

Research Article

Risk Factors of Urethro-cutaneous Fistula Development in Hypospadias Surgery

Faktor Risiko Fistel Urethrokutan Pasca Operasi Hipospadia

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ABSTRACT

Urethrocutaneous fistula development is the most common complication found hypospadias surgery. Several factors associated with the incidence of fistulas are the age at the time the surgery. The type of hypospadias, the degree of chordae, the operative technique applied and catheter type. This study aimed to determine the risk factors associated with the urethro-cutaneous fistula development in hypospadias surgery. The results showed that from 310 hypospadias patients undergoing urethroplasty, urethra cutaneous fistula development occurred among 105 patients (30.6%) with a mean age of surgery 10.89 ± 6.27 years. Hypospadias type has a significant difference with the incidence of urethro-cutaneous fistula development ($p = 0.027$). Age ($p = 0.615$), degree of chordae ($P=0.805$), operative technique ($P=0.901$) and catheter type ($P=0.691$) do not have a significant impact to urethro-cutaneous fistula development. It can be concluded that operative urethroplasty has a risk of urethra-cutaneous fistula that associated with hypospadias type.

Keywords: *Hypospadias, urethrocutaneous fistula development, urethroplasty*

ABSTRAK

Fistel uretrokutan merupakan komplikasi yang paling sering ditemukan pasca pembedahan hipospadia. Beberapa faktor diduga memiliki hubungan dengan insiden terjadinya fistula, yaitu usia saat operasi, tipe hipospadia, derajat kordae, teknik operasi yang digunakan dan tipe kateter. Penelitian ini bertujuan untuk mengetahui faktor resiko yang memiliki keterkaitan dengan terjadinya fistel uretrokutan pada pasien pasca operasi hipospadia. Hasil menunjukkan dari 310 pasien yang menjalani uretroplasti didapatkan manifestasi fistel uretrokutan sebanyak 105 (30,6 %) pasien dengan rerata usia $10,89 \pm 6,27$ tahun. Uji statistik menunjukkan tipe hipospadia memiliki hubungan dengan angka kejadian fistel urethrokutan ($p=0,027$), sedangkan faktor risiko lain seperti usia ($p=0.615$), derajat kordae ($P=0.805$) teknik operasi ($p=0,901$), tipe kateter ($0,691$) tidak memiliki hubungan signifikan. Dapat disimpulkan tindakan operatif uretroplasti memiliki risiko fistel uretrokutan yang berhubungan dengan tipe hipospadia.

Kata Kunci: *Fistel uretrokutan, hipospadia, urethroplasty.*

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INTRODUCTION

The term hypospadias comes from the Greek terms *hypo* and *spadon* which means below and gap respectively. Hypospadias is a congenital abnormality in the form of external urethral meatus which opens in the ventral aspect of the penis proximal to the tip of glans penis (1,2). This condition is often followed by the discovery of MUE in the ventral penis, chordae, and more dorsal skin folds (dorsal hood). Surgery is an option for hypospadias correction (3,4).

Urethro-cutaneous fistula development is the most common complication found after hypospadias repair, with incidence rates varying between 15% to 45% (5). Broadly, fistula is defined as a channel that connects two epithelial ducts. Urethrocuteaneous fistula development can occur early after surgery or a period of time after surgery. Many factors contribute to the formation of fistulas in the body, such as hematoma, infection, overly tense approximation, and inadequate surgical wound management. Several literatures reported several conditions associated with urethrocuteaneous fistula developments, including proximal hypospadias type, complicated surgical procedures, meatal stenosis, urethral strictures, urethral diverticulum, and infections (6).

METHOD

This study is an analytical observational study based on secondary data from patient medical records. The study was conducted at the Urology Clinic and Minimally Invasive Urology Installation, Dr. Soetomo General Academic Hospital, Surabaya, and has received approval from the ethical committee through certificate number 1504/KEPK/IX/2019. The data taken were data from primary hypospadias patients who had urethroplasty by two experienced urologists at Dr. Soetomo General Academic Hospital Surabaya in the period of June 2014 to June 2019. The criteria were patients aged 0-20 years with a hypospadias diagnosis and hypospadias repair in June 2014 - June 2019. Hypospadias patients who did not undergo surgery and patients with urethrocuteaneous fistula caused by other abnormalities or multiple previous corrections were not included in this study. The variables recorded in this study were patient age, hypospadias type, chordae type, hypospadias repair technique, catheter type used, and onset time of fistula, whereas the dependent variable was fistula occurrence. The data were then presented descriptively, and statistical analysis was carried out using chi-square using SPSS version 21 for Windows.

