D). A total of 46 patients had two stage procedures (glanular (n=2), distal (n=2), midpenile (n=6), proximal penile (n=8) and penoscrotal in (n=28) patients (Figure 2A).

The overall fistula rate was 12% with 9% rate for single stage and 24% for two stage repairs as depicted in Figure 2B ($p = 0.01$ by Fisher's exact test). The fistula rate was 10.6% in good urethral groove group, 14.2% in moderate and 14.1% in poor urethral groove groups as shown in Figure 2C ($p = 0.73$ by X^2 test). In the group without chordee or mild chordee, the fistula rate was 12.1% whereas moderate to severe chordee group had 11.6% fistula rate as demonstrated in Figure 2D ($p = 1.00$ by Fisher's exact test).

Analysing the patients with proximal and penoscrotal hypospadias, fistula rate was 33.3% for one stage procedures and 11.6% for two stage procedures as evident from Figure 3A ($p = 0.1$ by Fisher's exact test). Fistula rate was unaffected by the type of dressing used. Other problems encountered were meatal stenosis in 6, skin breakdown in 4, graft contracture in 4 and poor cosmesis in 4 (Figure 3B).

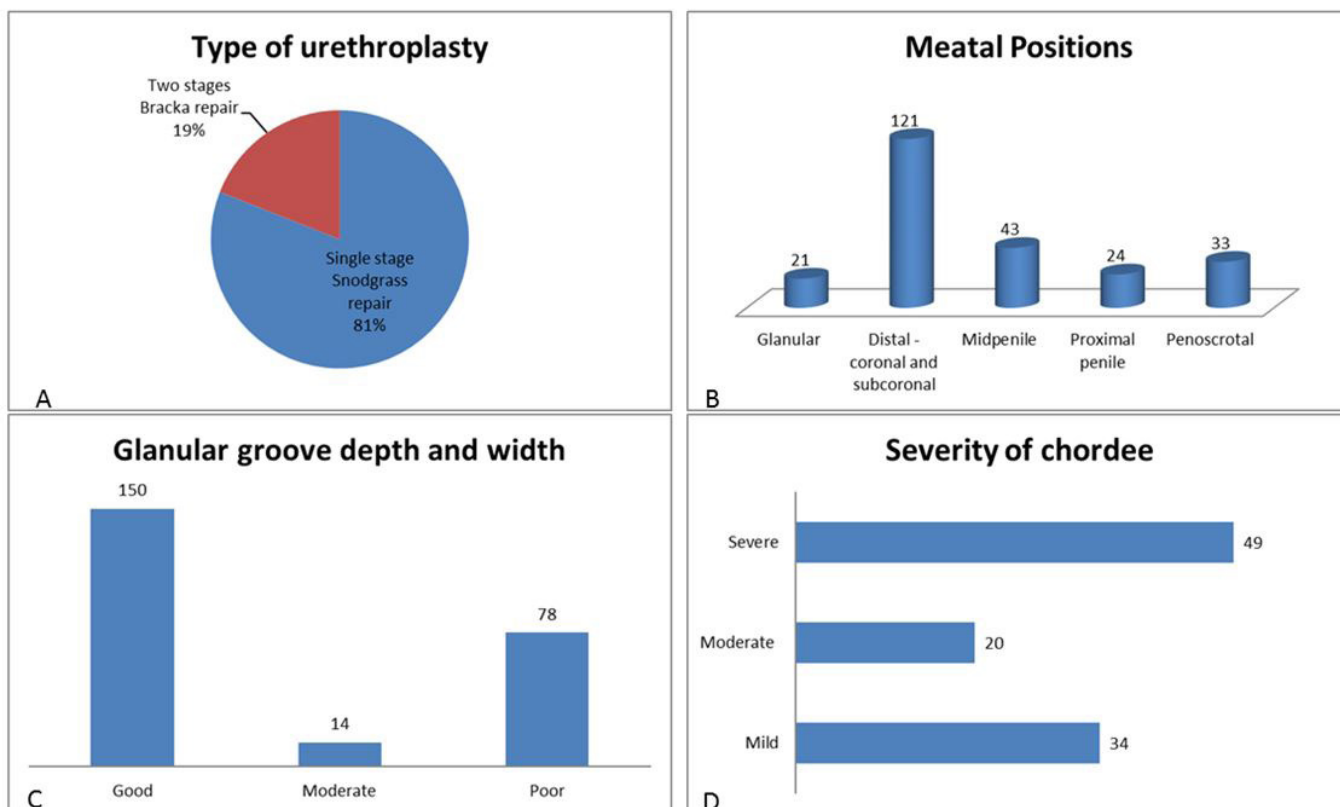


Figure 1: (A) Type of stage of hypospadias repair; (B) Positions of the ectopic meatus; (C) Nature of the glanular groove; (D) Number and nature of severity of chordee

