

Incidence of urethrocutaneous fistula formation during the first three postoperative months period of hypospadias reconstruction surgeries

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Abstract

Background and objectives: Urethrocutaneous fistula is one of the most frequent complications of hypospadias reconstructive surgeries. This study aimed to find the rate of fistula development following different types of reconstructive surgeries and their risk factors.

Method: This study was conducted at Hawler teaching hospital, Rizgary teaching hospital, and Zheen international hospital in Erbil – Iraq from September 2020 to March 2021. A total number of 39 patients who underwent single-step surgery for reconstruction of hypospadias were included in this study and they were followed up for the first three months postoperatively for post-operative complications especially urethrocutaneous fistula development.

Results: Four patients out of thirty-nine developed urethral-cutaneous fistula (10.3%). A statistically significant relation was found between those aged older than 5 years and the rate of fistula development (three out of ten) (p -value = 0.023). Also, tourniquet time during the operation had a statistically significant relation with the incidence of fistula formation (mean time < 17.66 vs. > 20.5 minutes) in the fistula-free vs. fistula group respectively (p =0.046).

Conclusion: Reconstructive surgeries for hypospadias at earlier ages and with as short as possible tourniquet time reduce the incidence of fistula formation post-operatively.

Keywords: Hypospadias; Postoperative complication; Urethrocutaneous fistula; Tourniquet time.

Introduction

Hypospadias is one of the most common congenital abnormalities in boys, the incidence is about 1 in 150-300 live births.¹ This incidence is increasing nowadays because of the increase in assisted reproduction technology and the use of hormonal therapy for supporting gestation.² Family history and first-degree relatives increase the chance of the next baby being affected by hypospadias, If the brother or father had hypospadias the next sibling is prone to have the same condition fourteen or nine times respectively, diagnosis is clinically based and needs the

following criteria: an ectopic ventrally urethral meatus, ventral curvature of the penis and dorsally hooded prepuce skin. not a must in all the criteria to be present.³ The urethral meatus location and type of hypospadias have classically been used to define the severity of hypospadias also proximal hypospadias with undescended testis need karyotype assignment because of feminization.⁴ Surgery is the only treatment option for hypospadias and nowadays many different ways of operation techniques invented with a lot of modification by using different types of

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flaps and grafts according to degree and severity of hypospadias but still it is associated with many postoperative problems. The aim of the operation is to functionally and anatomically be accepted i.e., for sexual, fertility, and urination in a standing position.⁵ Main Post-operative complications of hypospadias repair include bleeding and hematoma, edema wound infection, wound dehiscence, skin necrosis, flap necrosis, urethrocutaneous fistula formation, external urethral meatus stenosis, and tissue loss.⁶ Urethrocutaneous fistula is one of the most frequent complications of hypospadias reconstructive surgeries.⁷ Incidence of post-operative fistula formation in different types of reconstructive surgeries ranging between 0% to over 35%.⁶ Fistula

Patients and methods

This is a prospective study carried out between September 2020 and March 2021 in three Hospitals of Erbil City (Hawler teaching hospital, Rizgary teaching hospital, and Zheen international hospital), A total number of 39 patients underwent operation for reconstruction of hypospadias included in this study. Inclusion criteria included all patients with hypospadias who needed single-step surgery. Exclusion criteria were patients who needed staged operation or multiple operations, or previously operated for hypospadias. A questionnaire was prepared by the researcher which contained the following criteria: patient's age, date of admission and discharge, location of the external urethral meatus (Glandular, distal, and proximal), presence of chordee or not, circumcised or not, type of suture material & way of suturing, use of antibiotics with its type and duration, type of stent & duration, use of suprapubic cystostomy tube or not, whether changing of dressing done or not, and both intra and post-operative complications. Patients were followed up for three-month post-operatively to give a chance for the scar to gain strength. The tabularized incised plate (TIP) is now most popularly used for distal

formation remains a significant challenge for urologists and coupled with the nature of its recurrence, these fistulae are associated with frequent redo surgeries, increased hospital costs, and poor functional and anatomic outcomes of the urethra and penile shaft.⁸ The main risk factors for fistula formation after reconstructive surgery are the type of hypospadias, age of the patient at the time of surgery and surgical technique.⁹ Fistula repair may be very simply managed just by urinary diversion or may need multiple steps surgeries according to its severity.¹⁰ The aim of this study is to find the incidence of urethrocutaneous fistula development post reconstructive surgeries of hypospadias with finding risk factors for that.

