Original Article

Is Stent Type Used in Snodgrass Method a Factor in Fistula Formation?

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Abstract

Context: Snodgrass method (tubularized incised plate urethroplasty [TIPU]) is a widely used technique for hypospadias repair. **Aim:** It was aimed to compare the outcome of hypospadias repair with stenting using feeding tube compare with those with Foley catheter. **Subjects and Methods:** The demographic characteristics of the 123 patients who underwent hypospadias repair with Snodgrass method, the success of the applied method, and the factors affecting fistula complication were evaluated retrospectively. Patients were divided into two groups: those operated before January 2010 (Group A) and those who were operated after (Group B). In Group A patients, urethroplasty was performed using silicone Foley catheters, in which balloon of these catheters was filled by saline at appropriate size. In Group B, urethroplasty was performed using feeding catheter. **Results:** Group A and Group B consisted of 32 and 91 patients, respectively. Fistula developed in 10 (31.3%) and 4 (4.39%) patients in Group A and Group B, respectively. There was a statistically significant difference between the two groups in terms of the development of fistula complication (P = 0.0002). **Conclusion:** The use of a feeding catheter in TIPU could be a more advantageous than using a Foley catheter.

Keywords: *Complication, fistula, hypospadias, stent, tubularized incised plate urethroplasty*

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Introduction

Hypospadias is the most common genital malformation in newborn infants due to incomplete development of urethral folds. Its prevalence ranges from 3 to 8 in 1000 live male births.[1-4] Some investigators have emphasized that the incidence of hypospadias has increased in the United States over the past 30 years. Duckett and Snyder reported that 50% of cases were distal, 30% were mid-penile, and 20% were proximal hypospadias.[5] Although more than 300 operation techniques and modifications have been described to date in hypospadias repair, the ideal technique is still a matter of debate. An ideal method; simple, easy to learn, practicable in most cases, completed in a single session, delivering acceptable cosmetic results with a low complication rate. The Snodgrass method, which was described in 1994, is one of the most preferred methods in recent years.[6] To obtain a successful result in hypospadias surgery, the length of the neourethra, suture technique, selection of the urinary diversity, and the stent used in the urinary diversion are important, together with the appropriate surgical technique.[7] There is still no consensus on which urinary diversion is to be chosen after hypospadias repair.[8] Although many pediatric surgeons opt for urinary diversion, there are some controversies regarding the use of urethral stent, transurethral bladder catheterization, choice of percutaneous cystostomy, and duration of diversion or the use of urinary diversion.[9-11]

In this study, it was aimed to investigate the effect of stent type on fistula development in patients who underwent hypospadias repair with Snodgrass method.

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Subjects and Methods

Ethics Committee approval was obtained before the initiation of the study (protocol number 06.09; date March 30, 2017). Due to the retrospective nature of this study, informed consent was not required to obtain from the parents of subjects included in the study. Files of cases who were operated on for distal hypospadias using Snodgrass method at Firat University Hospital Pediatric Surgery Clinic between 2006 and 2016 were retrospectively evaluated. The surgeries were performed by a surgical team consisting of three experienced surgeons, and the surgical technique was Snodgrass method (tubularized incised plate urethroplasty [TIPU]) at all operations. There was distal hypospadias in the all studied cases. The cases with proximal hypospadias were excluded from the study. In the study, 6–8 Fr Foley catheters or 6–8 Fr feeding catheters were used according to the width of the urethral plate of the patient. First applied surgical procedure is defined as the "primer surgery," and a complication corrective surgery, such as repair of any resultant urethrocutaneous fistula, is defined as "secondary surgery."

Patients were divided into two groups: those who operated before January 2010 (Group A) and those who were operated after (Group B). In Group A patients, urethroplasty was performed using silicone Foley catheters, in which balloon of these catheters was filled by saline at appropriate size. In Group B, urethroplasty was performed using feeding catheter. In all patients, urethroplasty was performed with 6/0 polydioxanone with continuous and subcutaneous sutures. Vascular flaps were placed on the single layer sutures. The urethral stents were removed in all patients after 7 days. The both never used Foley catheter and feeding catheter are shown in Figures 1 and 2 highlights a wider area in the deflated balloon of Foley catheter after 7 days of use. Monthly protective meatus calibration was performed for the first 3 months after removal of the urethral stent. Patients in both groups were evaluated retrospectively in terms of the characteristics of the patients, the success of the procedure, and the rate of fistula development.

