

Original Article

Single Stage Urethroplasty for Proximal Hypospadias with Chordee.

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Abstract

Proximal hypospadias with chordee usually requires two stage procedures: 1st stage is orthoplasty and ventral parking of prepuccial skin and 2nd stage is urethroplasty after 6 months of 1st stage. The aim of this study is to describe and report the outcome of a single stage repair- Koyanagi Nanamura procedure for proximal hypospadias with chordee. Between January 2006 to December 2010, 44 boys with proximal hypospadias underwent repair using the Koyanagi Nanamura technique in Paediatric Surgery Department of Faridpur Medical College Hospital and Dhaka Medical College Hospital. The boys' age ranged from 1 to 7 years. The technique employs the use of lateral penile skin and extends into the inner preputial skin. This flap enjoys double blood supply from the base of the meatus as well as the preputial vessels. Follow-up period was 6 months. Satisfactory results were obtained in 39 (88.6%) patients. Three patients developed fistulae. Two patients developed meatal stenosis. Results were considered satisfactory when the boy achieves a glanular meatus, single forward stream, unimpeded voiding, good cosmesis, and no need for secondary surgery for the urethra. Koyanagi Nanamura procedure is a reliable procedure in which the lateral flaps have dual blood supply, which produces good results (88.6%) and is suitable for proximal forms of hypospadias with chordee.

Key words: Hypospadias, Chordee, Fistula, Penis.

Introduction :

Hypospadias is a developmental anomaly characterized by a urethral meatus that opens on the ventral surface of the penis, proximal to the end of the glans, anywhere along the shaft of the penis, from glans to scrotum, or

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even in the perineum. It is one of the commonest congenital anomalies of the male genitalia occurring in approximately 1 in 300 live male births¹. The aim of surgical repair of hypospadias is to provide complete straightening of the penis, placing the meatus at the tip of glans, forming a symmetrical conical shaped glans and constructing a neourethra uniform in caliber².

Repair of proximal hypospadias is a major challenge to the Paediatric surgeons. Usually it is repaired by two stage procedure: In 1st stage orthoplasty, in which correction of chordee and ventral parking of preputial skin is done and in 2nd stage (after 6 months of 1st stage) urethroplasty is done. Often, the combination of procedures may add the complication rate of one procedure to that of another³. Some of the available techniques for hypospadias repair are para meatal-based flaps, for example, Mathieu and transverse preputial island pedicle flaps. Each flap has rich blood supply and lymph drainage from the ventral or dorsal aspects of the

root of the penis. The Koyanagi Nanamura procedure combines a meatal-based flap and a pedicle island flap into single procedure. It allows for excision of ventral midline chordee without jeopardizing the flap.

Materials and methods

During the period from January 2006 to December 2010, all the patients with proximal hypospadias with chordee who were admitted in Paediatric Surgery department were included in this study. Fourty four (44) boys with primary proximal hypospadias underwent single-stage repair using the lateral based (LB) flap technique. All the operations were performed by the same author in Dhaka Medical College Hospital, Dhaka and Faridpur Medical College Hospital, Faridpur. Follow-up period was 6 months. Results were considered satisfactory when the boy achieves a glanular meatus, single forward stream, unimpeded voiding, good cosmesis, and no need for secondary surgery for the urethra.

Surgical technique:

A traction suture of 4/0 prolene is placed through the tip of the glans and release any residual prepuccial adhesion. Insert a 6-8 F feeding tube (depending upon the size of the penis) into the bladder. A tourniquet is applied at the base of the penis. Make a skin incision on the inner surface of the prepuce at least 1 cm away from the coronal sulcus, to cross proximally to the meatus and extend laterally on each side to meet in the midline on the dorsum. Mark the incision on the remnant of the distal prepuce by starting from the dorsum on one side and then continuing around the corona down to the urethral plate beneath the glans. Extend the mark all the way along its edge to the most distal end of the glans, at the site of the stay suture. Be sure to make the flap wide enough to cover the plate without tension. On the other side of the prepuce, extend the line from the meatus to the glanular tip, coursing longitudinally along the side of the urethral plate. In the meatal groove, make the line parallel to each other to keep the meatal plate together with the urethral plate. Deglove the penile shaft proximally to the marked line with curved iris scissors, cutting between buck's fascia and dartos fascia. Check by artificial erection for release of the chordee and

