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Dorsal inlay inner preputial graft for primary hypospadias repair

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ABSTRACT

Background: The most commonly performed operation to repair distal hypospadias is the Tubularised incised plate (TIP) repair. The key step is midline incision of the urethral plate, which widens a narrow plate and converts a flat into a deep plate groove, ensuring a vertical, slit neomeatus and a normal-calibre neourethra. At times in cases of proximal hypospadias, the urethral plate is very narrow and needs to be augmented or substituted for further tubularisation. We report our experience with primary single stage dorsal inlay urethroplasty using preputial skin grafts. **Patients and Methods:** Children with proximal hypospadias with a narrow urethral plate formed the study group. Children needing transection of the urethral plate, having undergone circumcision/hypospadias repair previously or having an inadequate prepuce was excluded. **Results:** Twelve children with a mean age of 48.83 months underwent primary dorsal inlay preputial graft urethroplasty for proximal hypospadias with a very narrow urethral plate. At an average follow-up of 42.16 months, 2 (16.66%) children had a breakdown of ventral shaft skin. None of the children had meatal stenosis, and none of these 12 children developed urethrocutaneous fistula. **Conclusion:** Primary dorsal inlay inner preputial graft urethroplasty successfully fulfills all traditional hypospadias repair criteria. It offers a viable, safe, rapid and easy option in the management of proximal hypospadias with a narrow urethral plate.

Key words: Hypospadias, primary repair, urethra, urethroplasty

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INTRODUCTION

Controversy exists in primary hypospadias surgery, while making decisions concerning proximal cases.[1] Options exist based on whether the urethral plate is available for urethroplasty after associated ventral curvature is straightened. If an adequate urethral plate exists, then either tubularised incised plate (TIP) repair or an onlay preputial flap could be used. When the urethral plate needs to be transected a one-stage urethroplasty could be accomplished by tubularised preputial flaps or the Koyanagi flap or a two-stage repair done with Byars flaps or preputial grafts.[1] There exist several important distinctions between distal and proximal TIP repairs. TIP hypospadias repair has gained widespread acceptance because of its ability to correct different meatal variants, the simplicity of the operative technique, the low complication rate and the reliable creation of a normal appearing glanular meatus.[2]

At times in cases of proximal hypospadias the urethral plate is very narrow. Consequently, the urethral plate needs to be augmented or substituted for further tubularisation. Kolon and Gonzales[3] described a technique of 1-stage urethroplasty using an inner preputial based dorsal inlay graft. They used this technique in 32 patients and at 21 months of follow-up no patient had a stricture, fistula or diverticulum at the inlay graft site. Similarly Schwentner *et al*.[4] have reported on their experience with single stage dorsal inlay urethroplasty using skin grafts in 31 patients. After a mean follow-up of 30.71 months five patients underwent redo surgery, for a complication rate of 16.1%. We report our experience with primary single stage dorsal inlay urethroplasty using preputial skin grafts.

PATIENTS AND METHODS

Children with proximal hypospadias with a narrow urethral plate formed the study group [Figure 1a]. A detailed physical examination was done. The penis was examined for length, chordee, urethral plate and

size. Children needing transection of the urethral plate, having undergone circumcision/hypospadias repair previously or having an inadequate prepuce was excluded.

Operative steps: A circumferential incision was made below the corona and proximal to the hypospadiac urethral meatus [Figure 1b]. The penis was degloved and the chordee was corrected by dorsal plication of the corpora cavernosa [Figure 1c]. The urethral plate was kept intact. The glans was infiltrated with 1:100,000 epinephrine and incisions made bilaterally along the urethral plate from the native urethral meatus to the glans tip [Figure 1d]. The glans wings were developed for closure over the neourethra. An 8 Fr silicon catheter was placed to evaluate the urethral plate width for tubularisation [Figure 2a-d]. Whenever the plate width was found to be insufficient, the urethral plate was incised longitudinally in the manner described by Snodgrass.[5] A free graft was then measured and harvested from the inner prepuce (Figure 3a). The graft was defatted and sutured onto the incised urethral plate [Figure 3b]. The neourethra was rolled into a tube over an 8 Fr catheter [Figure 3c]. Another layer of closure was also accomplished using 7-0/8-0 polydioxanone [Figure 3d]. A vascularized tunica vaginalis flap was developed and used as a second layer cover [Figure 4a-b]. The glans and corona were reapproximated and the ventral shaft was covered with mobilized outer preputial skin flaps [Figure 4c-d].