RESULTS

Of the 310 patients who underwent urethroplasty, 105 patients (33.9%) suffered from fistula. The mean age of patients with fistula was higher (10.89+6.27) compared to those without the abnormality, albeit not significantly different. Urethrocuteaneous fistula development occurred on the third week after surgery in 39 patients, fourth week after surgery in 34 patients, and 3 first week after surgery in 32 patients. The data show that most fistulas were found in the age range of 2-15 years old with proximal hypospadias type, medium chordae, and Tubularized Incised Plate (TIP) Urethroplasty operative technique. The proportion of the characteristics studied

did not show differences in the pattern between patients with and without fistula. Of the four factors studied, only the hypospadias type had a correlation with the occurrence of fistula.

Table 1. Characteristics difference between patients with and without fistula

Age Range	Fistula	Without Fistula	P-value
< 2 years	1 (20 %)	4 (80 %)	0.615
2- 15 years	80 (32.7 %)	165 (67.3 %)	
> 15 years	21 (35 %)	39 (65 %)	
Hypospadias Type			
Glandular	1 (25 %)	3 (75 %)	0.027
Distal	21 (50 %)	24 (50 %)	
Proximal	83 (31.4 %)	181 (68.6 %)	
Degree of chordee			
Mild < 30 °	30 (30.3%)	69 (69.7 %)	0.805
Medium 30-45 °	46 (35.4 %)	84 (64.6 %)	
Severe > 45 °	29 (35.8 %)	52 (64.2 %)	
Operative Technique			
Thiersy Duply	24 (32.4%)	50 (67.6%)	0.901
TIP	76 (34.7%)	144 (65.4%)	
Dorsal Onlay Flap	5 (33.3%)	10 (66.7%)	
Koyanagi	0 (0.0%)	1 (100.0%)	
Catheter Type			
Silicon Catheter	70 (34,7%)	132 (65,3%)	0,691
NGT	35 (32,4%)	73 (67,6%)	

DISCUSSION

There were 310 patients with hypospadias and 105 patients (33.9%) with urethrocuteaneous fistula development complications in this study. Urethrocuteaneous fistula development is one of the most common complications that often occur after hypospadias surgery. This condition is a challenge for urologists to prevent complications that might emerge. There are several studies in Indonesia related to complications of urethrocuteaneous fistula development after hypospadias repair. A study by Fariz *et al.*, described that from a total of 116 hypospadias patients who had hypospadias repair, 12 patients (13.92%) were found with urethra-cutaneous fistula development complications at Cipto Mangokusumo Hospital in the period of January 2002 - December 2008 (6). Additionally, a study by Prada *et al.*, in 2015 described that from a total of 61 hypospadias patients who had hypospadias repair 21 (34%) patients with urethra-cutaneous fistula after hypospadias surgery at Arifin Achmad Riau Hospital in December 2014-January 2015 (7). The high incidence of urethra-cutaneous fistula at RSUD Dr. Soetomo could be due to the possibility of urinary tract infection. Based on culture examinations in patients with urethrocuteaneous fistula patients, it was obtained as much as 56% with positive urine culture.

The results of this study showed that there were no significant differences between the age groups and the occurrence of urethra-cutaneous fistula in hypospadias patients undergoing surgery. A study by Huang *et al.* at Nanjing Children's Hospital found that most urethra-cutaneous fistula complications were among 6-12 years old patients (38.9%) (8). In contrast, this study found that most complications were among 2-15 years old patients. This difference may be explained by variances in the

number of study samples. As age increases, the child will have more frequent erections which could affect the healing process. In younger children, wound healing is faster than in older children (8). Several recent studies suggest that the hypospadias correction should be done between 3 to 15 months of age; while in the European association of urology (EAU) guidelines, the correction is recommended at 6 to 18 months old (9).

This study found that there was a significant difference in the incidence of urethra-cutaneous fistula according to hypospadias type. Several studies explained that the highest incidence of urethra-cutaneous fistula was the proximal hypospadias type. Many factors cause urethrocutaneous fistula development complications in the proximal type, such as obstruction of urine flow distal to the neourethra, urethral diverticles, urinary extrusion, and local infection. In our study, we have found that proximal hypospadias has the highest incidence of urethro-cutaneous fistula. However, in this study distal hypospadias have the highest proportion of urethro-cutaneous fistula (50%). These results were in accordance with another study that focus on overall incidence of hypospadias in Indonesia which is the distal hypospadias suffer the most urethra-cutaneous fistula development (10). Elbakry in 2001 identified incidence of fistula was higher at the coronal sulcus which might influence by the fact that the coronary sulcus area has a hypo vascular transitional area of blood vessels between the skin and the glans penis. Hypospadias repair of the urethral plate in the glans area can cause disruption of blood supply in the coronary sulcus. in addition, an erection can cause a traction effect on the neourethra. It is explaining why neourethra healing in the corona area will more likely to be disrupted and why the urethro-cutaneous fistula mostly is distal hypospadias type (11).

