



# Complications of hypospadias surgery: Experience in a tertiary hospital of a developing country

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## ABSTRACT

**Background:** Over 300 different operations have been described for the management of hypospadias. In recent times, the numbers of operations used in various centres have gradually reduced as the principles necessary to ensure adequate cosmetic and functional results with minimum complications are better understood. The aim of this article was to review the different types of operations used for managing hypospadias in a tertiary hospital in a developing country, to analyse the complications of surgery and discuss the factors that contribute to complications. **Materials and Methods:** Patient folders, theatre, and ward records were used to obtain the required information. The age at surgery, types of hypospadias at presentation, types of operations done and complications were analysed. **Results and Conclusion:** With three main types of operations, tubularised incised plate urethroplasty and meatal advancement and glanuloplasty incorporated for anterior hypospadias (glanular, coronal, subcoronal, distal, midpenile), and lateral based flap urethroplasty for posterior hypospadias (proximal penile, penoscrotal, scrotal, perineal), most hypospadias were corrected with acceptable complication rates.

**Key words:** Complications, hypospadias surgery, lateral based flap urethroplasty, tubularised incised plate urethroplasty

## INTRODUCTION

Over 300 operations have been described for the management of hypospadias.<sup>[1]</sup> Recently, with a

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better understanding of the principles in the surgical management of hypospadias, fewer operations are being used for managing hypospadias in various centres with acceptable complication rates. Tubularised incised plate urethroplasty (TIPU) is now used in most centres for the management of anterior hypospadias (glanular, subcoronal, coronal, distal penile, mid penile) after it had been popularised by Snodgrass.<sup>[2,3]</sup> Mathieu's operation is used in some centres for the management of anterior hypospadias<sup>[4]</sup> and meatal advancement and glanuloplasty incorporated (MAGPI) in others.<sup>[5]</sup> For proximal hypospadias, a variable number of methods are used. While some use two-stage methods, others use one-stage methods.<sup>[6-8]</sup> In this paper, we reviewed the methods used to manage hypospadias in a tertiary hospital in a developing country and discussed the factors contributing to complications.

The aim of this study was to review the types of operations done for hypospadias in the Paediatric Surgery Unit of a tertiary hospital in a developing country, to analyse the results and complications of these operations and discuss the factors contributing to the complications.

## MATERIALS AND METHODS

Patient folders, theatre records, and ward records were used to obtain the required data. The age at surgery, types of hypospadias at presentation, types of

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operations done, complications, and results of surgery were analysed over a 3-year period (January 2011 to December 2013).

### RESULTS

One hundred seventy-seven operations were performed during this period and 123 operations from which all the required data could be obtained were analysed.

The types of hypospadias at presentation, age at surgery and the severity of chordee are shown in Figures, 1-3 respectively. Table 1 shows the types of Operations done for the different types of hypospadias. Figures 4-7 show the complications after surgery, the complications after TIPU, the complications after lateral based flap urethroplasty (LBFU) and the complications after MAGPI, respectively.

### DISCUSSION

Many different types of operations have been described for the surgical management of hypospadias.<sup>[1]</sup> The reason for this large number of operations is the fact that no single operation is known to give good results in all types of hypospadias. In recent times, with a better understanding of factors contributing to successful repair, the numbers of operations done have been considerably reduced in different centres.

Most centres use TIPU for anterior hypospadias,<sup>[2,3]</sup> while some use Mathieu’s operation and MAGPI.<sup>[4,5]</sup> TIPU is also used for the management of proximal hypospadias.<sup>[9,10]</sup>

In this centre, TIPU was used in 80% of the cases. Types of hypospadias for which TIPU was done included anterior (83%) and some posterior hypospadias (17%)

[Table 1]. These included the patients with a thin urethral plate in whom the skin parallel to the urethral plate was included in the tubularisation. TIPU was used for posterior hypospadias in those who had insignificant chordee and thus required only minimal dissection of the urethral plate for correction. Eighteen percent of the patients had urethro-cutaneous fistulae [Figure 5]. In various centres, this complication varies between 3% and 33% when used for distal hypospadias.<sup>[11]</sup> Fistula rate is higher when TIPU is used for posterior hypospadias.<sup>[12]</sup>