hypospadias and we used it for thirty-one cases out of thirty-nine. Surgery was done under general anesthesia and prophylactic antibiotics were given with induction of the anesthesia, the urethral plate was incised only through the epidermis, the penile skin is completely degloved, the glans was dissected from the urethral plate, dissection was done through the external margin of the plate to the presumed appropriate depth. Urethra was closed in two layers over 6-Fr or 8-Fr urethral stent (NG tube according to age of patient and urethral size and fixed to the glans penis), dartos flap was fixed over the suture line by using 6-0 or 5-0 vicryl, the glans and skin was closed by using 6-0 vicryl, the stent was kept in for 6-8 days according to the surgeon preference with 10 days post-operative antibiotic cover. Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Fisher's exact test was used (instead of the Chi-square test) when the expected frequency (value) was less than 5 of more than 20% of the cells of the table. Student's t-test of two independent samples (unpaired t-test) was used to compare the means of the two groups. A p-value of ≤ 0.05 was considered statistically

significant. The study had been approved by the ethical committee of the Kurdistan Higher Council of Medical Specialties (KHCMS) and the name of the patients

Results

Thirty-nine patients were included in the study, their mean age \pm SD was 3.9 ± 4.1 years, the median was 3 years, and the age

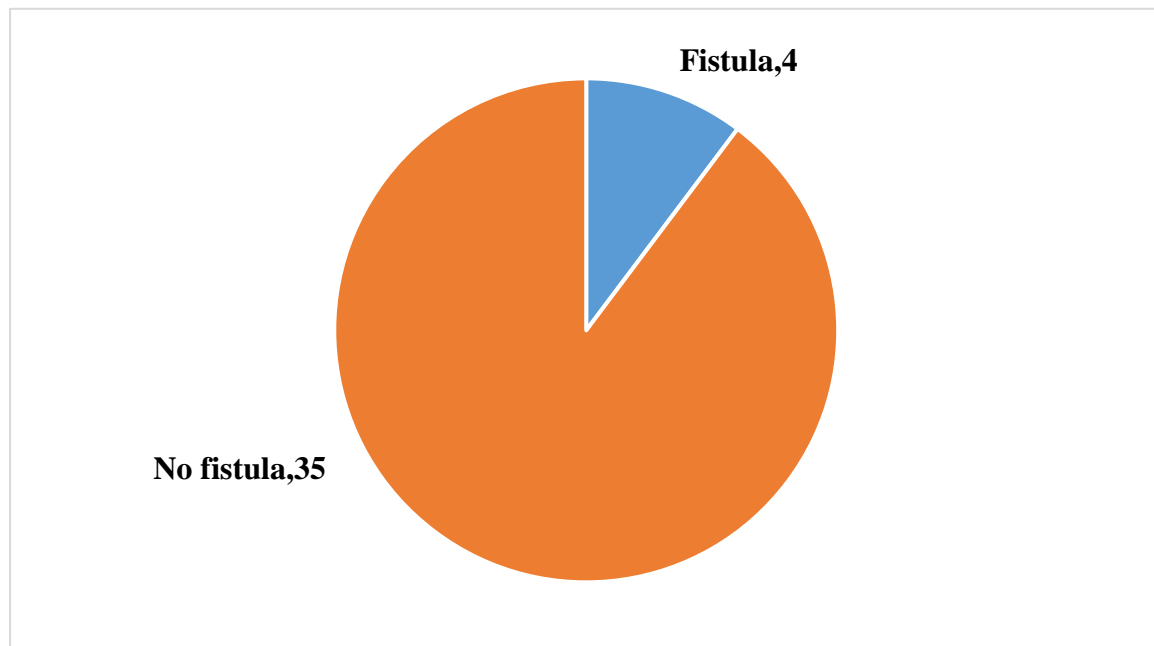
was kept anonymous, also consent was taken from patients or caregivers to be included in this study.

range was 1-19 years. The largest proportion of the sample (46.2%) were aged 1-2 years, as presented in Table (1).

