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Оригинальные статьи

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Tubularized incised plate urethroplasty with or without dilatation in hypospadias repair: a comparative study

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Background. *After tubularized incised plate (TIP) urethroplasty meatal and urethral dilatation is a common practice. There are some complication of uretheral dilatation like urethral bleeding,urethral perforation and creating a false passage. Moreover dilating the urethra regularly is physically or psychologically painful both for the child and the parents.*
The aim of this study *was to justify the necessity of uretheral dilatation after TIP urethroplasty.*
Materials and Methods. *This study was a prospective, comparative study performed in Dhaka Shishu (Children) Hospital from July 2017 to June 2020. Total 60 respondents were participated in this study with maintain inclusion criteria. Respondents with primary distal and mid-shaft hypospadias where TIP urethroplasty was indicated, admitted in Dhaka Shishu Hospital during study period were included. Group A was assigned non dilatation group and Group B was assigned to regular urethral ditatation group after TIP urethroplasty. Fistula formation, meatal stenosis and neourethral stricture were compaired between two groups. Informed written consents were taken from legal guardians. Data ware analyzed by SPSS Program.*
Results. *In this study there was no significant difference of ages between two groups. In Group B 10% (3)respondents developed urethrocutaneous fistula, 10% (3) respondents developed meatal stenosis and 3.33% (1)respondents developed neourethral stricture. On the other hand In Group A 10% (3) respondents developed urethrocutaneous fistula, 6.66% (2) respondents developed meatal stenosis. None of patient in Group A developed neourethral stricture.*
Conclusion. *There was no significant difference in fistula formation, meatal stenosis and neourethral stricture in between regular urethral dilatation group and non-dilatation group after TIP urethroplasty.*

Keywords: TIP, *hypospadias, dilatation*

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Introduction

The term hypospadias is derived from the Greek “hypo” means under and ‘Spadon’ means a rent or fissure (Duckett & Baskin 1998). Hypospadias can be defined as an arrest in normal development of the urethra, foreskin, and ventral aspect of the penis (Baskin & Ebbers 2006). Hypospadias is one of the most common congenital anomalies, occurring in approximately 1 in 250 newborns, or roughly 1 in 125 live male births (Paulozzi et al. 1997).

Classically three associated anomalies are found in the hypospadiac penis: (1) an ectopic opening of the urethral meatus located at any place between the glans and the base of the penis, (2) a ventral curvature of the penis (chordee), and (3) a hooded foreskin with a marked excess of skin on the dorsum of the penis and a lack of skin on the ventrum (Mouriquand & Mure 2001).

Hypospadias is classified by the location of the urethral meatus after release of chordee into anterior, middle and posterior groups. Anterior group includes Glanular, Coronal, Distal penile shaft & Middle group include Middle penile shaft (Murphy 2010).In this study we have included anterior and middle group of hypospadias.

The main goal of hypospadias surgery are orthoplasty (straightening),urethroplasty, meatoplasty and glanuloplasty, scrotoplasty, and skin cover (2). The success of operation is determined by excellent cosmetic appearance and normal voiding in a straight forward direction from the tip of the glans (2 ; Alkan et al. 2008).

To achieve the goal of surgery various surgical techniques were introduced. More than 300 procedures were described in literature and reflect the wide spectrum of the anomaly and prove that the treatment has not yet been perfected (Hamidy et al. 1999; 2).

Allmost all cases of urethroplasty, fistula as the most common complication and then dehiscence are the side effects that surgeons are worried about them. The other main complications are meatal stenosis, residual chordee and diverticulum (Borer JG et al. 2007).

Warren Snodgrass had described a procedure using a Tubularized incised plate (TIP) and its excellent results in 1994. In this method, making a longitudinal incision on the urethral plate (UP) with tubularization to make a neourethra and putting a flap on it can minimize the rate of complication. The most important note in this technique is creating a relaxing incision in the UP and using protective dartus flap to cover the neourethra (Snodgrass1994; Snodgrass et al 2006).

Although at first this method was used in cases of distal hypospadias, several years later, published articles on a variety of proximal forms were also demonstrated its success (Snodgrass et al. 1998; Masouvi et al. 2008 & 2009). This technique quickly became widespread and has been popular day by day in the world.