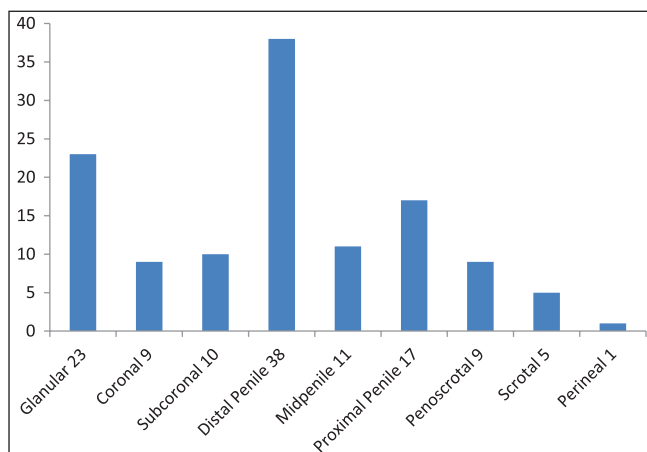
Factors that affect the fistula rate include type of hypospadias,<sup>[3,10]</sup> age at surgery,<sup>[13]</sup> width of urethral plate,<sup>[14]</sup> type of stitch used for urethroplasty,<sup>[15]</sup> suture technique,<sup>[15,16]</sup> the use of a covering protective layer,<sup>[17,18]</sup> and the use of a urethral stent<sup>[19]</sup> among others.

Perlmutter *et al.* showed that age of surgery between 4 and 6 months was associated with a lower complication rate.<sup>[13]</sup> In this centre practically all the operations were done after the age of 6 months [Figure 2]. Operating at an earlier age may, therefore, reduce the complications.

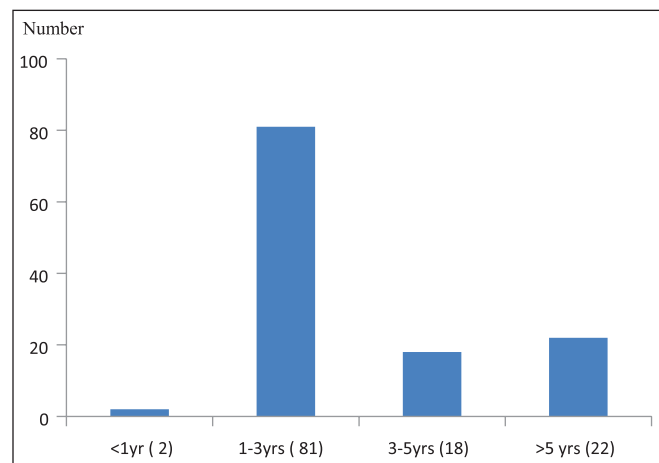
**Table 1: Types of operations in relation to types of hypospadias**

Type of hypospadias	TIPU	MAGPI	LBFU	Total (%)
Glanular	12	7	3	22 (17.9)
Subcoronal	9	1		10 (8.1)
Coronal	6	2		8 (6.5)
Distal penile	44			44 (35.8)
Mid penile	11			11 (8.9)
Proximal penile	12		2	14 (11.4)
Peno-scrotal	1		7	8 (6.5)
Scrotal	3		2	5 (4.1)
Perineal	1			1 (0.8)
Total (%)	99 (80)	10 (8)	14 (11)	123 (100)

TIPU: Tubularised incised plate urethroplasty, MAGPI: Meatal advancement and granuloplasty incorporated, LBFU: Lateral based flap urethroplasty



**Figure 1: Types of hypospadias**



**Figure 2: Age at surgery (number)**

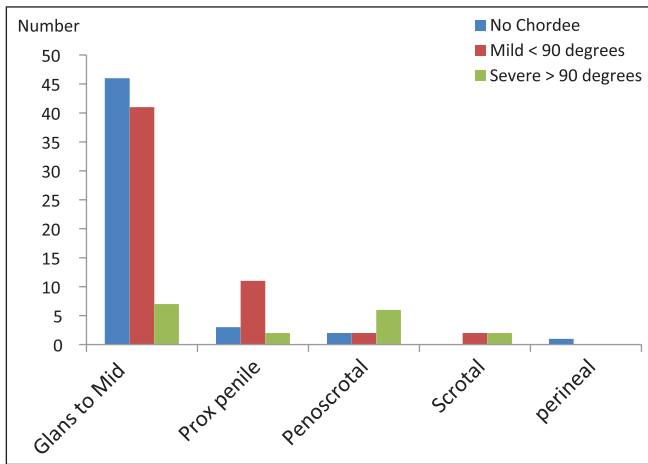


Figure 3: Types of hypospadias with chordee (number)

