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Original Article

Effect of catheter selection in hypospadias repair

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Abstract

Aim: The effects of catheter use on postoperative complications in patients undergoing hypospadias repair remains controversial. The aim of this study was to evaluate the effectivity of silicone and feeding catheters on surgical outcomes in patients undergoing hypospadias repair.

Material and Methods: The retrospective study included 169 patients with distal and midpenile hypospadias who were operatively treated with tubularized incised plate urethroplasty between July 2014 and July 2018. A feeding catheter was used in 79 patients (Group A) and a silicone catheter was in 90 patients (Group B). Postoperative complications including catheter-related complications (catheter occlusion, urine leak around the catheter, and spontaneous withdrawal) and hypospadias-related complications (urethrocutaneous fistula, meatal stenosis, urethral stenosis, and glans dehiscence) were recorded for each patient.

Results: The age of the patients ranged between 6 months and 15 years. The incidence of catheter-related complications was significantly higher in Group A compared to Group B ($p<0.021$). The overall incidence of hypospadias-related complications was 5.1% in Group A as opposed to 3.3% in Group B and no significant difference was found between the two groups with regard to postoperative complications.

Conclusion: Although catheter selection had no effect on hypospadias-related complications, the use of feeding catheters led to a higher incidence of catheter-related complications, which is likely to increase the anxiety levels of the parents.

Keywords: Catheter; child; complication; hypospadias

INTRODUCTION

Hypospadias is a ventral penile anomaly caused by underdevelopment of the anterior urethra. In hypospadias, the urethral meatus can be at any location on the ventral penis shaft, from just below the glans in mild cases to the perineum in severe cases. Hypospadias is a frequent anomaly of male external genitalia and occurs in about 1 in 300 live male births (1,2).

Surgery is the mainstay treatment of hypospadias and the primary goal in surgery is to achieve a functionally and cosmetically normal penis. The rate of postoperative complications such as meatal stenosis, urethrocutaneous fistula, and glans dehiscence vary between 0% and 25% according to the location of the meatus, surgical technique, age at surgery, surgical equipment, and the experience of the surgeon (3-6). To date, numerous techniques have been described for hypospadias repair. Of these, tubularized incised plate urethroplasty (TIPU) defined by Snodgrass is the most commonly preferred technique due to its low complication rates and better cosmetic outcomes (7-9). In previous studies, different urethral catheters have been used to reduce the complication rates in hypospadias repair. However, the use of catheters following hypospadias repair remains controversial particularly in patients undergoing TIPU. Some authors advocate the use of catheters for the reduction of postoperative dysuria, prevention of the retention and closure of the urethral plate following incision, and for stopping bleeding by catheter buffering, while other authors do not recommend catheter use. However, there is no consensus on a standard catheter type; therefore, various catheter types are being used by surgeons, primarily including silicone, feeding, and Foley catheters and Koyle diaper urethral stent (10-13). In this study, we aimed to investigate the effects of feeding and silicone Foley catheters used for hypospadias repair on postoperative complications.

MATERIAL and METHODS

The study was initiated after obtaining an approval from the local ethics committee. The retrospective study reviewed the medical records of 169 patients that underwent TIPU for distal hypospadias in Sivas Education and Research

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Hospital Pediatric Surgery Clinic between July 2014 and July 2018. All the patients were operated on under general anesthesia by the same surgeon experienced in TIPU (MA). Patients with glanular hypospadias and penoscrotal hypospadias and patients that were circumcised or were secondary cases were excluded from the study.

The first suture was passed through compact urethra and was continued up to the tip of the glans over the catheter using 6/0 polyglactin suture with the subcuticular suture technique. A flap was prepared from the preputial subcutaneous tissue and was fixed onto the anastomosis line. Glanuloplasty was performed with 5/0 polyglactin suture. Skin defect and the circumcision line were repaired with separated 5/0 polyglactin sutures. In the first 90 patients, we used the silicone catheter proposed in the literature. However, after the consumption of all silicone catheters in our hospital, we used a feeding catheter for the remaining patients, which were recommended in some studies. In total, a feeding catheter was used in 79 patients (Group A) and a silicone Foley catheter was in 90 patients (Group B) in a non-tight manner, both of which were in 6-8 Fr sizes. Forty-eight hours after surgery, the antibiotic impregnated dressing was opened out. Antibiotic therapy was administered in each patient both preoperatively and during the hospital stay. The catheters were removed in both groups within seven days and the patients were discharged following urination.