The midline incision of TIP urthroplasty heals in most cases by re-epithelization with no meatal stenosis or neouretheral stricture (AJ Lorenzo et al. 2002). In the classical method of TIP, to divert urine flow and preventing meatal stenosis, a stent is used. There are some complication related to stenting

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like uretheral injury, uretheral perforation, formation of afalse passage more over it is psychological and physical trauma for patient. AJ Lorenzo et al. in 2002 reported that there is no significant difference complication rate between stenting and nonstenting group in hypospadias repair (14).

So we want to check role of regular uretheral dilatation after TIP urethroplasty.

Materials and methods

This is a Prospective, comparative study which was done on Division of Pediatric Surgery, Dhaka Shishu (Children) Hospital from July 2017 to June 2020. Study subject were admitted patient with mid and distal penile hypospadias where TIP urethroplasty was indicated. Patients with hypospadius were allocated in two groups by random sampling. Parents were informed regarding the surgical procedures and written consent was taken. 30 patients included into Group A had TIP urethroplasty without regular uretheral dilatation, and 30 patients included into Group B had TIP urethroplasty with regular uretheral dilatation.

Selection criteria. All patients were included with primary distal and middle hypospadias, ranges from 1 year to 18 year, where TIP urethroplasty is indicated admitted in Dhaka Shishu Hospital during study period. Patients with H/O previous hypospadias surgery, circumcised hypospadias patient and Chordee more than 30º were excluded in this study.

Data collection. Data were collected in a pre-designed, semi-structured questionnaire, after taking consent from guardians in the consent form. The questionnaire was prepared by using the selected variables according to the objectives. Detailed information was collected from patient's mother or accompanying guardians. All the information's were gathered symmetrically and put into the questionnaire. On admission and after obtaining detailed history of each patient, they were thoroughly examined and diagnosis was confirmed by clinical examination and relevant investigations.

Operative technique. After brief discussion of the procedure, informed written consent was taken from the legal guardian for operation. All the patients were operated under general anaesthesia with caudal epidural block with bupivacaine. A glans traction suture of 4/0 plain catgut is fixed; a circumferential incision is made 2 mm proximal to the hypospadiac orifice and the penis partially degloved. Two parallel longitudinal incisions are made to separate the lateral borders of the urethral plate from the rest of the glans. Two glanular wings are dissected and reflected dorsally. A midline incision is made in the urethral plate extending from the hypospadiac meatus to 1–2 mm proximal to the tip of the glans .The incised urethra plate is tubularized over a stent using interrupted and subcuticular 6/0 vicryl.Glans wing are also approximated using 6/0 vicryl.Circumcision is performed and the penile skin closed in the midline ventrally.The stent is used as a urethral catheter and left in place for 7 days.

Post operative follow up and care. In the post-operative ward patients were routinely observed for haemorrhage, urinary retention and control of pain. Post-operative analgesia was maintained by per rectal Diclofenac Sodium suppositories, Paracetamol Syrup and Injection Pathedine and also by the effect of caudal anaesthesia.All patients were followed up daily till discharge for fever, bleeding, stent blockage, control of pain and other complaints. Dressing was chequed on 5th post-operative day. Details of healing pattern and other findings like wound infection, wound dehiscence were noted.Stent was removed on 7th post-operative day on both the group. After voiding information about urinary stream, direction and urethrocutaneous fistula were noted.

All the patients were followed up on 14th POD following urethroplasty when shape of the meatus, size & shape of the glans, persistent chordee, urethrocutaneous fistula and urinary problem were evaluated. The meatus and urethera of a boy under 1 year should accept a feeding tube of 6 Fr, between 1 to 3 years below 8 Fr, 4 to 10 years 8 Fr and 11 to 12 years of age 10 Fr. (Hadidi 2004).

Then monthly follow up will be given, upto 6 months.On each follow up we will check meatal size, urethral calibration by introducing appropriate size BMI feeding tube according to age.After 3 month of surgery, we will do an urethrogram to see any neourethral stenosis. In Group A, regular uretheral calibration is not done. In Group B, urethral calibration started on 14th POD with appropriate size tube according to age with local anaesthetic gel. Uretheral calibration should be done two times daily and kept in situ for five minutes for each attempt.

When in Group A, age related feeding tube passed too tightly or failed to pass, meatal stenosis was detected and advised for regular meatal dilatation at home with age appropriate BMI feeding tube initially twice daily for first 2 months then once daily for next 1 month, twice a week for 1 month, once a week for next 1 month, Once a month for last 1 month.