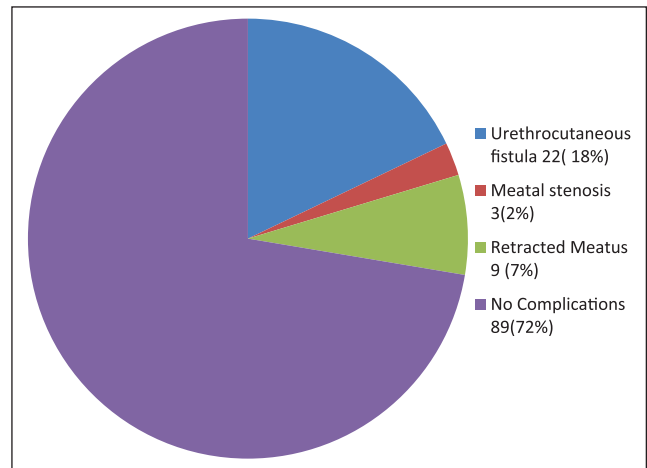


Figure 4: Complications of hypospadias surgery

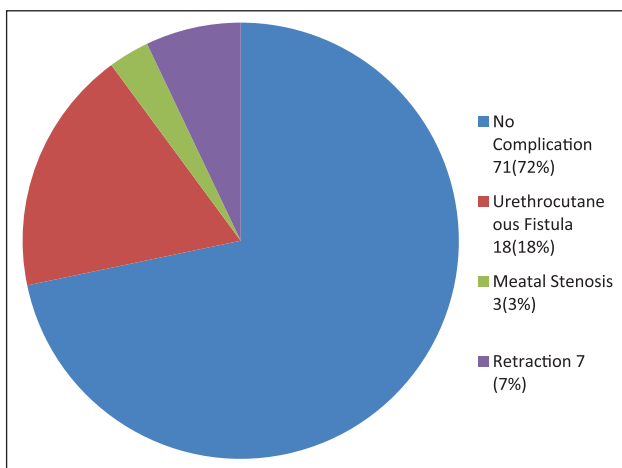


Figure 5: Complications of tubularised incised plate urethroplasty

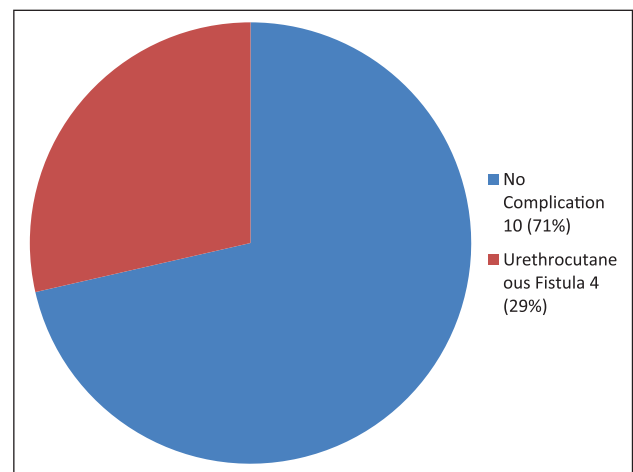


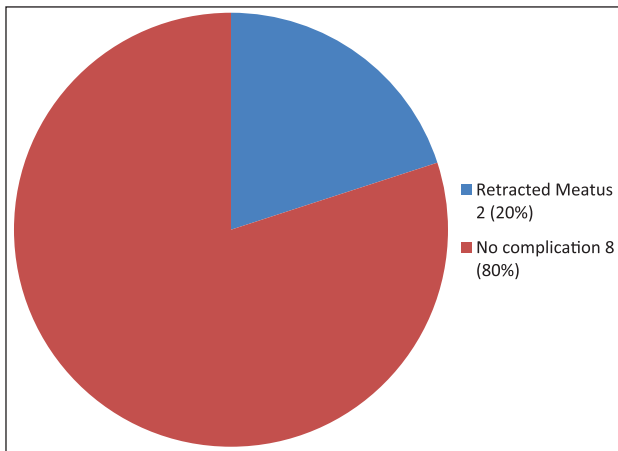
Figure 6: Complications of lateral based flap urethroplasty

A thin width of the urethral plate was shown by Sarhan *et al.* to be associated with a higher complication rate.<sup>[14]</sup> In this centre part of the skin parallel to the urethral plate was included in the tubularisation with relatively acceptable results as noted by the overall complication rate. Abdel moneim and Ahmed as well as Ulman *et al.* showed that a subcuticular technique gave fewer complications as compared with through and through repair.<sup>[15,16]</sup> In this centre size (6.0) or (7.0) vicryl was used in an interrupted and continuous through and through manner respectively. The use of a subcuticular repair may thus further reduce the complication rate.

