Factors Affecting Results of Hypospadias Repair: Single Technique and Surgeon

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Objective: *To review our experience of using the tubularized incised plate (TIP) urethroplasty to treat all type of hypospadias and identify factors that affect the results and complications.*

Material and Method: *A retrospective medical records review of 90 patients with hypospadias treated with TIP urethroplasty between November 2007 and March 2012 was performed. The operation was done by TIP technique in eighty patients. The entire length of the urethral plate was incised along the midline and the neourethra was tubularized over a 6 or 8 Fr feeding tube with Maxon or Vicryl 6-0 suture. The urethral stent was removed on the third to seventh post-operative day. All operations were done by the same surgeon. Postoperative follow-up was at least one year in all patients. Presence of complications requiring reoperation and overall general appearance were recorded.*

Results: *TIP was performed in 80 boys, age ranged from 11 months to 15 years (mean age 2.5 years). Distal hypospadias was found in 15, midshaft in 18, proximal in 16, and penoscrotal in 31 patients. Overall success rate was 76.25%. Re-operation was required in 19 patients (23.75%): for urethrocutaneous fistula in 12 (15%), complete disruption of the repair in three (3.75%) and meatal stenosis in four (5%). The meatal stenosis was managed by simple dilatation in all patients. All fistulas, except for one, were successfully repaired in a single operation. Complications increased in penoscrotal hypospadias and repaired at early period. Age at surgery did not increase complications rate.*

Conclusion: *TIP repair is a reliable method for treating all types of hypospadias. Complications rate may depend on type of hypospadias and increase in proximal and penoscrotal location. Our data indicate age at surgery does not increase urological complications. A better outcome is achieved with good experience.*

Keywords: *Hypospadias, TIP, Urethrocutaneous fistula, Urethroplasty*

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Snodgrass first introduced tubularized incised plate (TIP) urethroplasty in 1994[1]. The high success rate, modesty, low complication rate, and good cosmetic of the TIP repair have made it widely accepted as a good option for treating distal hypospadias.

The aim of hypospadias repair is to improve the wellbeing of patients throughout their entire lives. The aims of surgery are to change the anatomy of the penis to look normal and allow normal micturition and unimpaired sexual function. Surgery itself, anesthesia, hospitalization, separation from the parents, and postoperative pain can be stressful and interact with the child's short- and long-term adjustment. These factors may become more important if a child had repeated operations due to two-stage repairs or after complications[2,3].

Timing of hypospadias repair is influenced by penile size, genital awareness, and anesthetic risks. An earlier recommendation that surgery be performed after three years of age was revised in 1996 with the current opinion that repair is best done between six and 18 months[4]. However, several authors had reported that complication rates increase when surgery was done after the age of six months[5] or one year[5-8].

Many different repairs have been described and many are still used by surgeons worldwide. Despite the variety of approaches, experience has always been recognized as one of the most important factors in accomplishing continuous, successful outcomes.

In the present study, we reported the outcomes of hypospadias surgery performed by one surgeon using tubularized incised plate urethroplasty (TIP) in the first five years of practice and identified factors that affected the complications.

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Material and Method

A retrospective medical record review of patients with hypospadias treated with TIP urethroplasty between November 2007 and March 2012 was performed. Eighty patients with distal, midshaft, proximal, and penoscrotal hypospadias were

repaired by TIP urethroplasty. The surgical technique was similar to that described previously[1]. An artificial erection was induced to confirm a straight penis. Dorsal plication was used to correct residual ventral curvature. The entire length of the urethral plate was incised along the midline and the neourethra was tubularized over a 6 or 8 Fr feeding tube with Maxon or Vicryl 6-0 suture (cutting 3/8, 11 mm). A feeding tube provided urinary diversion for seven days. Thirteen patients had the stents slipped off accidentally before the seven days were done. Urethroplasty complications (UC) were defined as the presence of any one or more of the following at any time during follow-up: fistula, wound disruption, and meatal stenosis. We evaluated the following factors, age at surgery, original meatal location (defined as location of the meatus at the beginning of urethroplasty), suture type (polyglyconate versus polyglactin), size of urethral stent, duration for urethral stent, and learning curve. The patients were followed up every three months for at least one year.

Statistical analysis was done by Fisher's exact test. A p-value <0.05 was considered statistically significant. All statistical analyses were performed using Stata statistical software version 12 (Stata Corp., College Station, Texas, USA).

The study was approved by the Institutional Review Board Ethics Committee.