Data analysis. The data were collected in a preformed proforma. Statistical analyses were performed with SPSS 25.0 (Statistical Software Package for Social Sciences, SPSS Inc, Chicago, IL, USA) software system and were expressed in the text and tables as Mean ± SD (Standard deviation). For qualitative data comparison between 2 groups was obtained by Pearson Chi Square test. P value of < 0.05 was taken as minimum level of significance. And for quantitative data unpaired t-test was done and P value of < 0.05 was taken as significant.

Ethical consideration. Parents of all the patients were explained about the study and were duly informed about the treatment procedure, known merits and demerits, expected results and possible complications. The study did not involve any additional investigative procedure or significant risk, and did not impose any extra economic burden upon the parents. More over BICH (Bangladesh Institute of Child Health) thesis committee has approved this study protocol.

Table 1

Showing outcome of the study, *n* = 60

Parameter	Group A (Nondilatation), *n* = 30	Group B (Dilatation), *n*= 30	*p*
Age distribution, months (*Mean* ± *SD*)	55,2 ± 32,9	53,15 ± 31,12	> 0.05
Body weight, kg (*Mean* ± *SD*)	17,18 ± 8,42	16,89 ± 8,17	> 0.05
UC-fistula, *n*	3	3	> 0.05
Meatal stenosis, *n*	2	3	> 0.05
Uretheral stricture, *n*	0	1	> 0.05

Results

Obtained data was analyzed digitally with SPSS 25 (Social Package Statistical Service). Quantitative data was expressed as *Mean* ± *SD*. The results of the study are presented in Table 1.

The type of hypospadias in the patients who participated in the study is shown in Table 2, the frequency of hypospadias is shown in Figure 1.

Age range of Group A was 23 months to 144 months and Group B was 18 months to 132 months. The mean ages of Groups A and B were 55.2 ± 32.9 months and 53.15 ± 31.12 months. There was no significant difference between the mean ages of both group as *p* value was >0.05 (Table 3).

Weight range of Group A was 10.1–48.0 kgand Group B was 9.4–44.9 kg. The mean weight of Groups A and B were

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Table 2

Type of hypospadias among the study subjects

Types of hypospadias	Number of patient
Glanular	3
Coronal	29
Distal penile	19
Mid penile	9
Total	60

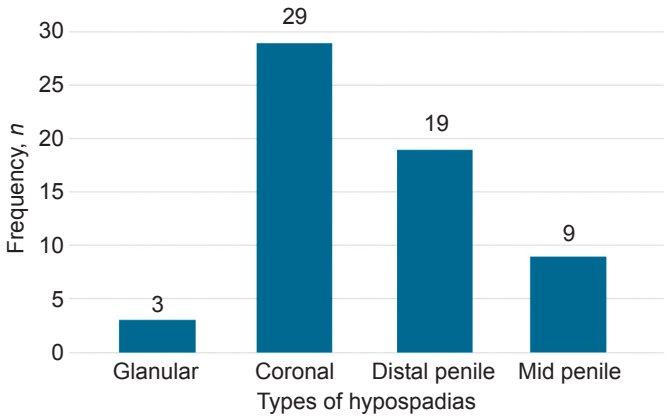

Fig. 1. Bar diagram showing frequency of hypospadias.

Table 3

Age distribution of the study groups, *n* = 60

Age	Group A (Nondilatation), *n* = 30	Group B (Dilatation), *n*= 30	*p*
Months	23–144	18–132	> 0.05
Mean ± SD	55.2 ± 32.9	53.15 ± 31.12	

Table 4

Comparison of weight of the participants between two groups, *n* = 60

Body weight	Group A (Nondilatation), *n* = 30	Group B (Dilatation), *n*= 30	*p*
Kg	10.1–48.0	9.4–44.9	> 0.05
Mean ± SD	17.18 ± 8.42	16.89 ± 8.17	

Table 5

Occurrence of Urethrocutaneous fistula among the study groups, *n* = 60

UC-Fistula	Group A (Nondilatation), *n* = 30		Group B (Dilatation), *n*= 30		*p*
	n	%	*n*	%	
Yes	3	10	3	10	> 0.05
No	27	90	27	90	

Table 6

Occurrence of meatal stenosis among the patients, *n* = 60

Meatal stenosis	Group A (Nondilatation), *n* = 30		Group B (Dilatation), *n*= 30		*p*
	n	%	*n*	%	
Yes	2	6.6	3	10	> 0.05
No	28	93.4	27	90	

Table 7

Occurrence of Neourethral stricture among the patients, *n* = 60

Meatal stenosis	Group A (Nondilatation), *n* = 30		Group B (Dilatation), *n*= 30		*p*
	n	%	*n*	%	
Yes	0	0	1	33.3	> 0.05
No	30	100	29	96.7	

17.18 ± 8.42 kg and 16.89 ± 8.08 kg. There was no significant difference between the mean ages of both group as *p* value was >0.05 (Table 4).