In this study, it was found that the more severe the chordae, the higher the probability of the patient experiencing postoperative urethra-cutaneous fistula, although it was not statistically significant. A cordial correction has an important role in reducing the number of urethra-cutaneous fistula occurrences. Research by Braga *et al.*, in 2007 identified five patients who experienced urethra-cutaneous fistula (14.2%), recurrent

curvature in five patients (14.2%), urethral diverticles in two patients (5.7%), meatal stenosis in two patients (5.7%), and urethral stricture in one patient (2.8%). Inadequate excision of the chordae and impaired blood flow after chorda repair causes necrosis, which facilitates the development of a urethra-cutaneous fistula development (12).

The TIP technique had the highest incidence of urethro-cutaneous fistula (34.7%) but did not provide a statistically significant difference. Research in Indonesia by Fariz *et al.*, in 2011 also found the same results. Decent surgical factors help reduce the incidence of urethra-cutaneous fistula. Poor neourethra formation and vascularization, failed epithelialization of the neourethra, improper surgical procedures, necrosis in the flaps and grafts, improper use and thin epithelial tissue, improper and too tight suturing are the risk of incidence of urethro-cutaneous fistula (6).

Based on the urine diversion type of 105 patients with fistula complications, 70 patients (34.7%) used silicon catheters, and 35 patients (32.4%) used NGT. The use of urine diversion devices was not associated with the patient's probability of developing a urethrocutaneous fistula. A study by Fariz *et al.*, in 2011 found fistulas in eight patients (11.9%) who used silastic and four patients (9.5%) who used foley catheters, but there was no urethro-cutaneous fistula found among patients using NGT (6). Another study conducted by Prada *et al.*, in 2015 at Arifin Anwar Hospital Riau showed that the use of NGT often resulted in urethra-cutaneous fistula compared to the use of foley catheters (7). On the one hand, the use of a urethral catheter aims to prevent postoperative urethral edema that can block urine flow, reduce pain during urination, and as a splint that helps in healing the neourethra. On the other hand, the use of a catheter can cause an infection resulting from the migration of bacteria along the catheter. Furthermore, catheter balloons can also cause bladder spasms, and irritation due to the catheter components can delay wound healing (6,7).

The design of this study is a retrospective study that might generate information bias. Within this limitation, result of this study conclude that hypospadias type is a significant risk factor for urethra-cutaneous fistula at Dr. Soetomo General Academic Hospital.

REFERENCES

1. Giannantoni A. *Hypospadias Classification and Repair: The Riddle of The Sphinx*. European Urology. 2011; 60(6): 1190–1191.
2. McAninch JW and Lue TF. *Smith & Tanagho's general urology*. 19th edition. New York: Mc Graw Hill; 2013.
3. Shehata S and Hashish M. *Management of Post Hypospadias Urethral Fistula*. Current Concepts of Urethroplasty. 2011; 47-60.
4. Wein AJ and Kolon TF. *Campbell-Walsh-Wein Urology Twelfth Edition Review*. 3rd edition. United States: Elsevier; 2020.
5. Chung JW, Choi SH, Kim BS, and Chung SK. *Risk Factors for the Development of Urethrocutaneous Fistula after Hypospadias Repair: A Retrospective Study*. Korean Journal of Urology. 2012; 53(10): 711–715.
6. Fariz M, Rodjani A, and Wahyudi I. *Risk Factors for Urethrocutaneous Fistulas Formation After One Stage Hypospadias Repair*. Indonesian Journal of Urology. 2011; 18(2): 47-54.
7. Prada WD, Wahid TOR, and Burhanuddin, L. *Hubungan Insiden Fistula Uretrokutaneus Dengan Tipe Hipospadia Pasca Operasi Uretroplastik*. Jurnal Online Mahasiswa Fakultas Kedokteran. 2015; 2(2): 1-10.
8. Huang LQ, Ge Z, Tian J, *et al*. *Retrospective Analysis of Individual Risk Factors for Urethrocutaneous Fistula After Onlay Hypospadias Repair In Pediatric Patients*. Italian Journal of Pediatrics. 2015; 41: 1–4.
9. Riedmiller H, Androulakakis P, Beurton D, Kocvara R, and Gerharz E, and European Association of Urology. *EAU Guidelines on Paediatric Urology*. European Urology. 2001; 40(5): 589–599.
10. Duarsa GWK, Tirtayasa PMW, Daryanto B, *et al*. *Risk*

- Factors For Urethrocutaneous Fistula Following Hypospadias Repair Surgery In Indonesia.* Journal of Pediatric Urology. 2020; 16(3): 317.e1-317.e6.
11. Elbakry A. *Management of Urethrocutaneous Fistula After Hypospadias Repair: 10 Years' Experience.* BJU International. 2001; 88(6); 590-595.
 12. Braga LHP, Salle JLP, Lorenzo AJ, et al. *Comparative Analysis of Tubularized Incised Plate Versus Onlay Island Flap Urethroplasty for Penoscrotal Hypospadias.* The Journal of Urology. 2007; 178(4): 1451-1457.