

Use of preputial island flap for penile skin reconstruction in hypospadias

Mansour Mollaeian¹, Houshang Pourang², Farid Eskandari³, Hojatollah Raji *

1- Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran

2- Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran

3- Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran

*Corresponding author: Hojatollah Raji, Bahrami Children's Hospital, Tehran University of Medical Sciences, Tehran, Iran. Email: hojatollah_raji@yahoo.com

Abstract

Introduction: Providing the material for penile reconstruction after release of chordee associated with hypospadias is challenging. We have used the preputial vascularized island flap for this purpose. We report the results of this prospective study.

Materials and Methods: One hundred and twelve boys ranging from 13 months to 12 years of age were enrolled in this study. The location of meatus ranged from midshaft to glanular and all of them had associated penile curvature from 10 to 40 degrees. The preputial skin vascularized flap was created and used for covering the defect in all cases. The underlying dartos tissue of the flap also lied on the urethral suture line to prevent the formation of fistula. The follow up period ranged from 2 months to 72 months. All patients received caudal anesthesia for postoperative pain management.

Results: All patients had skin defects on the ventral surface of their penile shaft after correction of penile curvature. The ischemia and necrosis of the flap developed in 5 cases however these were in initial phases of the study. In 20 cases the appearance of the flap seemed liked a hypertrophied loose patch on the ventral aspect of penis. These cases went on to have a good appearance over time. Only in two of these cases a second operation to refashion the flap was needed.

Conclusion: Thepreputial island flap is a safe method for covering the new urethra and penile skin defects, with good cosmetic results.

Keywords: preputial island flap, penile curvature, hypospadias

Introduction

Hypospadias is a congenital abnormality, and when possible, a single stage repair is carried out. Surgical repair of hypospadias has remained one of the most demanding problems for surgeons, because of the high complication rate. The preputial island flap repair for hypospadias has gained wide popularity in our practice and it can be applied to penile skin reconstruction in hypospadias. It has a good blood supply and can be mobilized as a pedicle. This technique was previously described by Scuderi and popularized by others, with some modifications^{1,2,3,4,5}.

This is a prospective study of consecutive 112 cases managed by preputial island flap

technique for reconstruction of the skin defect of the penis which occurred after correction of its curvature.

Materials and Methods

This study was performed at the department of pediatric surgery at Bahrami university hospital, Tehran, Iran, between 2006 and 2013. 112 boys ranging from 13 months to 12 years of age were enrolled in this study. The location of meatus differed from midshaft to glanular; however all of them had associated penile curvature from 10 to 40° in severity.

The follow-up period ranged from 2 months to 72 months, (mean 2.2 years). Collected perioperative and follow-up data of this

study included age, type of hypospadias, urethrocutaneous fistula, meatal stenosis and flap necrosis. The data were collected in questionnaires and analyzed.

Surgical technique

The preputial island flap technique provides outstanding results in appropriately selected patients. The severity of chordee can only be established with certainty at the time of surgery when the penis is degloved and when the division of the corpus spongiosum is clearly identified. The anatomy of urethral meatus is not appropriate for assessing the severity of hypospadias.

A traction suture is placed at the tip of the glans and artificial erection induced to assess the chordee. An incision was made at least 5mm from the corona, on the ventral surface the incision is continued proximal to the meatus and skin is completely freed. Performing the dissection in the accurate plane is important to avoid bleeding and to preserve the blood supply to the prepuce and dorsal penile skin. When the skin is mobilized enough, the chordee is corrected. If the skin is insufficient despite the mobilization to complete the correction of chordee, a midline dorsal plication is done using Heineke-Mikulicz technique. When urethroplasty has been completed, the whole mucosa of the inner part of the foreskin is removed, taking care not to compromise the vascularization of the rest of the prepuce. A transverse line is then drawn at the junction of the dorsal penile skin and the outer prepuce, parallel to its free border and situated so that enough length remains to cover the dorsal penis with no tension after suturing the free border up to the subcoronal incision. This line is superficially and carefully incised, and a generous vascular pedicle to the skin of the island flap, based on the axial blood supply of the dorsal dartos fascia, is progressively

developed by sharp dissection. A tension-free transposition with no torsion is vitally important to prevent problems of flap viability.

Results

From August 2006 to April 2014, 112 children (aged 13 months to 12 years, mean age= 2.3 years) underwent repair of primary hypospadias and correction of chordee using the preputial island flap technique. Patients who had penoscrotal hypospadias were excluded from this study. Ninety-nine children had mild to moderate chordee that was corrected with complete degloving and these underwent preputial island flap repair. In 13 cases, a dorsal plication was necessary to correct the curvature. The follow-up period ranged from 2 months to 72 months (mean 2.2 years). The oldest boy was 15 years at follow-up. Complication developed in 9 of 112 children (8.0%) undergoing island flap repair (2 flap necrosis, 3 urethrocutaneous fistula and 4 meatal stenosis). All complications were resolved with one additional procedure. In 103 of 112 children (91.9%) the parents were satisfied with the cosmetic results. The appearance of the flap seemed like a hypertrophied loose patch on the ventral surface of the penis in 20 cases. Most of these cases went on to have a good appearance over the time. Two of them underwent a second operation to refashion the flap.

Discussion

After urethroplasty, the penis must be resurfaced with skin. Although many techniques have been developed for this, several have now been abandoned. Simply suturing the lateral edges of the ventral skin leads to a median suture, usually under tension that can be relaxed by incising the dorsal skin down to the midline^{6,7,8}. A ventral skin cover can also be achieved by

rotating the entire penile shaft spirally around the ventrum. However, these techniques are now rarely used. The preputial tissue may be transposed by opening a small button-hole in its middle and bringing the glans through it, like a head through a 'poncho'. The major drawback of this procedure is the difficulty in fashioning the lateral borders without leaving unsightly bulky edges of skin. Another technique is Z-plasty. The Z-suture line crosses the urethroplasty twice and unsightly redundant skin is frequent, resulting in two 'dog ears'^{9, 10, 11}.

Preputial island flap described here is simple, consumes little extra time and is suitable for most hypospadias reconstructive repairs having the ventral skin defect. Problems of flap viability must be avoided by carefully dissecting the vascular pedicle. The key is to stay as close as possible to the derma of the dorsal skin. All the vascular bundles must be for the flap and saved. Fistula formation is a complex problem too, which many factors other than skin coverage contribute, but good viability of the flap and not having overlying sutures, as in the present technique, are probably important in preventing this complication. We reviewed our experience with preputial island for penile skin reconstruction in hypospadias in 112 children. Our results show that penile skin reconstruction with this technique has good success with acceptable complication rates. Our overall complication rate of 8.0% favorably compares with other series of mid shaft to glanular hypospadias repair using preputial island flap. In this research we have experienced flap necrosis in 2 cases. However, these were in former cases of this study and probably due to technical error. Barbara et al have not reported flap necrosis previously¹².

Occurrence of early urethrocutaneous fistula can be due to poor blood supply to the flap

when it is used for urethroplasty. A fistula rate of 2.6% is acceptable and resembles studies reported previously^{13,14}.

However it is not the aim of this study to show the results of urethroplasty. Instead, the goal of this report is to evaluate the reliability of preputial island flap.

Conclusion

Using preputial island flap for covering the skin defect of ventral surface of penile shaft which occurs after correction of the penile curvature associated with hypospadias is a favorable option. This option uses the natural penile tissue for penile reconstruction with excellent cosmetic and functional result.

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