Common catheter-related complications included catheter occlusion, urine leak around the catheter, and spontaneous withdrawal. Catheter occlusion was considered in the catheters that could not be opened with irrigation, urine leak was considered in the presence of urine leak around the catheter (at least once), and withdrawal of the catheter was considered as the spontaneous withdrawal of the catheter seventh days prior to the planned withdrawal.

Postoperative complications included urethrocutaneous fistula, meatal stenosis, urethral stenosis, and glans dehiscence. Surgical outcomes were evaluated both on the day of catheter removal and on postoperative weeks 2 and 6 and months 6 and 12 based on physical examination findings, observation of urination, and urethral calibration if needed. The outcomes were compared between the two groups

Statistical analysis

Data were analyzed using SPSS 18.0 for Windows (SPSS Inc., Chicago, IL, USA). Continuous data were compared using Independent-samples t-test. Descriptives were expressed as mean ± standard deviation (SD) for continuous variables and as frequencies and percentages for categorical variables. Group means were compared using Fisher's exact test and binary comparisons were performed using Student's t test. A p value of <0.05 was considered significant.

RESULTS

A total of 169 patients underwent hypospadias repair with TIPU. A feeding catheter was used in 79 (46.7%) (Group A) and a silicone Foley catheter was used in 90 (53.3%) patients (Group B). The ages of the patients ranged between 6 months and 15 years and the mean age was 34.79±28.55 months in Group A and 35.17±27.33 months in Group B. In both groups, most of the patients had distal hypospadias (Group A: n=56; 74% vs. Group B: n=66; 73%) followed by midpenile hypospadias (Group A: n=23; 26% vs. Group B: n=24; 27%). However, no significant difference was found between the groups with regard to mean age and the type of hypospadias (Table 1).

Table 1. Patient characteristics

	Group A (Feeding Tube) (n=79)	Group B (Silicone Tube) (n=90)	p
Mean Age (Months ± SD)	34.79±28.55	35.17±27.33	0.583
Type of hypospadias, n (%)			0.427
Distal	56 (74%)	66 (73%)	
Midpenile	23 (26%)	24 (27%)	
Mean follow-up (months ± SD)	18.2±5.2	20±6.1	0.46

SD: Standard Deviation

Postoperative Complications

Summarized in Table 2.

Catheter-related complications

These complications occurred in 19 (24.1%) and 10 (11.1%) of the patients in Group A and B, respectively (p=0.021). Of these complications, catheter occlusion occurred in 12 (15.1%) and 5 (5.5%) of the patients in Group A and B, respectively, and a significant difference was found between the groups (p=0.034). Urine leak around the catheter was noted in 13 (16.5%) and 6 (6.7%) of the patients in Group A and B, respectively, and a significant difference was also found between the groups (p=0.038). However, although withdrawal occurred in 9 (11.4%) and 5 (5.5%) of the patients in Group A and B, respectively, no significant difference was found between the groups (p=0.137) (Figure 1).

Table 2. Distribution of complications			
Complications	**Group A (Feeding Tube) (n:79)**	**Group B (Silicone Tube) (n:90)**	**P Value**
Catheter-related complications	19 (24.1%)	10 (11.1%)	0.021
Catheter occlusion	12 (15.1%)	5 (5.5%)	**0.034**
Urine leak	13 (16.5%)	6 (6.7%)	**0.038**
Withdrawal	9 (11.4%)	5 (5.5%)	0.137
Hypospadias-related complications	4 (5.1%)	3 (3.3%)	-
Meatal Stenosis	3 (3.8%)	2 (2.2%)	-
Ureterocutaneous fistula	1 (1.3%)	1 (1.1%)	-
Urethral Stenosis	0	0	-
Urethral Diverticulosis	0	0	-
Data were shown as number of patients (%)			

Hypospadias-related complications

In Group A, 3.6% (n=2) of the patients with distal hypospadias and 4.3% (n=1) of the patients with midpenile hypospadias developed meatal stenosis and 4.3% (n=1) of the patients with midpenile hypospadias developed urethrocutaneous fistula. In Group B, 1.5% (n=1) of the patients with distal hypospadias and 4.2% (n=1) of the patients with midpenile hypospadias developed meatal stenosis, and 4.2% (n=1) of the patients with midpenile hypospadias developed urethrocutaneous fistula. Meatotomy was performed in patients with meatal stenosis and fistula repair was performed in patients with urethrocutaneous fistula 6 months after the surgery. No patient had glans dehiscence in both groups. The overall incidence of hypospadias-related complications was 5.1% in Group A as opposed to 3.3% in Group B and no significant difference was found between the two groups with regard to postoperative complications.

