https://doi.org/10.15218/zjms.2017.025

Outcome of Snodgrass urethroplasty by modifying tubularization and dartos layer in Erbil

Received: 2/5/2016 Accepted: 15/8/2016

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Abstract

Background and objective: Snodgrass first described the tubularized, incised plate (TIP) urethroplasty for distal hypospadias repair in 1994. This study aimed to find out whether there is any difference in the fistula rate with single versus double layer tubularization, and the use of ventral versus dorsal dartos layer.

Methods: Between May 2009 and July 2014, tubularized incised plate urethroplasty was performed for correction of hypospadias in Erbil for 112 patients with age ranging from 1-32 years. Five patients were excluded from the study because of lack of adequate follow up. Data were analyzed using the statistical package for the social sciences.

Results: Urethral fistula occurred in seven cases (6.5%).The use of an additional reinforcing second layer for the tubularization had a significant effect on decreasing the fistula formation (P = 0.05). The fistula rate was slightly lower with dorsal dartos flap (5.4%) than ventral dartos flap (7.8%).

Conclusion: The urethral plate, when dissected, should be thick enough to allow for tubularizationin two layers. Both dorsal and ventral dartos flaps are effective in preventing urethral fistula.

Keywords: Hypospadias; Dartos flap; Fistula

Introduction

Hypospadias is defined as an abnormal ventral opening of the urethral meatus, with or without an abnormal ventral curvature of the penis (chordee). The meatus can be glanular, coronal, Subcoronal, along with the penile shaft, penoscrotal, scrotal, or perineal. With an incidence of 1:300, hypospadias is one of the most common genital anomalies in male newborns.[1] The aim of hypospadias surgical treatment is to bring the urethral opening at the top of the glans, achieving a straight penis, creating favorable conditions for a successful psychosexual life, a low percentage of post-operative complications and one-stageoperation.[2] Snodgrass first described the tubularized, incised plate (TIP) urethroplasty for distal hypospadias repair in 1994. The major principles are deep longitudinal incision of the urethral plate, which allows for its tubularization, and the interposition of a barrier layer of dartos pedicle between the neo-urethra and overlying skin.[3] Snodgrass urethroplasty method is suitable both as a primary operation as well as a repeated operation after an unsuccessful urethral reconstruction by using some other method. It is also suitable for boys who have already been circumcised. Furthermore, by the longitudinal incision of the urethral plate, as this method requires, a normal size neo-urethra can be formed even where the urethral plate is narrow, and good cosmetic appearance (vertical slit meatus at the tip of glans). Therefore, Snodgrass method has been referred to as the method of choice for surgical hypospadias treatment.[4,5] This study aimed to find out whether there is any difference in the outcome and fistula rate with the use of single layer versus double layer tubularization, the use of ventral versus dorsal dartos layer, and in circumcised versus uncircumcised cases.

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https://doi.org/10.15218/zjms.2017.025

Methods

Design and sample collection

This is a comparative study between two surgical methods. Between May 2009 and July 2014, tabularized incised plate urethroplasty was performed for correction of hypospadias (coronal to proximal penile) at Rizgary Teaching Hospital and Raparin Pediatric Hospital in Erbil for 112 patients. The mean ± SD age of the patients was 6 ± 5.9 years and ranged from 1-32 years. A short history was taken including patient's demographics, any difficulty in urination, ventral penile curvature on erection, and any associated anomaly. Clinical examination was performed including the level of the meatus, meatal stenosis, chordee, depth of urethral plate groove, the width of the urethral plate, and any associated anomalies were noted. The outcomes and possible complications were discussed with the parents and the informed consent was obtained. Preoperative photos were taken. The TIP repair was carried out as described by Snodgrass in the published reports.[6] However, depending on surgeons' preference in 79 cases double layer tubularization was used, and in 51 cases including circumcised cases, a ventral dartos layer (Figure 1) were used instead of dorsal dartos layer (Figure 2). Surgical instruments, suture materials (6-0Vicryl) were the same for all patients. For urinary drainage, we used short, 5-7 cm, perforated intra-urethral stent, for post-operative urination, fixed on outer meatus and kept in place for 7-14 days according to the length of the tubularized neo-urethra. A compression dressing was applied and left in place for3–7 days. All of the patients were examined 1 week, 1 month, 3 months and 6 months after discharge. Data including duration of the surgery, reinforcing layer, type of dartos layer, stenting time, duration of hospitalization, and any complications such as break down, hematoma, meatal stenosis, and fistula formation were collected. Also, surgeon/parent satisfaction was calculated according to a score sheet derived from the hypospadias objective scoring evaluation (HOSE) system[7] which includes meatal location, meatal shape, urinary stream, curvature, and urethral fistula.

The information related to operation along with findings in follow-ups was recorded in forms and they were compared between the groups.

Exclusion criteria:

Exclusion criteria were moderate to severe chordee and previous repair. Five patients were excluded from the study because of lack of adequate follow up, therefore; only the remaining 107 patients were included in the analysis.

Ethical considerations:

The study protocol was approved by Research Ethics Committee of the College of Medicine of Hawler Medical University. Informed consent was obtained from all parents (for children below 18 years old) and from the patients above that age.