3 patients in both group developed urethrocutaneous fistula. Here test statistic is less than critical value so $p > 0.05$. Result is not statistically significant (Table 5).

Post-operative meatal stenosis was diagnosed at the time of follow up and treated by gentle meatal calibration with age appropriate PVC BMI feeding tube. In Group A 2 patients developed meatal stenosis& in group B 3 patients developed meatal stenosis. Here test statistic is less than critical value; so $p > 0.05$. Result is not statistically significant (Table 6).

Neourethral stricture was diagnosed at the time of urethral calebration during followup. Gentle urethral calibration with age appropriate PVC BMI feeding tube. In Group A no patient and in Group B only 1 patient developed neourethral sticture. Here test statistic is less than critical value; so $p > 0.05$ (Table 7, Figure 2–4).

Fig. 2. 3rd postoperative day after TIP urethroplasty.

Fig. 3. Meatus opening in 6 months after TIP urethroplasty.

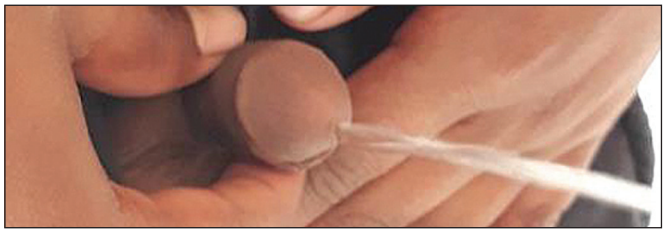

Fig. 4. Urinary stream and its direction in 6 months after TIP urethroplasty.

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Discussion

Surgical techniques for the repair of hypospadias are being developed continuously, implying that no single procedure is considered a panacea for hypospadias. Hypospadias arises by a failure of the urethral fold to fuse, and thus surgical techniques based on tubulariz-ation of the urethral plate with no skin grafts have been described (King 1970).

The innovative technique of the tubu-larized-incised urethral plate provides a narrow urethral plate wide enough for easy tubularization and provides a vertically orientated and a cosmetically normal neome-atus (9).

In this technique the urethral plate is divided into two epithelial strips that are approximated in the midline ventrally to form the floor of the neo-urethra, while the roof and the side-walls are formed by the incised raw area that will eventually be covered by epithelium regenerating from the edges of plate (11).

The technique revived the principle of Denis Browne, in which the urethral plate forms the roof of the neourethra and the floor is formed by epithelial growth from the edges of the plate to cover the raw area underneath the skin cover around a stent.

This prospective comparative study was conducted in the Department of Paediatric Surgery, Dhaka Shishu Hospital,Dhaka during the period of July 2017 to June 2019.

60 patients with anterior and mid penile hypospadias in whom the meatuses were located from glans penis to mid shaft proximally. Before operation patients were included by systemetic randomized sampling to form study sample volume. These 60 patients were grouped into: Group-A included 20 patients who were operated TIP urethroplasty without regular uretheral dilatation and in Group-B included 20 patients who were operated TIP urethroplasty with regular uretheral dilatation.

In this study, surgical complications and outcome between the two groups were compared. In our study age range of the patients were 18 months to 144 months with the mean age 54.66 months. The mean ages of Group A and Group B were 55.2 ± 32.9 months and 53.15 ± 31.12 months. There was no significant difference (p value > 0.05) between the mean ages. Schultz and colleagues pointed out that an ideal age might be 6 to 18 months to minimize the emotional effect of this traumatic experience (Schultz et al. 1983).

The consensus statement on the timing of genital surgery from the American Academy of Pediatrics also supports early surgery before 18 months of age (Baskin 2010). But in our study the mean age of urethroplasty in both groups is higher than the above mentioned reference which is explained by late visits of children's parents to a specialist.

