

Study of Causes Responsible for Urethrocutaneous Fistula after Hypospadias Repair in Tertiary Care Centre

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Abstract:

Background and Objective: Urethro-cutaneous fistula after hypospadias repair remains a significant problem despite advances in surgical techniques. The incidence of urethrocutaneous fistula development varies from 4 to 28 %. In the case of severe proximal hypospadias, two – stage hypospadias, repair had previously been widely performed because of the high complication rate. The Purpose of this study was to investigate the various factors associated with the development of urethrocutaneous fistula development hypospadias repair.

Materials and Methods: Between January 2017 and December 2020, 312 patients underwent hypospadias repair. This study included 252 patients who were followed up for more than 6 months. Potential risk factors studied for the development of fistula after operation included age, location of hypospadias, type of hypospadias repair, suture materials, methods and duration of catheterization. Data were analyzed retrospectively.

Results: Out of 252 patients, 54 patients (21.4 %, 54/252) developed urethrocutaneous fistula after hypospadias repair. Fistula formation was statistically related with type of hypospadias and type of hypospadias repair. In the multivariate analysis, only the location of hypospadias was a significant independent risk factor in urethrocutaneous fistula development after hypospadias repair (p value-0.001).

Conclusions: Our results suggest that the risk of developing urethrocutaneous fistula after hypospadias repair is associated with the location of hypospadias (more proximal – type hypospadias). Type of hypospadias repair, suture materials, suture techniques, and number of other combined urologic disorder were not related to the development of urethrocutaneous fistulas.

Keywords: Urethrocutaneous Fistula; Hypospadias.

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Introduction

Urethro-cutaneous fistula after hypospadias repair remains a significant problem despite advances in surgical techniques. The incidence of urethrocutaneous fistula development varies from 4 to 28%. In the case of severe proximal hypospadias, two – stage hypospadias, repair had previously been widely performed because of the high complication rate. Nowadays, however, with advances in surgical techniques, many urologists prefer one-stage hypospadias repair to two-stage repair [1-3]. Despite these surgical advances, complication rates after hypospadias repair remain high [2,4]. No single technique is omnipotent in all cases of urethrocutaneous fistula; thus, urologist should be familiar with a variety of reconstructive techniques. The purpose of this study was to identify the perioperative risk factors for urethra-cutaneous fistula development after hypospadias repair.

Materials and Methods

The study was done at department of urology, Patna Medical College Hospital, Patna from January 2017 and December 2020. 312 patients underwent hypospadias repair at our urologic department. Out of the 312 patients, 252 patients who were followed up for more than 6 months were included in this study. Patients were divided into two groups: Group A, in which urethrocutaneous fistula occurred after hypospadias repair (54 patients or 21.4%), and Group B, in which no urethrocutaneous fistula occurred after hypospadias repair (198 patients, or 78.6%). Data were analyzed retrospectively according to the patient's age at the time of last follow-up, location of hypospadias (distal, middle, or proximal), type of hypospadias repair, suture materials and techniques (continuous versus interrupted, subcuticular versus full thickness),

methods and duration of catheterization after hypospadias repair, combined congenital urologic disorder, timing of presentation and repair of fistula, and number and location of fistula. Classifications of hypospadias are based on an abnormal location of the urethral meatus and include distal (glandular, coronal, subcoronal), middle (penile), and proximal (penoscrotal, scrotal, perineal) hypospadias. The operative methods used to repair hypospadias were tubularized incised plate urethroplasty, only island flap urethroplasty, Mathieu hypospadias repair, mental advancement and glanuloplasty, and transverse preputial island flap urethroplasty. Repair of hypospadias and urethrocutaneous fistula was exclusively performed by a single surgeon.