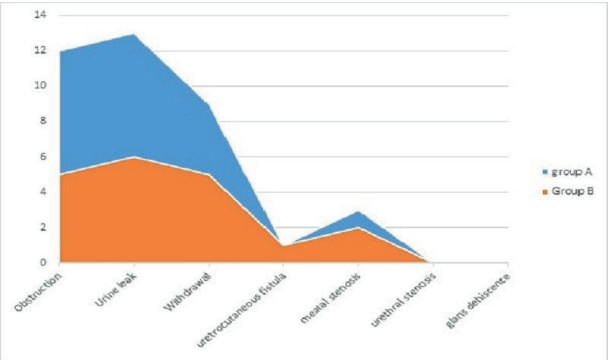

Figure 1. Complications of groups

DISCUSSION

Hypospadias is a frequent congenital anomaly of male external genitalia. Surgery is the mainstay treatment of hypospadias and the primary goal in surgery is to achieve a functionally and cosmetically normal penis. Factors affecting surgical success include the location of the meatus, surgical technique, age at surgery, experience of the surgeon, and surgical equipment (4,8,14,15).

Literature indicates that more than 100 surgical techniques have been defined for the treatment of hypospadias, all aimed at achieving better outcomes and lower complication rates. Of these, tubularized incised plate urethroplasty (TIPU), defined by Snodgrass, has recently emerged as the most commonly preferred technique, which is a simple and one-step procedure providing relatively lower complication rates and better cosmetic outcomes (8,9,10). In previous studies, TIPU has been shown to provide remarkably low complication rates particularly in patients with distal and midpenile hypospadias (5,14-16). In the present study, all the patients were operated on with TIPU by the same surgeon.

It is commonly known that complication rates increase as the location of the urethral meatus is shifted from distal to proximal (3). In a previous single-centre study, Sarhan et al. (16) evaluated 500 patients and proposed that the location of the urethral meatus is one of the most significant risk factors in hypospadias repair. Additionally, the other important factor affecting surgical success is the experience of the surgeon and several studies indicated that as the experience of the surgeon increases, the complication rates decrease substantially (17,18).

Literature reviews indicate controversial findings regarding the use of stents in hypospadias repair. There are some studies showing no difference between using and not using an urethral stent in patients with distal hypospadias surgically treated with the Mathieu and Snodgrass technique with regard to complication rates, whereas other studies maintain that the complication rates are four times higher in non-stent patients compared to those treated with stents (1,19,20). Although there is no consensus on the type of the stent to be used in hypospadias repair, silicone catheters are commonly preferred as urethral

stents due to their lower complication rates (11,12,21,22). Xie QG et al. (13) compared the effectivity of Foley catheter and the gastric tube in 361 cases and reported that the gastric tube provided better drainage while the Foley catheter resulted in fistula in 13.3% and urethral stricture in 10.70% of the patients. In addition, Saraç et al. (23) reported that the incidence of fistula complications was statistically higher in Foley catheterized cases than that of feeding catheterized cases.

In our study, the surgical technique, suture material and the suturing technique, and the surgeon-related factors were the same in all the patients. Notwithstanding, the complication rate was significantly higher in the patients treated with a feeding catheter compared to those treated with a silicon Foley catheter, which could be attributed to the fact that silicone Foley catheters are relatively more pliable and cause less bladder irritation. Lee et al. (10) compared the effectivity of Koyle diaper urethral stent and silicone stent and reported that although Koyle diaper urethral stent led to less catheter-related complications, no significant difference was found between the two stents with regard to hypospadias-related complications, as in our study. On the other hand, in terms of pricing, Koyle diaper urethral stent (51.16 USD) is the most costly catheter as compared to silicone Foley catheter (1-5 USD) and feeding tube (0.2 USD).

The most important limitation of our study was the absence of a non-stent treatment group. Another limitation was that the study did not employ an objective scale for patient selection. Further prospective studies are needed to substantiate our findings.

CONCLUSION

The results indicated that although catheter selection had no effect on hypospadias-related complications, it had a significant effect on catheter-related complications. Accordingly, we believe that catheter selection is highly effective in the improvement of satisfaction in both patients and their relatives in early postoperative period.