Statistical analysis was performed using the IBM SPSS Statistics for Windows, Version 21.0 (Chicago, IL, USA). Data were expressed as the median and interquartile range for quantitative nonparametric measures and the mean and standard deviation for parametric data. Fisher's exact test was used to compare nonparametric data among the two groups. The $P < 0.05$ was considered statistically significant.

Results

A total of 123 hypospadias patients aged 6 months to 15 years (mean 63.2 ± 35.6 months) were followed up for 4 months to 10 years (mean 3 years) after managed using the Snodgrass method. Of them, a total of 14 patients (11.4%) developed fistula. Group A and Group B consisted of 32 and 91 patients, respectively. The mean age of patients in Group A and Group B was 70.6 and 60.6 months, respectively [Table 1]. Preoperative urethral meatus localization in Group A

Table 1: Characteristics of the surgical patients

	Group A	Group B	Total
Number, *n* (%)	32 (26)	91 (74)	123 (100)
Age (months), mean±SD	70.6±38.7	60.6±34.3	63.2±35.6
Number of primary surgery, *n* (%)	27 (84.4)	85 (93.4)	112 (91.1)
Number of secondary surgery, *n* (%)	5 (15.6)	6 (6.6)	11 (8.9)
Meatus localization, *n* (%)			
Coronal	17 (53.1)	33 (36.3)	50 (40.7)
Penile + subcoronal	15 (46.9)	58 (63.7)	73 (59.3)
Penile cordi, *n* (%)	15 (12.2)	80 (65.0)	95 (77.2)
Additional pathology, *n* (%)	9 (28.1)	19 (20.9)	28 (22.8)
Fistula*, *n* (%)	10 (31.3)	4 (4.4)	14 (11.4)

*There is significant difference between the two groups (P=0.0002). SD=Standard deviation

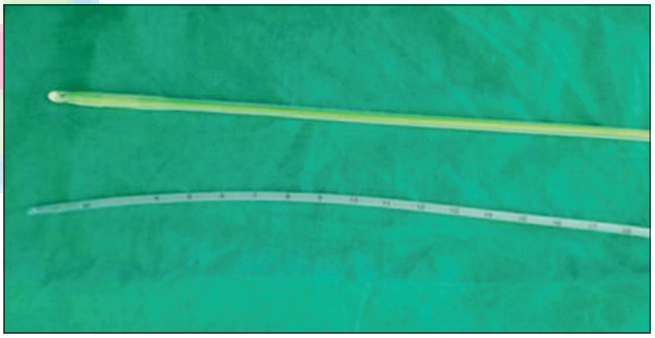

Figure 1: The both never used Foley catheter and feeding catheter

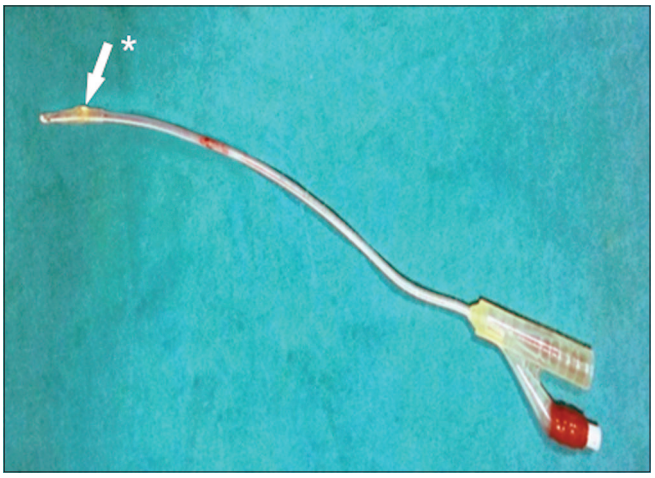

Figure 2: A wider area in the deflated balloon of Foley catheter after 7 days of use (white arrow)

Table 2: Meatus location according to patient group

Meatus localization	Group A			Group B			Total
	Primary surgery	Secondary surgery	Total	Primary surgery	Secondary surgery	Total	
Coronal (*n*)	17	0	17	31	2	33	50
Penile + subcoronal (*n*)	10	5	15	54	4	58	73
Total (*n*)	27	5	32	85	6	91	123