Cut the marked lines to elevate the para meatal-based "Manta wing" prepuccial flap, leaving the more central portion in place as the new urethral plate. Make a vertical midline incision into the ventral glans. Deepen the incision to the level of the corpora to free up glans wings. Lay the para meatal foreskin flap on top of the urethral plate. Then tubularise the flap over the feeding tube by 6/0 polyglactin (Vicryl) subcuticular suture. Anchor the neourethra to the distal edge of the cleft glans. Approximate the glans wings. Divide the prepuce dorsally to form two Byars' flaps. Swing the flaps ventrally to cover the remaining ventral skin defect using 5/0 plain cat gut.

Bifid scrotum was present in 4 patients and was corrected during surgery by mobilizing and suturing the scrotal tissues ventral to the corpus spongiosum with z-plasty to create the penoscrotal junction. Third-generation Cephalosporin and Amikasin were given intravenously for 7 days. Povisep soaked gauze was applied for 5 days, thereafter the wound is left exposed, only Povisep ointment was applied for next 7 days.

Results :

Patients' age at the time of surgery ranged from 1 to 7 years. The type of hypospadias and associated anomalies are summarized in (Table-I).

Table-I: Distribution of the proximal hypospadias anomaly:

Type of hypospadias anomaly□	No. of patients
Proximal penile hypospadias with Chordee□	21
Proximal hypospadias with torsion□	12
Penoscrotal hypospadias with bifid scrotum□	04
Penoscrotal hypospadias with transposition□	7
Total□	44

There was a degree of bifid scrotum that was corrected during the operation. Seven patients had associated penoscrotal transposition that was corrected 6-12 months later.

Table-II: Outcome (n=44)

Outcome	1 st follow up (after 1 month)	2 nd follow up (after 3 month)	3 rd follow up (after 6 month)
Shape of the glans	Conical in 44 cases	Conical in 44 cases	Conical in 44 cases
Shape of the penis	Cylindrical in 44 cases	Cylindrical in 44 cases	Cylindrical in 44 cases
Meatal opening	Stenosis in 2 cases	Stenosis in 2 cases	No stenosis
Urinary flow	Narrow stream in 2 cases	Narrow stream in 2 cases	Normal flow
U-C fistul	Fistula in 3 cases	Fistula in 3 cases	Fistula in 3 cases
Stricture urethra	No stricture	No stricture	No stricture

Satisfactory results were achieved in 39 (88.6%) of 44 patients. Complications occurred in 5 patients. Three patients developed urethra-cutaneous fistula occurring at the coronal sulcus. Two patients had meatal stenosis and become normal after regular meatal dilatation and for 3 months. The 3 fistulae responded to simple closure.

Discussion:

Proximal hypospadias has always constituted a major challenge and is more prone to complications. There are significant differences in the preferred techniques for proximal hypospadias and chordee correction with tubularised incised plate and transverse island tubed flap being the most popular⁴. Other current techniques include the Thiersch-Duplay principle⁵, the onlay island flap^{6,7}, and the 2-stage repair for primary and complicated cases⁸. Incision of the urethral plate was first described by Reddy in 1975⁹, Orkiszewski in 1987¹⁰, Rich et al in 1989¹¹, and popularized by Snodgrass in 1994¹².

Most of the patients referred to the author with proximal hypospadias had significant deep chordee, which required excision of the urethral plate. In the author's opinion, this meant that the tubularised incised plate, onlay island flap, and Thiersch-Duplay were not ideal alternatives. The LB flap offered a single-stage repair that is suitable when excision of the midline chordee tissue is preferred by the surgeon. The use of prepuce and lateral skin for the reconstruction of neo-urethra was first described by Van Hook in 1896¹³. However, vascularised pedicle flap repairs dominated in 1970s because of the works done by innovative surgeons such as Hodgson, Asopa, Duckett, Elder and others.