Results

Of the 252 children who underwent hypospadias repair, 54 patients (21.4%) developed urethrocutaneous fistula after hypospadias repair. Mean follow-up periods, mean age of the patients at the time of follow-up, and number of other congenital urologic disorders were comparable between the two groups. The incidence rates of urethrocutaneous fistula according to the type of hypospadias were 10.3% (16/155), 21.8% (12/55), and 61.4% (26/42), for distal, middle, and proximal hypospadias, respectively. There were significant differences in incidence rates of urethrocutaneous fistulas according to the type of hypospadias between the two groups in the univariate ($p < 0.001$) and multivariate ($p < 0.001$) analysis. The suture materials used in hypospadias repair were polyglactin 910 (Vicryl), chromicized catgut (Chromic catgut), and polydioxanone (PDS). The incidence rates of urethrocutaneous fistula according to the type of suture materials were 20.2%, 24.3%, and 24.0% respectively. We also divided the group according to the suture technique used. The incidence rates of urethrocutaneous fistula according to suture technique were I. 28.0% and 26.1% for interrupted and continuous suture methods, respectively. Rates of suture technique II. were 27.3% and 27.1% for full-thickness and subcuticular suture methods, respectively. There were no significant differences in incidence rates of urethrocutaneous fistula development according to the suture material or techniques ($p = 0.684$, $p = 0.538$, $p = 0.806$, respectively). In the univariate analysis, fistula formation was statistically related to type of hypospadias and type of hypospadias repair. In the multivariate analysis with stratification by hypospadias site, however, only the location of hypospadias was a significant independent risk factor for urethrocutaneous fistula development after hypospadias repair. Perurethral catheterisation (infant feeding tube/ indwelling Foleys catheter) were used in all cases and there were no cases of suprapubic cystostomy. Mean duration of urethral catheterization was 11.9 ± 3.0 and 11.1 ± 3.2 days in groups A and B, respectively. Of the 54 patients

who developed urethrocutaneous fistula after hypospadias repair, 47 patients who (74.6%) developed urethrocutaneous fistula within 1 month after hypospadias repair (Table 5). The longest period from hypospadias repair to development of urethrocutaneous fistula was 15 months. A total of 35 patients (55.6%) underwent repair of urethrocutaneous fistula within 12 months after hypospadias repair (Table 5). Most of the patients (46/54, or 85.7%) had only one fistula and no patients had more than two.

Discussion

Hypospadias is one of the most common congenital urologic disorders that occur only in male infants. Although the incidence rate of hypospadias differs greatly by urologic center, studies by Carlson et al. [5] reported an incidence rate of 1 per 125 newborn infants. A recent study that analyzed a huge pool of hypospadias patients reported that the incidence of hypospadias is increasing nowadays. The direct causes of hypospadias are still unknown, but genetic and environmental factors, especially endocrine disruption, may have a crucial role in the development of hypospadias [6-9]. Hypospadias repair should be focused on three important goals: voiding in an upstanding position proper voiding stream, and normal penile appearances that can lead to normal erection and normal sexual coitus. After the surgery, male patients should not be stressed out emotionally by hypospadias. To achieve these critical goals, it is very important that the urethral meatus be located at the end of the glans and that the penis be erected straight up during hypospadias repair. Nowadays, pediatric surgical techniques and pediatric anesthesia skills have advanced greatly. As a result, hypospadias repair can be done at an earlier age in children. Proper timing of hypospadias repair is 6 to 24 months after birth. In this period, the children are not yet aware of their sexual identity. Most hypospadias can be corrected by single-stage hypospadias repair, but severe hypospadias can be corrected by several stages of repair at 6 to 12 months intervals. In general, to increase the success rate of hypospadias repair, it is important that the surgeon be able to handle the tissue with the viable vessel, manipulate the tissue very exquisitely, suture without tension, and use fine suture materials and careful bleeding control. The suture material should be a very fine and absorbable thread (6-0 to 8-0 Vicryl, Chromic Catgut, PDS, Dexan). PDS is not widely used because the incidence rate of urethral stricture after hypospadias repair has been reported to be high. Suture techniques can be divided into subcuticular and full-thickness sutures, but many studies have reported that there are no significant differences between the two techniques in the development of urethrocutaneous fistula after hypospadias repair. One of the most common complications of hypospadias repair is urethrocutaneous fistula [10].

Small - sized fistula may disappear spontaneously, but most fistulas need surgical correction [11]. The incidence of urethrocutaneous fistula after hypospadias repair varies from surgeon to surgeon. Kass and Bolong [12] reported just 1 patient (0.48%) with fistula development out of 206 cases of hypospadias repairs. Sarhan et al. [13] reported 47 patients (9.4%) with development of fistula out of 500 cases of hypospadias repairs. In the univariate analysis, the type of hypospadias and the type of hypospadias repair had a statistically significant effect on outcome. However, the type of hypospadias and the type of hypospadias repair were strongly related in the cross-tabulation analysis. Thus, the analysis was carried out with stratification by location of hypospadias separately, and the results showed that no other factors had a significant impact on the outcome of the surgery. Why patients do or do not develop urethrocutaneous fistula is not completely understood. Surgical technique is thought to be a key factor, although a local deficit in growth factors may also play a role [16]. Local or systemic, adjuvant or neoadjuvant hormonal therapy has been proposed to reduce fistula development, but the results are controversial so far. Also, some of the postoperative care including the use of particular types of dressing and surgical material, wound status, and antibiotics should be considered [17]. These postoperative factors were excluded in our study and may play an important role as risk factors; henceforth, we will need to add these factors in our follow-up studies. There are few studies regarding perioperative risk factors for the development of urethrocutaneous fistula because there are too many variables to consider and it is quite difficult to perform the analysis. In this respect, even though our preliminary study had some limitations and pitfalls, it could be helpful to those who are planning to perform hypospadias repair. Further investigations with new study designs will be necessary to confirm our initial findings in this relatively small patient series.