Djordjevic *et al.* showed the importance of a dartos flap in reducing fistula rate.<sup>[17]</sup> Dhua *et al.* in a comparison study did not show a statistical difference in fistula rate after comparing the dartos flap to a tunica vaginalis flap though the tunica vaginalis flap was slightly better.<sup>[20]</sup> Safwat *et al.* showed in a comparison study that a double flap gave fewer complications as compared with a single flap.<sup>[18]</sup> In this centre, a dartos flap dissected

from the dorsal part of the penis, button holed and brought ventrally as a single layer was used in most cases as a protective layer. Results may be improved by adopting a double layer technique. An observation made after dissection of the dartos flap from the dorsal penile skin was necrosis of the distal end of the dorsal skin. The distal end was therefore consistently excised to ensure well vascularised skin for skin cover. Others have observed this complication and suggested that meticulous dissection of the dartos flap may reduce this complication.<sup>[13]</sup> The use of a tunica vaginalis flap may, however, avoid this complication completely as shown by Dhua *et al.*<sup>[20]</sup>

The use of a stent affects the complication rate. Buson *et al.* showed a reduction in complication rate with the use of urethral stents.<sup>[19]</sup> Leclair *et al.* however, showed no increase in fistula rate in the absence of urethral stents.<sup>[21]</sup> Demirbilek and Atayurt showed a reduction in complication rate when a suprapubic stent was used instead of a urethral stent placed in the



**Figure 7: Complications of meatal advancement and glanuloplasty incorporated**

bladder.<sup>[22]</sup> Arda compared urethral stenting to bladder catheterisation and showed that bladder catheterisation gave fewer complications.<sup>[23]</sup> Radwan *et al.* showed that a suprapubic catheter in combination with a urethral drain gave the least complications.<sup>[24]</sup> The nature of the stent is important. Latex stents are associated with reactions especially when used for a long-time.<sup>[25]</sup> In this centre, latex stents were used initially but later changed to a silicon or a polyvinyl stent. Complications associated with the use of the urethral stents included blockage, and loss of the stent before the required number of days. Blocked stents were managed with irrigation or change of stent if irrigation failed. Some patients developed bladder spasms despite the prophylactic use of oxybutynin hydrochloride. Whether the use of a stent reduces the complication rate or not is yet to be confirmed universally.

An observation made was that the use of thin skin just proximal to the meatus to initiate the tubularisation increased the fistula rate. It became normal practice in this centre to incise this portion into well vascularised skin proximally whenever thin skin was observed at this point.

Meatal stenosis is another important complication of TIPU.<sup>[26]</sup> This complication ranges between 0% and 17% in various studies.<sup>[13]</sup> Factors that affect the stenosis rate include, incising the plate too far to the tip of the glans<sup>[13]</sup> and the use of a large urethral stent causing pressure on the meatus.<sup>[26]</sup> The size of the neo-meatus may also contribute to this complication since healing is always associated with some narrowing.<sup>[26]</sup> In this study, 3% of the patients had meatal stenosis over the study period [Figure 5]. In order to ensure an adequately sized meatus, the glans wings were developed in such a way as to have a long flap which was closed in the midline with a rotation of the flaps. Stitches

were placed between the glans wings and the urethral plate at the meatus after the glanuloplasty, as part of the meatoplasty. Dilatation after TIPU was not done postoperatively as a routine, as suggested by Lorenzo and Snodgrass.<sup>[27]</sup> An attempt was made to ensure that the size of the meatus was 10 French. The size of the stent used was either 6 or 8 French depending on width of the urethral plate. This was to ensure minimal pressure on the repair and meatus. It was left *in-situ* for 8 to 10 days. Dilatation was instituted if stenosis occurred. Occasionally, a meatoplasty was needed to correct stenosis.