Results

We stratified eighty patients into four groups to demonstrate the learning curve of the TIP repair. Group 1 was the first 20 patients, group 2 was the consecutive 20 patients, group 3 was the consecutive 20 patients, and the last 20 patients constituted group 4. The age of the patient at the time of surgery and the original locations of the meatus after degloving of the penis are summarized in Table 1. The hypospadias defects were distal in 15 (18.75%), midshaft in 18 (22.5%), proximal in 16 (20%), and penoscrotal in 31 (38.75%). Most of the chordee disappeared after degloving of the penis. There was no significant difference in the age of the patient at the time of surgery and the original locations of the meatus between the four groups. Overall success rate was 76.25% for all patients with hypospadias. Re-operation was required in 19 patients (23.75%) including urethrocutaneous fistula in 12 (15%), complete disruption of the repair in three (3.75%), and meatal stenosis in four (5%). The meatal stenosis was managed by simple dilatation in all patients. All fistula, except for one, were successfully repaired in a single operation.

The results of TIP urethroplasty and the factors affecting result of hypospadias repair are shown in Table 2 and 3.

The success rate was 55%, 70%, 90%, and 90% for group 1, 2, 3, and 4, respectively (Table 3). In the univariate analysis, complications were significant only in patients repaired at the first 40 cases of the study.

Discussion

TIP hypospadias repair has gained widespread acceptance because it is adaptable, has a low complication rate, and reliably creates a good meatus. Complication rates of TIP still vary although more recent reports have a lower rate for fistula formation between 0% and 16%[9,10]. Most reports have low complication rates for distal type compared to proximal type. Snodgrass and Lorenzo reported a 33% complication rate for TIP in proximal type with a fistula rate of 21%[11]. In this retrospective study, the factors affecting to a successful TIP urethroplasty were analyzed.

Table 1. Patient characteristics and sequence of operation

	First 1-20 cases n = 20 (%)	21-40 cases n = 20 (%)	41-60 cases n = 20 (%)	61-80 cases n = 20 (%)
Site of hypospadias				
Distal	6 (30)	5 (25)	4 (20)	0
Mid	4 (20)	4 (20)	5 (25)	5 (25)
Proximal	4 (20)	4 (20)	3 (15)	5 (25)
Penoscrotal	6 (30)	7 (35)	8 (40)	10 (50)
Age of patient				
<1 year	0	0	1 (5)	1 (5)
12 years	10 (50)	8 (40)	10 (50)	7 (35)
2-4 years	7 (35)	9 (45)	5 (25)	7 (35)
>4 years	3 (15)	3 (15)	4 (20)	5 (25)

Table 2. Relation between risk factors and all complications

Risk factor	Presence of complication: number (%)	*p*-value
Site of hypospadias		
Distal (n = 15)	2/15 (13)	0.520
Mid (n = 18)	3/18 (17)	
Proximal (n = 16)	5/16 (31)	
Penoscrotal (n = 31)	9/31 (29)	
Age of patient (years)		
<1 (n = 2)	0/2 (0)	0.903
1-2 (n = 35)	8/35 (23)	
2-4 (n = 28)	8/28 (29)	
>4 (n = 15)	3/15 (20)	
Suture material		
Maxon^{R} (n = 52)	13/52 (25)	0.789
Vicryl^{R} (n = 28)	6/28 (21)	
Stent size		
6 Fr (n = 64)	15/64 (23)	0.999
8 Fr (n = 16)	4/16 (25)	
Duration of stent placement (days)		
>7 (n = 13)	4/13 (31)	0.496
≥7 (n = 67)	15/67 (22)	

Univariable analysis of factors related to outcome (complications). Fisher's exact test was used for all comparisons.

Table 3. Relation between learning curve, other factors, and complications

Factor & complication	First 1-20 cases n = 20 (%)	21-40 cases n = 20 (%)	41-60 cases n = 20 (%)	61-80 cases n = 20 (%)	*p*-value
Site of hypospadias					
Distal	6 (30)	5 (25)	4 (20)	0	0.457
Mid	4 (20)	4 (20)	5 (25)	5 (25)	
Proximal	4 (20)	4 (20)	3 (15)	5 (25)	
Penoscrotal	6 (30)	7 (35)	8 (40)	10 (50)	
Age of patient (years)					
<1	0	0	1 (5)	1 (5)	0.897
1-2	10 (50)	8 (40)	10 (50)	7 (35)	
2-4	7 (35)	9 (45)	5 (25)	7 (35)	
>4	3 (15)	3 (15)	4 (20)	5 (25)	
Presence of complications					
Yes	9 (45)	6 (30)	2 (10)	2 (10)	0.028

Univariable analysis of factors related to outcome (complications). Fisher's exact test was used for all comparisons.

American Academy of Pediatrics (AAP) and European Association of Urology (EAU) guidelines recommend hypospadias surgery between the ages of six and 18 months. However, these recommendations were derived from level 4 evidence (expert opinion), and the EAU panel noted evidence obtained from 'well-designed non-experimental studies' (level 3) supported repair as early as four months of age[12].