Weight range of Group A was 10.1–48.0 kg and Group B was 9.4–44.9 kg. The mean weight of Group A and Group B were 17.18 ± 8.42 kg and 16.89 ± 8.17 kg. There was no significant difference between the mean ages of two groups.

After preoperative evaluation hypospadias was corrected with TIP urethroplasty in all 60 patients (Figure 2–4). 30 patients of Group A were urethera was not dilated regularly, dilatation done only in followup visits and in 30 patients of Group B were urethera was regularly dilated upto 6 months. As per reference of Murphy 2005 age appropriate BMI feeding tube was kept in situ for 7 days in all patients. All the patients were followed up daily after urethroplasty till discharge from the hospital and after discharge at 2nd weeks, 1st, 2nd, 3$^{rd.}$ 4th, 5th and 6th month following operations.

Urethrocutaneous fistula was the problem to concern as it needs reoperation. In our study 3 patients in each group developed Urethrocutaneous fistula. Among the 6 fistula patient, 3 patient associated with wound infection and 3 fistula patient associated with trauma during dilatation. This result is similar to result of Redwan et al. 2012 and Xu et al. 2013 studies. Fistula of 3 patients was located on the corona and 2 patients on the distal penile shaft and 1 patient in mid penile. Three fistulas were evident on the 8th and 9th Post-operative day and 3 were evident on 1st follow up on 2nd week. Five patients needed repair of fistula and in 1 patient fistula was spontaneously healed.

The mean age of the patients with fistula was 58.4 moths which is more than the mean age of the patients in Group B. Regarding Urethrocutaneous fistula in both group the rate of fistula is 10% which is within the range of other studies like Redwan et al. 2012 and Xu et al. 2013. But fistula rate higher in comparison to the study Snodgrass et al 2010 where the fistula rate was only 1.6 %. Single experienced Surgeon and state of the art meticulous instrument might be the key to the less fistula rate of Snodgrass.

In Dhaka Shishu Hospital, Dhaka Urethrocutaneous fistula topped the list of various complications; 40% (Sajid 2005), 34.4% (Masud 1998), 25% (Nag 2009), 14.29% (Sabbir 2017) and in BSMMU, Dhaka 33.3% (Alam 2000). These results are near similar to our study.

In this study meatal stenosis was the second most striking complication. Maximum meatal stenosis was detected at the time of 1st post discharge follow up on 2nd week. After detecting meatal stenosis meatotomy done. In Group A 2 (66.6%) patient develop meatal stenosis and in Group B 3 (10%) patients develop meatal stenosis. The result is similar with the result of Elserbiny et al. 2004 and Redwan et al. 2013.

Dilatation started on 1st Post discharge follow up at 2nd week. The meatus of a boy accepted between 1 to 3 years of age below 8 Fr, 4–10 years 8 Fr and 11–12 years 10 Fr (Anderson 2003, Hadidi 2004). Meatal stenosis developed in 10% (Sajid 2005), 13.3% (Amin 2006) and 5.71% (Sabbir 2017) patients in other studies at Dhaka Shishu hospital. Snodgrass showed.18% meatal stenosis in his study and Lorenzo et al. in 2002 showed only 3% meatal stenosis.

In group A, 2 patients and in group B, 1 patient developed post-operative wound infection. All the wound infections were treated appropriately with culture sensitive antibiotics and regular dressing. Probably apparently prolonged operation time and midline suture in TIP urethroplasty is the cause of high wound infection rate.

Regarding neourethral stricture only 1 patient (33.3%) developed in group B and none in Group A. Neouretheral stricture was treated with serial dilatation. Lorenzo et al in 2002 showed similar result where only 3% patient developed neouretheral stricture.

Conclusion

Complications are common incidence in hypospadias surgery. The type and incidence of complications vary with the particular form of repair. Attention to detail and meticulous technique are imperative to keep the incidence of all complications to a minimum. Dilatation of the neourethera is unnecessary after TIP urethroplasty. The follow-up of two group of respondents was done and shows that there is no difference between regular dilatation and without dilatation after TIP urethroplasty in the treatment of distal and mid penile hypospadias. But nondilatation is comfortable for patient both mentally and physically.

Recommendations

Routine dilatation is not necessary to prevent urethrocutaneous fistula, meatal stenosis and neourethral stricture in patient after TIP urethroplasty for mid and distal penile hypospadias.

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