Table 3: Distribution of patients with fistula

	Coronal	Penile + subcoronal	Total
Group A			
Primary surgery	4	4	10
Secondary surgery	0	2	
Group B			
Primary surgery	0	2	4
Secondary surgery	0	2	

was at the coronal level in 17 patients (53.1%) whom underwent primary surgery and it was at the penile and subcoronal levels in 15 patients (46.9%), while 10 of them managed by primary surgery and the remaining five patients were corrected by secondary repair. In Group B, the meatus was preoperatively located at the coronal level in 33 patients (36.3%), while 31 of them were managed by primer surgery and the remaining two patients were corrected by secondary repair. It was at the penile and subcoronal levels in 58 patients (63.7%), while 54 of them underwent primary surgery and the remaining four patients were managed by secondary repair [Table 2]. Fistula developed in 10 (31.3%) and 4 (4.39%) patients in Group A and Group B, respectively. A total of 10 patients (31.3%) developed fistula in Group A. Four of them at the coronal level underwent primary surgical repair. Fistulas developed at distal penile and subcoronal level in six patients, while four of them underwent primary surgery and the remaining two patients managed by secondary surgery. In Group B, a total of 4 patients developed a fistula at the distal penile and subcoronal level, while two patients underwent primary surgery and the other two patients were managed by secondary surgery. Fistula complication developed in ten cases (31%; eight underwent primary surgery and two underwent secondary surgery) in Group A and in four cases (4.4%; two underwent, two underwent secondary) in Group B. There was a statistically significant difference between the two groups in terms of development of fistula complication (P = 0.0002). Patients with fistula were corrected by secondary surgery [Table 3]. Hematoma and/or infection complications were not observed in any case.

Discussion

Hypospadias is the most common congenital malformation in men.[12] The goal in hypospadias surgery is to obtain good cosmetic and functional results in a single session.[13] Despite advances in surgical techniques, postoperative complications still occur. The most common complications are total opening of urethroplasty, urethrocutaneous fistula, and meatal stenosis. These complications frequently occur in the first 6 months of postoperative period.[14-16]

The Snodgras method, also called TIPU, is the most commonly used method today in hypospadias repair, and it can be used in the majority of all distal and proximal hypospadias.[17] The complication rate in hypospadias surgeries varies between 6% and 30% according to the hypospadias pattern.[18] Compared to other methods, the complication rate is low in the TIPU method, and the most frequently reported complications are fistula in 0%–39% (average 5%) and meatal stenosis in 0%–32% (average 3%).[18-20] Buson *et al*. found that the complication rate of those who did not use the urinary diversion was higher than those who used the urinary diversion (18.9% and 4.6%, respectively).[21] A total of 14 patients (11.3%) developed fistula in our series. Although there are many factors that affect the complication rate, the roles of urethral stenting and urinary diversion in this context remain controversial.[11,22] After repair of the hypospadias, the edema should be eliminated, and the anastomosis line should be healed before urinary contact. Urinary diversion is expected to prevent urinary contact. For this purpose, it is suggested to use urinary diversity to increase success in hypospadias repair.[7] Snodgrass tubularized the urethral plate around a stent while defining TIPU and used an intraurethral stent as a urinary diversion.[6-23] Complication rate after TIPU surgery using urethral stent has been reported ranging 0%–40%.[7] Most researchers have stated that undesired complication rate was too high when they first applied the TIPU and decreased dramatically as they gain surgical experience.[24-26]

It has been reported in the literature that the use of a stent as a urethral catheter in cases who underwent to TIPU is also effective on fistula complication. The present study was essentially an audit of 123 patients who underwent TIPU over the stated period, and the fistula complication rate in the early period (Group A) was higher than that of the later period (Group B).

However, the conditions might have changed the case number, surgical experience, facilities, etc., which might affect the outcome of our patients in favor of the later period. As surgical experience increases, fistula complications decrease. These were limiting factors for the present study.

In the study of Ghareeb and Azooz in which the Foley and hole-end catheters were used in every half of the 72 patients, it was found that hole-end catheter had better drainage.[27] In a study involving 361 cases of stent use by Xie *et al*., Foley catheter (n = 91) and feeding catheter (n = 270) were compared. Fistula complications were found to be statistically higher in Foley catheterized cases (20.8%) than that of feeding catheterized cases (13.3%).[28] In the present study, a total of 10 (31.3%) patients developed fistula complication in the Foley catheterized Group A patients, of them eight and two cases underwent the primary and secondary surgery, respectively. A total of 4 (4.5%) patients developed fistula complication in the feeding catheterized Group B patients, in which each two cases underwent the primary and secondary surgery, respectively. There was a statistically significant difference between the two groups in terms of fistula complication (P = 0.0002). We think that the difference between the groups in terms of fistula development is related to the type of stent used as well as the increase in experience.

Conclusion

The use of a feeding catheter for urinary drainage after urethroplasty could be a more advantageous than using a Foley catheter.

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Conflicts of interest

There are no conflicts of interest.

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