Retraction of the meatus is another complication that occurs after TIPU.<sup>[13]</sup> In this centre, there was a 7% complication rate [Figure 5]. This was usually associated with the breakdown of the glanular repair. Factors that are known to contribute to break down are a tight repair and the pressure from a urethral stent.<sup>[26]</sup> In this centre, the glans wings were developed in such a way as to reduce the tension on the repair. To achieve this, long flaps were dissected and brought together in the midline as rotation flaps. This was, however, found to be more difficult in the patients who had already been circumcised.

Other factors known to influence complications are good lighting, the experience of the surgeon,<sup>[13]</sup> the use of magnification and an avascular field that ensure adequate visibility. In this centre, a tourniquet was used to ensure an avascular field and released at intervals of 30-45 min as has been used by others.<sup>[28]</sup> This was sometimes associated with haematoma postoperatively. A small incision made in the skin allowed egress of blood and prevented haematoma after the repair.

LBFU has been used by some for posterior hypospadias.<sup>[29]</sup> In some centres, two-stage surgery is used for posterior hypospadias while in others one stage methods are used.<sup>[6-8,10,29,30]</sup> The different types of operations used shows a lack of satisfactory results in all cases. In this centre, LBFU was used for the patients in whom the dissection of the urethral plate was necessary to correct chordee [Table 1]. It has the advantage that the flap created is in continuity with the native meatus and a variable length can be obtained depending on the need. After dissection of the urethral plate, the flap is raised in continuity with the meatus and continued laterally along the penile shaft to the prepuce. This results in one main anastomosis at the meatus rather than two anastomoses. A dartos flap from the lateral aspect maintains the blood supply. A protective layer of dartos is obtained either from this flap, the scrotal area or the tunica vaginalis. Hadidi has used this

method quite successfully.<sup>[29]</sup> This procedure was used in some patients with glanular hypospadias with severe chordee but mostly in those with posterior hypospadias [Table 1]. They constituted 11% of the operations done. This was initially done as a two-stage procedure but later, as a one-stage procedure when it was realised that the complications were not necessarily reduced by doing the surgery in two-stages. A second operation was done if and when a complication occurred.

The commonest complication noted during this period was a urethro-cutaneous fistula [Figure 6] (29%). This was sometimes associated with a meatal stenosis but not in all cases. This, when corrected resulted in a maximum of two operations for posterior hypospadias.

MAGPI was used for some of the distal hypospadias [Table 1]. This was used mostly in glanular hypospadias when it was felt that the native meatus could easily reach the tip of the penis.

This was successfully used for anterior hypospadias surgery by Duckett.<sup>[5]</sup> His complication rate was very low. He emphasized the importance of an elastic urethra in reducing the complication rate. The relatively high complication rate [Figure 7] of 20% in this centre may be associated with the selection of patients with relatively less elastic urethra. Better selection of the patients may help to reduce this complication.