Post-operatively, the catheter was removed after 7-10 days. The children were observed for urinary stream. During the follow-up, the penis was examined for complications such as wound infection, wound dehiscence, meatal stenosis and persistent chordee.

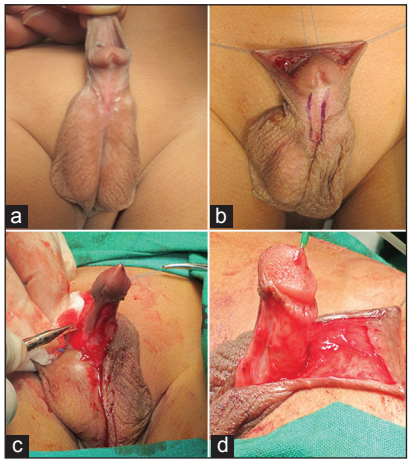


Figure 1: (a) Penoscrotal hypospadias in a 2-year-old, (b) marking of urethral plate, (c) degloving of penis, (d) creation of artificial erection

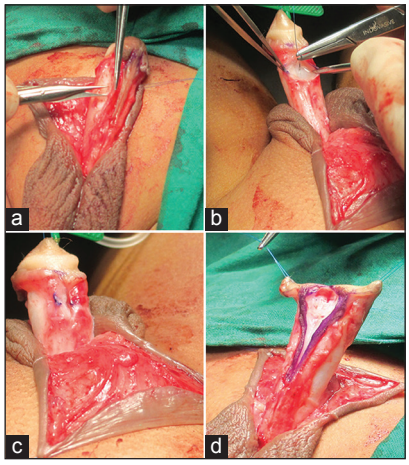


Figure 2: (a) Raising of urethral plate along with spongiosm from underlying cavernosa, (b) dorsal plication, (c) dorsal plication done, artificial erection shows a straight penis, (d) longitudinal incision of urethral plate

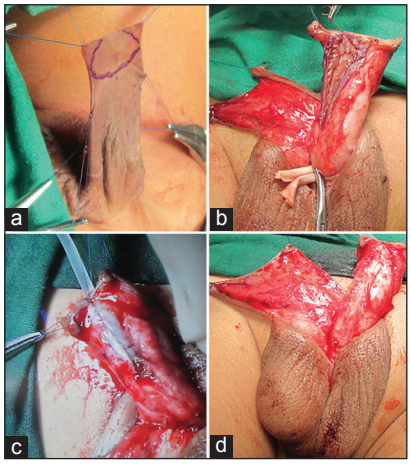


Figure 3: (a) Marking of the prepuce to extract a free inner prepucial skin graft, (b) free graft sutured to the incised urethral plate, (c) tubularisation of urethral plate, (d) spongioplasty completed

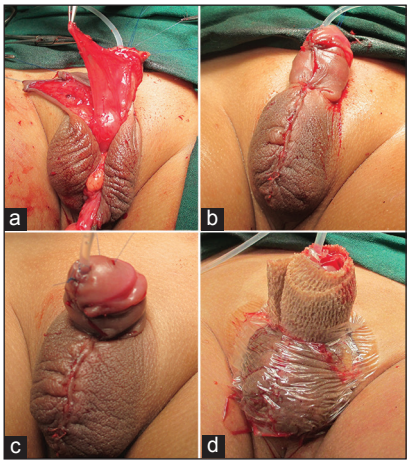


Figure 4: (a) Vascularised tunica vaginalis flap used as a second cover, (b) closure of skin cover, (c) the final look post-operatively, (d) compression dressing given

RESULTS

During the period January 2007-December 2011, 12 children with a mean age of 48.83 ± 8.29 (range 36-67) months underwent primary dorsal inlay preputial graft urethroplasty for proximal hypospadias with a very narrow urethral plate. Pre-operatively, the urethral meatus was at the proximal shaft in ten and penoscrotal in the remaining two. The chordee was successfully released by skin release and dorsal plication of the corpora cavernosa. The mean operating time was 138.16 ± 10.35 (range 121-152) min.