Statistical analysis

Data were analyzed using the statistical package for the social sciences (version 19). Fisher's exact test was used to compare between proportions as the expected count of more than 20% of the cells of the tables were less than 5. A *P* value of less or equal to 0.05 was considered statistically significant.

Results

The age ranged from 1 to 32 years (mean ± SD = 6 ± 5.9 years). The commonest meatal level preoperatively was distal penile which was seen in 59 cases as shown in Table 1. We found that the reinforcing layer was effective in decreasing the fistula formation from 14.3% to 3.8% (*P* = 0.05) as shown in Table 2. We found that both dorsal and ventral dartos layers were effective in de-creasing urethral fistula formation with no statistically significant difference between the two techniques (*P* = 0.254) as shown in Table 3. We found that the

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fistula rate in uncircumcised and previously circumcised patients was almost similar (*P* = 0.567) as shown in Table 4. We found a high satisfaction rate with the final result of Snodgrass urethroplasty by both the parents (89.7%) and surgeon (83.2%) (*P* = 0.61) as shown in Table 5.

Table 1: Distribution of sample by meatal level preoperatively.

Meatal level	No	%
Coronal	17	15.9
Subcoronal	17	15.9
Distal penile	59	55.1
Midpenile	13	12.1
Proximal penile	1	0.9
Total	107	100

Table 2: Correlation between reinforcing layer and fistula development

Fistula	Reinforcing layer				*P* value
	No		Yes		
	No.	%	No.	%	
No	24	85.7	76	96.2	
Yes	4	14.3	3	3.8	0.05
Total	28	100	79	100	

Table 3: Correlation between types of Dartos layer and fistula development.

Fistula	Dartos layer				*P* value
	Ventral		Dorsal		
	No.	%	No.	%	
No	47	92.2	53	94.6	
Yes	4	7.8	3	5.4	0.254
Total	28	100	79	100	

Table 4: Correlation between previous circumcision and fistula development.

Fistula	Previous circumcision				*P* value
	No		Yes		
	No.	%	No.	%	
No	75	93.7	25	92.6	
Yes	5	6.3	2	7.4	0.567
Total	80	100	27	100	

Table 5: Parents and surgeon satisfaction

Type	Highly Satisfied	Moderately Satisfied	Unsatisfied	*P* value
Parent Satisfaction	96(89.7%)	9(8.4%)	2(1.9%)	0.61
Surgeon Satisfaction	89(83.2%)	16(15%)	2(1.9%)	

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Discussion

Several surgical techniques have been advocated for repairing hypospadias, among which Mathieu and Snodgrass are the most commonly used techniques.[8] Since it was introduced in 1994, Snodgrass urethroplasty has been the adopted procedure for distal hypospadias correction by many urologists.[4,9] In our series in addition to distal hypospadias, the Snodgrass urethroplasty has been used for midpenile and proximal penile hypospadias with a high success rate. Many researchers have supported the use of Snodgrass urethroplasty for proximal hypospadias, and some believe that it can be used practically in all types of hypospadias.[2] The longitudinal split of urethral groove described by Snodgrass is considered an innovation to urethral plate preservation surgery. It allows tension-free tubularization of the narrow urethral plate to form a neourethra of an adequate size.[10] In this series urethral fistula occurred in seven cases (6.5%), which is lower than that reported by Holland et al.(10%)[11] and Mazin (8%),[12] but; higher than that reported by Imamoglu et al. (4%).[13] We found that the use of an additional reinforcing second layer for the tubularization has a significant effect in decreasing the fistula formation. We believe that the urethral plate, when dissected, should be thick enough to allow for tubularization in two layers, namely the first subepithelial together with a second reinforcing one. Another important factor in preventing urethral fistula is the use of dartos flap.[8,14] We compared the use of ventral dartos (Figure 1) versus dorsal dartos flap (Figure 2) in decreasing the fistula formation.

Figure 1:a- Subcoronal hypospadias in circumcised boy, b- Double layer tubularization is completed and Ventral dartos layer is ready for second layer coverage of the neourethra, c- Ventral dartos layer inset, d- Dressing.

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We found that the fistula rate was slightly lower with dorsal dartos flap (3/56, 5.4%) than ventral dartos flap (4/51, 7.8%), however; statistically insignificant i.e. both flaps are effective in preventing urethral fistula formation. We believe that the dartos flap act as a good vascular tissue bulk laid over the repair decreased the rate of fistula. We compared the incidence of fistula in relation to the previous circumcision and found that there was no statistically significant difference in the rate of fistula formation between the previously circumcised (2/27, 7.4%) and uncircumcised patients (5/80, 6.3%). Therefore; we believe that Snodgrass technique is highly successful for hypospadias repair in both circumcised and uncircumcised patients. The high success rate of Snodgrass technique is reported by other researchers.[5,15,16] Among the seven cases of fistula, three of them were small fistula that healed within two months with conservative management with local antibiotic ointment and regular urethral dilatation, while the other four cases scheduled for surgical repair after a minimum of six months. Six patients developed meatal stenosis with weak urinary stream 3-4 weeks after surgery, four of them successfully managed with regular urethral dilatation for three months, while the other two cases underwent meatotomy.