## SUMMARY

Hypospadias surgery remains challenging and continues to be associated with a number of complications. Despite a large number of available operations, one may successfully manage these patients with a few well selected operations in a developing country. Careful selection of patients and attention to detailed technical factors may help reduce the complication rate. TIPU remains a very good option for most patients with anterior hypospadias. LBFU is an option that can be used for posterior hypospadias with an acceptable complication rate.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Smith ED. The history of hypospadias. *Pediatr Surg Int* 1997;12:81-5.
- Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. *J Urol* 1994;151:464-5.
- Cook A, Khoury AE, Neville C, Bagli DJ, Farhat WA, Pippi Salle JL. A multicenter evaluation of technical preferences for primary hypospadias repair. *J Urol* 2005;174:2354-7.
- Retik AB, Mandell J, Bauer SB, Atala A. Meatal based hypospadias repair with the use of a dorsal subcutaneous flap to prevent urethrocutaneous fistula. *J Urol* 1994;152:1229-31.
- Duckett JW. MAGPI (meatoplasty and glanuloplasty): A procedure for subcoronal hypospadias. *Urol Clin North Am* 1981;8:513-9.
- Duckett JW Jr. Transverse preputial island flap technique for repair of severe hypospadias. *Urol Clin North Am* 1980;7:423-30.
- Koyanagi T, Nonomura K, Kakizaki H, Takeuchi I, Yamashita T. Experience with one-stage repair of severe proximal hypospadias: Operative technique and results. *Eur Urol* 1993;24:106-10.
- Snodgrass W, Koyle M, Manzoni G, Hurwitz R, Caldamone A, Ehrlich R. Tubularized incised plate hypospadias repair for proximal hypospadias. *J Urol* 1998;159:2129-31.
- Palmer LS, Palmer JS, Franco I, Friedman SC, Kolligian ME, Gill B, et al. The "long Snodgrass": Applying the tubularized incised plate urethroplasty to penoscrotal hypospadias in 1-stage or 2-stage repairs. *J Urol* 2002;168(4 Pt 2):1748-9.
- Chen SC, Yang SS, Hsieh CH, Chen YT. Tubularized incised plate urethroplasty for proximal hypospadias. *BJU Int* 2000;86:1050-3.
- Braga LH, Lorenzo AJ, Salle JL. Tubularized incised plate urethroplasty for distal hypospadias: A literature review. *Indian J Urol* 2008;24:219-25.
- Ozturk H, Onen A, Otçu S, Kaya M, Ozturk H. The outcome of one-stage hypospadias repairs. *J Pediatr Urol* 2005;1:261-6.
- Perlmutter AE, Morabito R, Tarry WF. Impact of patient age on distal hypospadias repair: A surgical perspective. *Urology* 2006;68:648-51.
- Sarhan O, Saad M, Helmy T, Hafez A. Effect of suturing technique and urethral plate characteristics on complication rate following hypospadias repair: A prospective randomized study. *J Urol* 2009;182:682-5.
- Ulman I, Erikçi V, Avanoğlu A, Gökdemir A. The effect of suturing technique and material on complication rate following hypospadias repair. *Eur J Pediatr Surg* 1997;7:156-7.
- Abdelmoneim G, Ahmed M. Two different suturing techniques in distal hypospadias repair using tubularized incised plate urethroplasty: A prospective randomized study. *Ann Pediatr Surg* 2013;9:117-21.
- Djordjevic ML, Perovic SV, Vukadinovic VM. Dorsal dartos flap for preventing fistula in the Snodgrass hypospadias repair. *BJU Int* 2005;95:1303-9.
- Safwat A, Al-Adl AM, El-Karamany T. Vascularized dartos flap in conjunction with tubularized incised plate urethroplasty: Single versus double flaps for management of distal hypospadias. *Curr Urol* 2012;6:67-70.
- Buson H, Smiley D, Reinberg Y, Gonzalez R. Distal hypospadias repair without stents: Is it better? *J Urol* 1994;151:1059-60.
- Dhua AK, Aggarwal SK, Sinha S, Ratan SK. Soft tissue covers in hypospadias surgery: Is Tunica vaginalis better than dartos flap? *J Indian Assoc Pediatr Surg* 2012;17:16-9.
- Leclair MD, Camby C, Battisti S, Renaud G, Plattner V. Unstented Tubularised Plate urethroplasty combined with Foreskin Reconstruction for distal hypospadias. *European Urology* 2004;46:526-30.
- Demirbilek S, Atayurt HF. One-stage hypospadias repair with stent or suprapubic diversion: Which is better? *J Pediatr Surg* 1997;32:1711-2.
- Arda IS, Mahmutoglu M. Urethral catheterization in hypospadias surgery: Should the device enter the bladder or be made a urethral stent? *J Pediatr Surg* 2001;36:1829-31.
- Radwan M, Soliman MG, Tawfik A, Abo-Elenen M, El-Benday M. Does the type of urinary diversion affect the result of distal

- hypospadias repair? A prospective randomized trial. *Ther Adv Urol* 2012;4:161-5.
25. Nacey JN, Tulloch AG, Ferguson AF. Catheter-induced urethritis: a comparison between latex and silicon in a prospective trial. *Br J Urol* 1985;57:325-8.
  26. Karakus SC, Koku N, Parmaksiz ME, Ertaskin I, Kilincaslan H, Deliaga H. The effect of urethral catheter size on meatal stenosis formation in children undergoing tubularized incised plate urethroplasty. *Urol J* 2014;10:1095-8.
  27. Lorenzo AJ, Snodgrass WT. Regular dilatation is unnecessary after tubularized incised-plate hypospadias repair. *BJU Int* 2002;89:94-7.
  28. Thapa B, Pun M. Snodgrass tubularized incised plate urethroplasty for distal and midpenile hypospadias. *J Nepal Paediatr Soc* 2014;34:1.
  29. Hadidi AT. Lateral-based flap: A single stage urethral reconstruction for proximal hypospadias. *J Pediatr Surg* 2009;44:797-801.
  30. Moursy EE. Outcome of proximal hypospadias repair using three different techniques. *J Pediatr Urol* 2010;6:45-53.