Conclusions

Considering the incidence rate of urethrocutaneous fistula development after hypospadias repair, significantly better outcome is achieved with distal hypospadias. Our data suggest that only the type of hypospadias has a statistically significant impact on urethrocutaneous fistula development, whereas type of hypospadias repair, suture materials, and technique have no significant effect on the outcome.

References

1. Ghali AM, el-Malik EM, al-Malki T, Ibrahim AH. One - stage hypospadias repair. Experience with 544 cases. *Eur Urol.* 1999; 36: 436 – 42.
2. Nuininga JE, DE Gier RP, Verschuren R. Feitz WF. Long – term outcome of different types of

- 1 – stage hypospadias repair. *J Urol.* 2005; 174 (4 Pt 2); 1544-8.
3. Uygur MC, Unal D, Tan MO, Germiyanolu C, Erol D. Factors affecting outcome of one – stage anterior hypospadias repair; analysis of 422 cases. *Pediatr Surg Int.* 2002;18: 142 -6.
4. Demirbilek S, Kanmaz T, Aydin G, Yucesan S. Outcomes of one –stage techniques for proximal hypospadias repair. *Urology.* 2001; 58:267 – 70.
5. Carison WH, Kisely SR, MacLellan DL. Maternal and fetal risk factors associated with severity of hypospadias: a comparison of mild and severe cases. *J Pediatr Urol.* 2009; 5:283–6.
6. Paulozzi LJ, Erickson JD, Jackson RJ. Hypospadias trends in two US surveillance systems. *Pediatrics.* 1997; 100: 831-4.
7. Paulozzi LJ. International trends in rates of hypospadias and cryptorchidism. *Environ Health Perspect.* 1999; 107:297-302.
8. Schnack TH, Zdravkovic S, Myrup C, Westergaard T, Christensen K, Wohlfahrt J, et al. Familial aggregation of hypospadias: a cohort study. *Am J Epidemiol* 2008; 167:251 – 6.
9. Wang MH, Baskin LS. Endocrine disruptors, genital development, and hypospadias. *J Androl.* 2008; 29:499 – 505.
10. Retik AB, Keating M, Mandell J. Complications of hypospadias repair. *Urol Clin North Am.* 1988; 15:223 – 36.
11. Waterman BJ, Renschler T, Cartwright PC, Snow BW, De Vries CR. Variables in successful repair of urethrocutaneous fistula after hypospadias surgery. *J Urol.* 2002; 168:726–30
12. Kass EJ, Bolong D. Single stage hypospadias reconstruction without fistula. *J Urol.* 1990; 144 (2 Pt 2): 520 – 2.
13. Sarhan OM, El – Hefnawy AS, Hafez AT, Elsherbiny MT, Dawaba ME, Ghali AM. Factors affecting outcome of tubularized incised plate (TIP) urethroplasty: single – center experience with 500 cases. *J Pediatr Urol.* 2009; 5: 378 – 82.
14. Kwon T, Song GH, Song K, Song C, Kim KS. Management of urethral fistulas and strictures after hypospadias repair. *Korean J Urol.* 2009; 50:46 – 50.
15. Hwang JS, Jung GW, Cho WY. Outcome of tubularized incised plate urethroplasty for correction of hypospadias. *Korean J Urol.* 2003; 44: 1026 – 31.
16. el – Galley RE, Smith E, Cohen C, Petros JA, Woodard J, Galloway NT. Epidermal growth factor (EGF) and EGF receptor in hypospadias. *Br J Urol.* 1997; 79:116 – 9.
17. Gapany C, Grasset N, Tercier S, Ramseyer P, Frey P, Meyrat BJ. A lower fistula rate in hypospadias surgery. *J Pediatr Urol.* 2007; 3:395 .