At a mean follow-up of 42.16 ± 15.74 (range 18-72) months, 2 (16.66%) children had a breakdown of ventral shaft skin. The urethral tube was fine and none of these two children developed urethrocutaneous fistula. The skin wound healed by secondary intention. None of the children had meatal stenosis, and none of these 12 children developed urethrocutaneous fistula. No incidence of glans dehiscence was noted. Cystoscopy done at the end of 3 months revealed no strictures, and the dorsal inlay grafts were intact and appeared healthy. Parents of three (25%) children complained of occasional splaying of urine.

DISCUSSION

Hypospadias is a common genitourinary anomaly affecting nearly 1/300 male new-borns.[1,3] More than 100 different types of procedures have been described for the repair of this anomaly. Irrespective of the technique used, the goals of repair remain unchanged. A straight penis (orthoplasty) with a urethral meatus in the normal position on the glans (meatoplasty and glanuloplasty), a neourethra of adequate homogeneous calibre with a solid, straight urinary stream (urethroplasty) and adequate skin coverage of the phallus (with or without scrotoplasty).[3]

Complications following hypospadias repair are common and include stricture, fistula and diverticulum formation. During the past decades the most common technique of proximal hypospadias repair involved the use of a vascularised transverse preputial island flap as a tubularised neourethra or as a ventral onlay over an intact urethral plate. The results of these procedures were satisfactory and improved over time. The incidence of anastomotic strictures continued to be bothersome. Preservation of urethral plate and use of onlay flaps brought about increased incidence of urethral diverticula.

Snodgrass described the TIP technique for hypospadias repair in 1994 as a means to widen and improve the mobilization of the urethral plate when performing a Thiersch–Duplay urethroplasty.[1,2] Since then, many reports have been published describing the success of this modified procedure. Current understanding advocates preservation of the urethral plate whenever possible with chordee correction. The hypospadias repair is performed by rolling the urethral plate into a tube. Whenever adequate urethral plate is not available to roll into a tube, then a longitudinal incision of the plate or a transverse preputial island flap is used to augment the plate. Kolon and Gonzales[3] in 2000 described the use of inner preputial free graft to augment the urethral plate by suturing it onto the incised urethral plate. The neourethra was then rolled into a tube in typical Thiersch–Duplay fashion. The authors believe that this technique successfully fulfilled all the traditional hypospadias repair criteria. The dorsal inlay graft repair preserved the urethral plate and increased the surface area of healthy epithelium. Moreover this technique does not leave the neourethra with a long denuded surface awaiting re-epithelialization. The dorsal inlay graft technique will also permit the extension of the incision right up to the neomeatus at the tip of the glans. This manoeuvre is especially helpful in a hypospadiac penis with a flattened glans. With placement of the dorsal graft in the incision a vertical slit like neourethral meatus is formed at the glans tip without the risk of stenosis.

Our study too has demonstrated that dorsal inlay inner preputial graft urethroplasty is a safe and viable option in the treatment of proximal hypospadias with a narrow urethral plate. Inner preputial free graft helps in augmenting the urethral plate so as to make it possible to tubularise the plate. Complications such as meatal stenosis are not commonly seen with this procedure.

Asanuma *et al*.[6] in their study have reported on their results of the dorsal inlay graft procedure performed on 28 patients with no deep groove and no severe curvature. At a mean of 22 months of follow up, an urethrocutaneous fistula developed in only one patient (3.6%), requiring repair surgery 6 months after urethroplasty. No patient had meatal stenosis, neourethral stricture or urethral diverticulum along the inlay graft.