Today, a valid standard is the performance of hypospadias repair before the patient is one year old, because this increases the success rate of the operation and minimizes the psychological effects on the child. Many factors may influence the timing of hypo-spadias repair, including age at doctor appointment or referral, other health issues affecting anesthesia risks, different size of penis, waiting lists, and parents may express concern about the ideal timing of surgery. Nicol Corbin Bush reported data in consecutive prepubertal boys undergoing TIP hypospadias repair show age at surgery is not a risk factor for urologic complications[13]. In the present study, the authors did not observe any meaningful

difference in the success rate and urologic complications when stratified by patient age after adjusting for meatal location.

The authors have not observed a difference in the urologic complications between those who placed urethral stent for seven days and less than seven days due to accidental slip off. In the present study, minimal chordee was present in 23 patients with hypospadias. Dorsal plication was applied to only five of these cases during surgery. Plication was not required in the other cases because of the minimal chordee remained when the penile skin was degloved. A similar success rate was observed between those with chordee and those without it. The presence of minimal chordee did not affect the success of the surgery.

On univariate analysis, the re-operation rate was significantly higher in the first 40 patients (group 1 and 2). The increase in success rate in subsequent groups reflects the improvement of surgical skills with time. Knowledge of surgical techniques and delicate tissue handling with accurate preservation of tissues and blood supply are essential.

Conclusion

TIP repair is a reliable method for treating all types of hypospadias. Complications rate may depend on type of hypospadias and increase in proximal and penoscrotal locations. Our data indicates age at surgery does not increase complications. In the present study, the success rate improved with experience of the procedure.

What is already known on this topic?

TIP is a technique that is easily applied and has a low complication rate in midshaft and distal hypospadias. Its success rate has been reported at 85% to 96%, and excellent functional and cosmetic results are achieved using this technique. For proximal hypospadias, this technique can be used with a little more complications. Most reports have low fistula rates for distal lesions, while proximal lesions continue to have higher rates.

We believe that the widespread use of the TIP repair is not only because of the high success rate but also because it is an easily learned and applied technique.

Today, a valid standard is the performance of hypospadias repair before the patient is one year old, because this increases the success rate of the operation. Previous studies show that complications increased with increasing age.

What this study adds?

In the present study, we did not observe a meaningful difference in the success rate when stratified by patient age in contrast to the previously reported data.

In the present study, the operation was done by same surgeon and technique. The increase in success rate in subsequent groups reflected the improvement of surgical skills with time. Knowledge of surgical techniques and delicate tissue handling with accurate preservation of tissues and blood supply are essential. Pediatric fellowship training enables surgeons to perform hypospadias repairs with minimal complications. Proximal repairs continue to be more challenging with higher complication rates. Intensified training to master one approach rather than applying different techniques to the same hypospadias is important to decrease the initial learning curve.

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Potential conflicts of interest

None.

References

1. Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. J Urol 1994; 151: 464-5.
2. Mondaini N, Ponchietti R, Bonafe M, Biscioni S, Di Loro F, Agostini P, et al. Hypospadias: incidence and effects on psychosexual development as evaluated with the Minnesota Multiphasic Personality Inventory test in a sample of 11,649 young Italian men. Urol Int 2002; 68: 81-5.
3. Woodhouse CR, Christie D. Nonsurgical factors in the success of hypospadias repair. BJU Int 2005; 96: 22-7.
4. American Academy of Pediatrics. Timing of elective surgery on the genitalia of male children with particular reference to the risks, benefits, and psychological effects of surgery and anesthesia. Pediatrics 1996; 97: 590-4.
5. Perlmutter AE, Morabito R, Tarry WF. Impact of