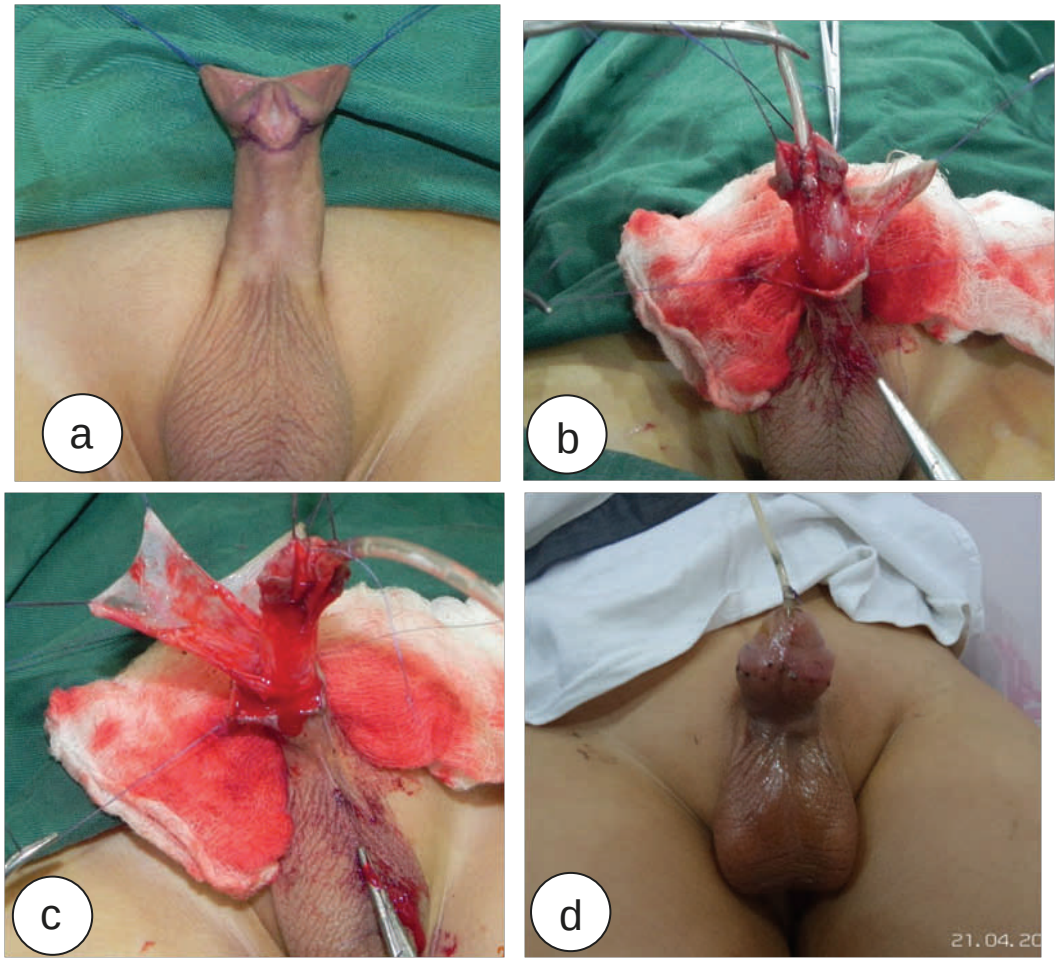

Figure 2: a- Subcoronal hypospadias in non-circumcised boy marking done, b- Double layer tubularization is completed,c- Dorsal Dartos layer is ready for second layer coverage of the neo-urethra, d- First dressing change after five days.

https://doi.org/10.15218/zjms.2017.025

We found high satisfaction of parents (96, 89.7%) and surgeons (89, 83.2%) with the final result. The high satisfaction rate with Snodgrass urethroplasty is supported by other researchers.[2,6,8] The high satisfaction rate with Snodgrass urethroplasty is due to excellent cosmetic and functional result with vertically oriented meatus (Figure 3 and 4) and a low percentage of postoperative complications. It is one stage operation and applicable for most types of hypospadias and even for revision cases; therefore; in agreement with the author Snodgrass, we believe that on the basis of our experience, this method is the most suitable for hypospadias repair.

Conclusion

We believe that the urethral plate, when dissected, should be thick enough to allow for tubularization in two layers. Both dorsal and ventral Dartos flaps are effective in preventing urethral fistula formation. We recommend Snodgrass technique because it is highly successful for hypospadias repair in both circumcised and uncircumcised patients and has been used for distal, midpenile, and proximal penile hypospadias with high success rate.

Conflicts of interest

The authors report no conflicts of interest.

Figure 3: a- Distal penile hypospadias preoperative, b & c - Postoperative after first dressing change showing vertically oriented meatus with excellent cosmetic appearance.

Figure 4: a- Subcoronal hypospadias preoperative, b – Five days post-operative after first dressing change c- Postoperative after stent removal showing vertically oriented meatus with excellent cosmetic appearance.

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