Competing interests: The authors declare that they have no competing interest.

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REFERENCES

1. Baskin LS. Hypospadias In: Coran AG, eds. Pediatric Surgery. 7th edition. Philadelphia, WB Saunders, 2014;1531-55.
2. Sweet R, Schrott H, Kurland R, et al. Study of the incidence of hypospadias in Rochester, Minnesota, 1940-1970, and a case-control comparison of possible etiologic factors. Mayo Clin Proc 1974;49:52-8.
3. Bertozzi M, Yıldız A, Kamal B, et al. Multicentric experience on double dartos flap protection in tubularized incised plate urethroplasty for distal and midpenile hypospadias. Pediatr Surg Int 2011;27:1331-6.
4. Yildiz T, Tahtali IN, Ates DC, et al. Age of patient is a risk factor for urethrocutaneous fistula in hypospadias surgery. J Pediatr Urol 2013;9:900-3.
5. Al-Ghorairy BA, Elashry OM, Al-Housain AE, et al. Analysis of five-year experience with tubularized incised plate urethroplasty for anterior and mid penile hypospadias. Eur J Pediatr Surg 2009;19:90-5.
6. Rompré MPD, Nadeau G, Moore K, et al. Learning curve for TIP urethroplasty: A single-surgeon experience. Can Urol Assoc J 2013;7:789-94.
7. Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. J Urol 1994;151:464-5.
8. Oswald J, Korner I, Riccabona M. Comparison of the perimeatal-based flap (Mathieu) and the tubularized incised-plateurethroplasty (Snodgrass) in primary distal hypospadias. BJU Int 2000;85:725-7.
9. Snodgrass W. Changing concepts in hypospadias repair. Current opinion in urology 1999;9:513-6.
10. Lee LC, Schröder A, Bägli DJ, et al. Stent-related complications after hypospadias repair: a prospective trial comparing Silastic tubing and Koyle urethral stents. J Pediatr Urol 2018;14:423.
11. Hosseinpour M, Noori S, Amir-Beigi M, et al. Safety of latex urinary catheters for the short time drainage. Urol Ann 2014;6:198-201.
12. Yesildag E, Tekant G, Sarimurat N, et al. Do patch procedures prevent complications of the Mathieu technique? J Urol 2004;171:2623-5.
13. Xie QG, Su C, Li ZQ, et al. Foley catheter versus urethral stent plus gastric tube for urine drainage following urethroplasty. Zhonghua Nan Ke Xue 2014;20:439-41.
14. Snodgrass W, Bush N, Cost N. Tubularized incised plat hypospadias repair for dista hypospadias. J Pediatr Urol 2010;6:408-13.
15. Sarhan OM, El-Hefnawy AS, Hafez AT, et al. Factors affecting outcome of tubularized incised plate (TIP) urethroplasty: Single-center experience with 500 cases. J Pediatr Urol 2009;5:378-82.
16. Tavakkoli TK, Mohammadi RT. Tubularized incised plate urethroplasty using buccal mucosa graft for repair of penile hypospadias. Urol J 2012;9:514-21.
17. Hafez AT, Helmy T. Tubularized incised plate repair for penoscrotal hypospadias: role of surgeon's experience. Urology 2012;79:425-7.
18. Marrocco G, Vallasciani S, Fiocca G, et al. Hypospadias surgery: A10-year review. Pediatr Surg Int 2014;20:200-3.
19. Chalmers DJ, Siparsky GL, Wiedel CA, et al. Distal hypospadias repair in infants without a postoperative stent. Pediatr Surg Int 2015;31:287-90.
20. Turial S, Enders J, Engel V, et al. Stent-free tubularized incised plate (TIP) repair of distal and mid-shaft hypospadias irrespective of age. Eur J Pediatr Surg 2011;21:168-70.

21. Badiola F, Anderson K, Gonzalez R. Hypospadias repair in an outpatient setting without proximal urinary diversion: Experience with 113 urethroplasties. J Pediatr Surg 1991;26:461-4.
22. Polat H, Gulacti U. The Ideal Use of Catheters in Hypospadias Repair: An Experimental Study. Urol J 2016;13:2856-9.
23. Sarac M, Bakal U, Tartar T, et al. Is stent type used in snodgrass method a factor in fistula formation? Niger J Clin Pract 2018;21:1198-202.