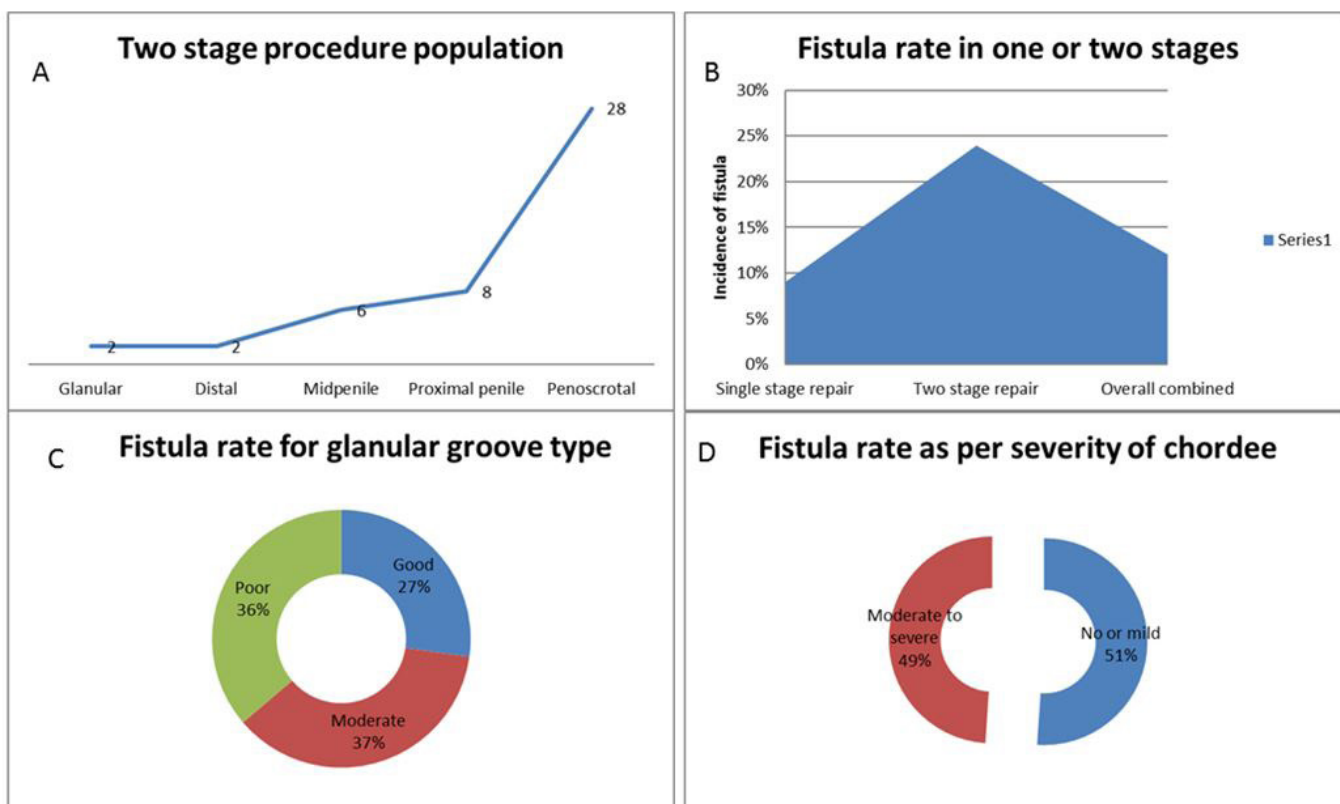


Figure 2: (A) Numbers of various types of hypospadias for two stage urethroplasty; (B) Fistula rate as per the stage of repair in proximal hypospadias; (C) Fistula rate as per the type of glanular groove; (D) Fistula rate as per severity of chordee

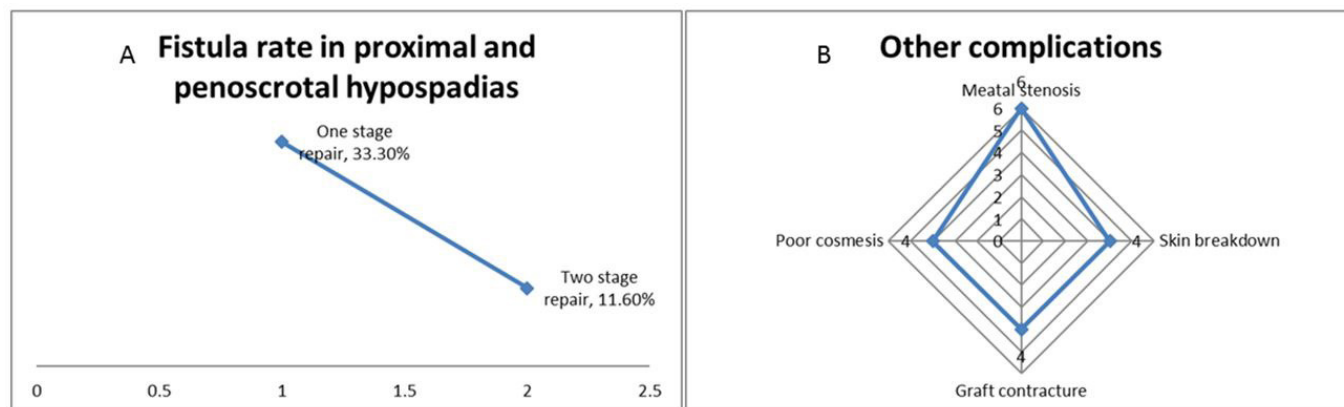


Figure 3: (A) Fistula rate in one or two stages in proximal/penoscrotal hypospadias; (B) Complications other than fistula formation