Table (1): Age distribution of patients.

Age (years)	No.	(%)
1-2	18	46.2
3-4	11	28.2
≥ 5	10	25.6
Mean \pm SD	3.9	(± 4.1)
Total	39	(100.0)

The incidence rate of fistula was 10.3% within the first three months after the operation as



presented in Figure (1).

Figure (1): Incidence of fistula within the first three months after the operation.

None of the 18 patients aged 1-2 years developed a fistula, while 1 out of 11 patients (9.1%) aged 3-4 years developed a fistula, compared with 30% of patients aged ≥ 5 years ($p = 0.023$) as presented in Table (2). No significant association between the incidence of fistula with the following variables: type of hypospadias

($p = 0.281$), chordee ($p = 0.284$), type of operation ($p > 0.999$), type of antibiotic ($p = 0.284$), suprapubic cystostomy tube ($p > 0.999$), size of suture material ($p = 0.573$), duration of the operation ($p > 0.999$), and intra-operative complications ($p = 0.103$), as shown in Table (2).

Table (2): Incidence of fistula by the studied factors.

	No fistula		Fistula		Total		p-value*
	No.	(%)	No.	(%)	No.	(%)	
Age (years)							
1-2	18	(100.0)	0	(0.0)	18	(100.0)	
3-4	10	(90.0)	1	(9.1)	11	(100.0)	
≥ 5	7	(70.0)	3	(30.0)	10	(100.0)	0.023
Type of hypospadias							
Glandular	13	(100.0)	0	(0.0)	13	(100.0)	
Distal	22	(84.6)	4	(15.4)	26	(100.0)	0.281
Chordee							
Yes	2	(66.7)	1	(33.3)	3	(100.0)	
No	33	(91.7)	3	(8.3)	36	(100.0)	0.284
Circumcision							
Not done for all	35	(89.7)	4	(10.3)	39	(100.0)	NA
Type of operation							
TIP	31	(88.6)	4	(11.4)	35	(100.0)	
MGPI	4	(100.0)	0	(0.0)	4	(100.0)	>0.999
Antibiotic use							
Used for all	35	(89.7)	4	(10.3)	39	(100.0)	NA
Type of antibiotic							
Injection	2	(66.7)	1	(33.3)	3	(100.0)	
Oral	33	(91.7)	3	(8.3)	36	(100.0)	0.284
Tourniquet							
Used for all	35	(89.7)	4	(10.3)	39	(100.0)	NA
Catheter type							
NG tube used for all	35	(89.7)	4	(10.3)	39	(100.0)	NA
Suprapubic cystostomy tube							
Yes	2	(100.0)	0	(0.0)	2	(100.0)	
No	33	(89.2)	4	(10.8)	37	(100.0)	>0.999
Size of suture material							
5 zeros	10	(83.3)	2	(16.7)	12	(100.0)	
6 zeros	25	(92.6)	2	(7.4)	27	(100.0)	0.573
Change of dressing							
Done for all	35	(89.7)	4	(10.3)	39	(100.0)	NA
Duration of operation (minutes)							
< 150	28	(90.3)	3	(9.7)	31	(100.0)	
≥ 150	7	(87.5)	1	(12.5)	8	(100.0)	> 0.999
Intra-operative complications							
No complication	35	(92.1)	3	(7.9)	38	(100.0)	
Bleeding	0	(0.0)	1	(100.0)	1	(100.0)	0.103
Total	35	(89.7)	4	(10.3)	39	(100.0)	

*By Fisher's exact test.

NA: is not applicable.