Island flaps have a complication rate of 10% to 25%. Fistula, neourethral stricture and urethral diverticulum have been reported with these types of repair^{6,14}. The LB skin flap is a natural development of many well established procedures that used the lateral skin such as those of Van Hook¹³, Broadbent et al¹⁵, DesPrez et al¹⁶, Koyanagi et al¹⁷, and Joseph¹⁸. Broadbent et al in 1961 described a single-stage repair by using a buried skin strip based on the para meatal tissue and its blood supply¹⁵. DesPrez et al at the same year described a similar technique using a full-thickness skin strip from the ventral shaft of the penis, extending it outward onto the inner surface of the prepuce. However, DesPrez et al in his study on 65 patients during a 10-year period reported that one third of his patients developed fistula that necessitated a secondary procedure¹⁶.

In 1983, Koyanagi et al¹⁷ introduced a technique for hypospadias repair, which used para meatal-based flaps that extend distally around the distal shaft to incorporate

the inner layer of the prepuce. Koyanagi's operation theoretically appeared to provide an ideal treatment for severe proximal hypospadias. However, in his series of 44 patients, 6.88% required secondary surgery. In a series of patients reported by Glassberg et al¹⁹ in 1998, a secondary operation was required in 50% of those who underwent this technique. This complication rate was attributed to inadequacy of blood supply to the neo-urethral flaps. This may be the result of excess mobilization of the skin flaps from their lateral and dorsal blood supply (rendering the flap, which is several centimetres long, dependent entirely on the blood supply coming from the region of the urethral meatus). Furthermore, the presence of 2 anastomoses (dorsal and ventral) may increase the risk of fistula formation.

The preputial island flap, Broadbent, Desprez, and Koyanagi techniques are all based on a single blood supply (the para meatal blood supply). The LB flap has a dual blood supply; the neo-urethra is supported by an intermediate protective layer and involves the use of a Y-V glansplasty to have a slit like meatus. The blood supply of the LB flap comes from the meatal skin, which is in continuity with the flap (as in the Mathieu flap) and also the vascular pedicle (as in Duckett island flap). In another study of Hadidi in 2009²⁰ the success rate was 91% which corresponds with our study (86.6%).

The proposed technique ensures minimal disturbance of the pedicle of the island flap. The good vascularity of the skin flap is supported by the fact that the neourethra has not broken down or stenosed in any of patients with LB Flap. Devine and Horton²¹ described large V plasty to avoid meatal stenosis in hypospadias repair. The modified use of Y glansplasty and creation of a long anastomosis between the urethral meatus and glans results in a large apical meatus. In addition, the excision of a small V from the apex of the neomeatus helps to achieve a terminal slit like meatus. This decreases the risk of postoperative meatal stenosis that is a major contributing factor for fistula and break down of the repair. The use of a protective intermediate layer plays an important role in reducing complications in modern hypospadias surgery²².

Early in the series, the dorsal preputial fascia was the standard intermediate layer used. The experience with LB flap technique in 49 patients with primary and complicated proximal hypospadias was reported in 2003²². Since then, there have been few modifications to make the technique easier and to reduce complications and avoid rotation. These modifications include fixation of the LB flap in the midline (formation of urethral plate), the use of tunica vaginalis as a protective intermediate layer, and the use of polyglactin 6/0 for the reconstruction of the glans.

Conclusion:

The Koyanagi Nanamura technique is a good alternative for proximal hypospadias with chordee. Result of this procedure is satisfactory from the functional and cosmetic point of view. As it is a single stage procedure it may reduce the financial burden of the patient's family as well as the state and also reduce the psychological and social embracement of the patient. This technique may offer to the patients with proximal hypospadias with good success rate and relatively few complications.

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