Discussion

Hypospadias is a congenital anomaly of anterior urethral and penis having ectopic ventral meatus located proximal to the tip of the glans penis which is splayed open with prepusal skin hood and penis associated with ventral shortening and curvature, called chordee. It is anomaly in which pediatric urologists, pediatric surgeons, plastic surgeons and adult urologists have a challenging application of their reconstructive techniques [4-16]. It has anatomical, functional (urinary and genital), cosmetic, psychological and psychosexual aspects of outcome to consider in long term.

Hypospadias surgery results are the gold standard for appraisal and revalidation of the pediatric urologist, this has been a subject of great interest of late, with a recent cohort studies reporting that the outcome may be more associated with other factors than the surgeon factors [4-13,17-22]. We are aware about a wide variation in complication rates between the surgeons. To eliminate these bias, we selected small group of paediatric urologists trained at same national centre of excellence practicing same techniques using optical magnification and sub epithelial urethroplasty suture technique with same anaesthetic team and modern anaesthetic techniques, fine instrumentation, suture materials, catheter, wound dressing and antibiotics.

Urethroplasty techniques are generally categorized as-primary tubularizations, local pedicled skin flaps, tissue grafting techniques, or meatal advancement procedures. The incidence and usually applied techniques for the various types of hypospadias are as follows:

- 50%-Distal-Anterior (megameatus, glanular and subcoronal)
- 20%-Middle- (distal penile, midshaft, and proximal penile)
- 30%-Proximal-Posterior (penoscrotal, scrotal, and perineal)

The location is anterior in 50% of cases, middle in 20%, and posterior in 30%; the subcoronal position is the most common overall in the incidence. We prospectively recorded the meatal location, glans configuration, skin coverage, and chordee.

The most common complications following hypospadias repair are: urethrocutaneous fistula, meatal stenosis/urethral stricture, glans dehiscence, breakdown, and cosmetic unfavourable outcome requiring redo-surgery. Complication rates depend on many factors and our study has tried to eliminate many of the variables. A recent survey of North American pediatric urologists clearly showed that there is a discrepancy between complication rates reported in the literature and the participants' operative outcomes, regardless of practice setting, operative volume, or time in practice. However, in an era of economic restraints and academic pressure, publication bias may be a significant factor in reporting complication rates.

In a recent international hypospadias survey with nearly 500 participating pediatric urologists and pediatric surgeons, we sought to determine the strategies of follow-up and assessment of outcome (10). It was highly interesting that nearly 60% of all participants have a follow-up period of less than 6 months. On the other hand, only 10% of the surgeons would follow-up their patients until and beyond puberty. However, another survey performed at the 2011 ISHID meeting showed that more than 50% of the participants would follow their patients until puberty or beyond into adulthood. The range of follow-up lies between 6 weeks and 9 years. Most of papers do not address the issue of "lost to follow-up" or "excluded from the study." It must be assumed that the follow-up rate usually is 100%. It has been criticized that follow-up periods – especially in Northern America – are short, perhaps too short to draw proper conclusions on outcome and complications (11).

On the other hand, some believe that most of the complications appear within a short period post-operatively. Therefore, follow-up for 6 months or so appears to be sufficient (12). However, data from Gent show that there is a good long-term outcome without further complications in 75% of the patients. Among the 25% of patients who needed reoperation, only 47.37% appeared in the first year after surgery indicating the need for long-term follow-up (13). Moreover, growing and disturbing literature from adult urologists show the limitations of pediatric urologists' view. There is an apprehension that pediatric urologists simply do not have enough epidemiological data on the incidence of failed hypospadias repair in childhood and currently there is no reliable estimation of the number of patients undergoing further surgery in adulthood or redo-surgery (14–17).

Conclusion

The overall fistula rate was 12% with 9% rate for single stage and 24% for two stage repairs and was not affected by the type of urethral groove width, severity of chordee or type of dressing or catheter used. Objective measurement of glans penis width was not predictive of complications after hypospadias repair. These findings call into question whether glans size should be included in prognostic models for outcomes of hypospadias repair. Successful repair of hypospadias should have straight penis in erection, a meatus at or near the tip of the glans, permitting voiding in a standing position and allowing sexual intercourse satisfactorily with an acceptable cosmetic appearance of penis and scrotum.

Compliance with Ethical Standards

Conflict of Interest

The authors have no conflict of interest to declare. No funding source was involved in this study.

Ethical approval

All procedures performed on human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from the parents of each child prior to all the procedures. All parents were informed about the procedure.

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