This technique though initially described for primary repair, has also been used for hypospadias reoperations. Ye *et al*.[2] have reported on their experience with single stage dorsal inlay buccal mucosal grafts using

the Snodgrass technique for complex redo cases in 53 patients aged from 3 to 34 years old. After a follow-up of 14-30 months (mean 22.6 months), the total complication rate was 15.1%, with five cases of fistula and three cases of stricture. The authors opined that this approach represented an effective, simple and safe option for reoperations.

Schwentner *et al*.[7] reported on their extended experience with single-stage genital skin graft urethroplasty in thirty-one patients with failed hypospadias surgery. With a follow-up period of 78.45 ± 18.18 months, initial graft healing was successful in all. There was no postoperative infection involving the inlay. Four patients underwent redo surgery yielding a complication rate of 12.9%. Urethral stricture of the proximal anastomosis was most frequent. The authors concluded that this single-stage approach using dorsal inlay skin grafts was reliable, creating a substitute urethral plate in the long term.

Leslie *et al*.[8] analysed the histological and functional characteristics of the TIP vs dorsal inlay graft urethroplasty in an experimental rabbit model. A total of 24 New Zealand male rabbits were randomly allocated into four groups, including sham operation, urethroplasty, TIP urethroplasty and dorsal inlay graft urethroplasty. In the urethroplasty group the anterior urethral wall was half excised and the dorsal aspect was tubularised. In the TIP group the same steps were followed but tubularisation followed a longitudinal midline incision in the dorsal wall. In the dorsal inlay graft group the defect created by the dorsal incision was covered with an inner preputial graft. The animals were sacrificed at 4 and 8 weeks, respectively. The grafts took in all animals. The TIP defect was bridged by urothelium, while in the dorsal inlay graft group the preputial graft kept its original histological characteristics. In this short-term rabbit model dorsal inlay graft urethroplasty was feasible with good graft take and integration. Simple tubularisation of a reduced urethral plate led to significantly decreased flow.

CONCLUSIONS

Dorsal inlay inner preputial skin graft urethroplasty is an excellent option in the management of proximal hypospadias with minimal or no chordee and with a narrow urethral plate. It offers a viable, safe, rapid, easy, and an additional armamentarium in the management of hypospadias.

REFERENCES

1. Snodgrass WT. Hypospadias. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, editors. Campbell-Walsh Urology. 10th ed. Philadelphia: Elsevier-Saunders; 2012. p. 3503.
2. Ye WJ, Ping P, Liu YD, Li Z, Huang YR. Single stage dorsal inlay buccal mucosal graft with tubularized incised urethral plate technique for hypospadias reoperations. Asian J Androl 2008;10:682-6.
3. Kolon TF, Gonzales ET Jr. The dorsal inlay graft for hypospadias repair. J Urol 2000;163:1941-3.
4. Schwentner C, Gozzi C, Lunacek A, Rehder P, Bartsch G, Oswald J, *et al*. Interim outcome of the single stage dorsal inlay skin graft for complex hypospadias reoperations. J Urol 2006;175:1872-6.
5. Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. J Urol 1994;151:464-5.
6. Asanuma H, Satoh H, Shishido S. Dorsal inlay graft urethroplasty for primary hypospadiac repair. Int J Urol 2007;14:43-7.
7. Schwentner C, Seibold J, Colleselli D, Alloussi SH, Schilling D, Stenzl A, *et al*. Single-stage dorsal inlay full-thickness genital skin grafts for hypospadias reoperations: Extended follow up. J Pediatr Urol 2011;7:65-71.
8. Leslie B, Jesus LE, El-Hout Y, Moore K, Farhat WA, Bägli DJ, *et al*. Comparative histological and functional controlled analysis of tubularized incised plate urethroplasty with and without dorsal inlay graft: A preliminary experimental study in rabbits. J Urol 2011;186:1631-7.

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