patient age on distal hypospadias repair: a surgical perspective. Urology 2006; 68: 648-51.
6. Korvald C, Stubberud K. High odds for freedom from early complications after tubularized incised-plate urethroplasty in 1-year-old versus 5-year-old boys. J Pediatr Urol 2008; 4: 452-6.
7. Dodson JL, Baird AD, Baker LA, Docimo SG, Mathews RI. Outcomes of delayed hypospadias repair: implications for decision making. J Urol 2007; 178: 278-81.
8. Ziada A, Hamza A, Abdel-Rassoul M, Habib E, Mohamed A, Daw M. Outcomes of hypospadias repair in older children: a prospective study. J Urol 2011; 185: 2483-5.
9. Cheng EY, Vemulapalli SN, Kropp BP, Pope JC, Furness PD III, Kaplan WE, et al. Snodgrass hypospadias repair with vascularized dartos flap: the perfect repair for virgin cases of hypospadias? J Urol 2002; 168: 1723-6.
10. Stehr M, Lehner M, Schuster T, Heinrich M, Dietz HG. Tubularized incised plate (TIP) urethroplasty (Snodgrass) in primary hypospadias repair. Eur J Pediatr Surg 2005; 15: 420-4.
11. Snodgrass WT, Lorenzo A. Tubularized incised-plate urethroplasty for proximal hypospadias. BJU Int 2002; 89: 90-3.
12. Tekgül S, Riedmiller H, Dogan HS, Gerharz E, Hoebeke P, Kocvara R, et al. Guidelines on paediatric urology [Internet]. Arnhem, The Netherlands: European Association of Urology; 2012 [cited 2012 Mar 8]. Available from: http://www.uroweb.org/gls/pdf/21_Paediatric_Urology.pdf
13. Bush NC, Holzer M, Zhang S, Snodgrass W. Age does not impact risk for urethroplasty complications after tubularized incised plate repair of hypospadias in prepubertal boys. J Pediatr Urol 2013; 9: 252-6.

ปัจจัยที่มีผลต่อความสำเร็จ ของการผ่าตัดแก้ไขภาวะท่อปัสสาวะเปิดต่ำ ผ่าตัดโดยศัลยแพทย์คนเดียวด้วยวิธีการผ่าตัดแบบเดียวกัน

วิทย์ วิเศษสินธุ์

วัตถุประสงค์: *เพื่อศึกษาหาปัจจัยที่มีผลต่อความสำเร็จ และภาวะแทรกซ้อนของการผ่าตัดแก้ไขภาวะท่อปัสสาวะเปิดต่ำ (hypospadias) ด้วยวิธี tubularized incised plate (TIP)*

วัสดุและวิธีการ: *เก็บข้อมูลย้อนหลังระหว่าง เดือนพฤศจิกายน พ.ศ. 2550 ถึง เดือนมีนาคม พ.ศ. 2555 ผู้ป่วยที่มีปัญหาภาวะท่อปัสสาวะเปิดต่ำ ได้รับการผ่าตัดแก้ไขด้วยวิธี tubularized incised plate โดยเย็บท่อปัสสาวะใหม่ด้วย Polyglactin 910 (Vicryl) หรือ Polyglyconate (Maxon) 6-0 หลังจากทำผ่าตัดผู้ป่วยทุกรายได้รับการใส่สายสวนปัสสาวะเป็นเวลา 3-7 วัน ข้อมูลพื้นฐานของผู้ป่วย ผลการผ่าตัดและภาวะแทรกซ้อนถูกวิเคราะห์ทางสถิติด้วยวิธี Fisher's exact test*

ผลการศึกษา: *ในจำนวนผู้ป่วย 80 ราย พบว่าเป็น hypospadias ชนิด distal, midshaft, proximal และ penoscrotal จำนวน 15, 18, 16 และ 31 ราย ตามลำดับ โดยมีอายุเฉลี่ย 2.5 ปี อัตราความสำเร็จอยู่ที่ 76.25% หลังผ่าตัดพบภาวะแทรกซ้อนแบบรูรั่ว 12 ราย แผลผ่าตัดแยก 3 ราย และปลายท่อปัสสาวะตีบ 4 ราย โดยที่ผู้ป่วยที่มีรูรั่วได้รับการผ่าตัดซ่อมแล้วสำเร็จภายในครั้งเดียว 11 ราย ผู้ป่วยที่มีปลายท่อปัสสาวะตีบแก้ไขโดยการขยายได้สำเร็จทุกราย ภาวะแทรกซ้อนมีแนวโน้มเกิดมากขึ้นใน hypospadias ชนิด proximal และ penoscrotal ซึ่งไม่พบว่ามีนัยสำคัญทางสถิติ การศึกษาพบว่าผู้ป่วยที่ได้รับการผ่าตัด 40 รายแรก มีภาวะแทรกซ้อนมากกว่า 40 รายต่อมา อย่างมีนัยสำคัญทางสถิติ*

สรุป: *Tubularized incised plate เป็นวิธีการผ่าตัดที่สามารถใช้ได้กับภาวะ hypospadias ได้ทุกชนิด เกิดภาวะแทรกซ้อนหลังการผ่าตัดต่ำ และสามารถแก้ไขภาวะแทรกซ้อนได้ง่าย อวัยวะเพศและรูเปิดท่อปัสสาวะมีลักษณะใกล้เคียงปกติ อายุของผู้ป่วยไม่มีผลต่อภาวะแทรกซ้อน อัตราความสำเร็จขึ้นกับความชำนาญ และประสบการณ์ของแพทย์ผ่าตัด*