It is evident in Table (3) that the mean age \pm SD of those who developed fistula was 8.25 ± 7.27 years, which was significantly ($p = 0.024$) higher than the mean age of patients who didn't develop fistula (3.44 ± 3.41 years). The table shows that the mean duration of tourniquet use (minutes)

was significantly ($p = 0.046$) higher in patients who developed fistula compared with those who didn't develop fistula (20.5 vs. 17.66 minutes respectively). No significant differences were detected between those who developed a fistula and those who didn't develop a fistula

regarding the duration of antibiotic use ($p = 0.557$), and duration of dressing ($p = 0.119$), duration of operation ($p = 0.225$).

Table (3): Means of the studied numerical variables among those with and those without fistula.

	No fistula (n = 35)		Fistula (n = 4)		p value*
	Mean	(±SD)	Mean	(±SD)	
Age (years)	3.44	(±3.41)	8.25	(±7.27)	0.024
Duration of antibiotic use (days)	7.00	(±0.59)	7.50	(±0.58)	0.119
Duration of operation (minutes)	124.00	(±19.55)	130.00	(±14.14)	0.557
Duration of tourniquet (minutes)	17.66	(±2.70)	20.50	(±1.00)	0.046
Duration of dressing (days)	6.66	(±0.94)	7.25	(±0.50)	0.225

*By t test for two independent samples.

Discussion

Urethrocutaneous fistula is the commonest complication post reconstructive surgeries for hypospadias, surgery for fistulas after hypospadias repair has remained a challenge for the treating surgeons and several surgical techniques have been described to obtain good results, with refined surgical techniques, fine suture materials, and special dressings, the results of surgery after hypospadias repair have improved significantly.¹¹ Distal narrowing and infection are important factors to determine the surgical outcome.¹² Some authors attribute suture materials, appropriate technique, meticulous surgery, and surgeon experience to be more crucial factors.¹³ Our study results revealed a higher incidence fistula rate (10.3%) when compared with Fattah et al. study results (6.5%).¹⁴ In our study there was a significant relation between the age of the patient at the time of operation and fistula rate, the mean age of those who developed fistula was 8.25 ± 7.27 years, which was statically significant ($p = 0.024$) higher than the mean age of patients who didn't develop a fistula (3.44 ± 3.41 years), and our result closely comparable to the finding seen in Sheng X et al, in which rate of hypospadias repair complications ranges from 10.1 to 37.5% in adult patients undergoing a primary repair.¹⁵ There are many studies showing that the age of a patient important risk

factor for hypospadias repair. Huang et al. found that older boys (> 6 years) with hypospadias repair were more subjected to urethra-cutaneous fistula.¹⁶ Yildiz et al. support that fistula was significantly higher in those aged over 10 years. And their explanations for that erection were taken into consideration as evidenced by research on adult patients with hypospadias.¹⁷ With increasing age, erection occurred more frequently, resulted in postoperative bleeding and dehiscence of the suture line, and affected the postoperative complications, especially for fistula development, secondly adolescent or adult hypospadias patients are much more likely to have undergone at least one urethral operation.¹⁸ Our study also revealed that there is a significant relation between tourniquet time used perioperatively and the development of fistula, the tourniquet time (in minutes) in patients who developed fistula was longer than those patients who didn't develop a fistula (20.5 vs. 17.66 minutes respectively ($p = 0.046$), and probably because increase ischemia time and more tissue edema and more pressure on suture line with subsequent fistula formation. Snodgrass et al support that tourniquet time affect the result of fistula development especially if applied for more than twenty minutes during operation because more ischemia time makes more harm to tissue and affects the process of wound healing.¹⁹ In

regard to other variables in our study (duration of operation, type, size of suture material and way of suturing, type, and duration of antibiotic, post-operative dressing duration and it was changed or not, type of catheter and supra pubic

Conclusions

In conclusion, the post-operative complications of hypospadias repair surgeries remain the main challenges for both the surgeon and the patient as well,

Conflicts of interest

The author reports no conflicts of interest.

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cystostomy) we didn't found a direct correlation between above-mentioned variables and development of urethrocutaneous fistula probably because of small sample size, duration of the study and postoperative follow up.

we conclude that to do such surgeries at earlier ages and with as short as possible tourniquet time.

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