

Modified Tubularized incised plate urethroplasty for distal hypospadias without chordate

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Abstract: Background/Purpose: Hypospadias is a congenital deformity characterised by an abnormally located urethral opening that can occur anywhere proximal to its normal location on the ventral surface of penis or into the perineum. Postoperative oedema was noticed in 3 patients which improved in few days. Superficial wound infection occurred in 3 patients, 2 healed and one developed urethrocuteaneous fistula. No dehiscence or voiding difficulty occurred in any case. One patient had leakage around the stent. No urinary retention occurred. No meatal stenosis developed in any patient. All children had good results that were described as a cosmetically acceptable penile shaft with normal meatal location. The objective of this study was to present our modified TIP repair technique for distal hypospadias without chordate. **Patients and Methods:** Between January 2009 and January 2013, 16 children with distal hypospadias underwent primary repair. Their ages ranged from 2 years up to 11 years. The location of the meatus was distal penile in 11 cases, coronal in 2 cases and subcoronal in 3 cases. **Results:** 16 patients were operated upon. 3 patients had associated anomalies, one patient had polydactyl and a repaired omphalocele minor, one patient had a unilateral palpable undescended testis and one patient had an inguinal hernia. The mean operative time was 35 minutes. Postoperative oedema was noticed in 3 patients which improved in few days. Superficial wound infection occurred in 3 patients, 2 healed and one developed urethrocuteaneous fistula. No dehiscence or voiding difficulty or meatal stenosis developed in any patient. 3 patients had urethrocuteaneous, one of them occurred because of wound infection. One of them closed spontaneously, while the others were successfully repaired. All children had good results that were described as a cosmetically acceptable penile shaft with normal meatal location. **Conclusion:** Hypospadias is one of the most common anomalies worldwide. Most of the hypospadias can be corrected with a single stage surgery, most common post-operative problems are infection and formation of a fistula requiring a second surgery. Modified TIP repair is a reliable method and can be applied safely to repair distal hypospadias without the need for repeated dilatation, meatal stenosis or stricture. This procedure is rapid, simple and safe and successful in the majority of patients.

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1. Introduction:

Hypospadias is a congenital deformity characterised by an abnormally located urethral opening, that can occur anywhere proximal to its normal location on the ventral surface of penis or into the perineum¹. The penis is more likely to have associated ventral shortening and curvature, called chordae, with more proximal urethral defects. The reported incidence of hypospadias is approximately 1:300 live births². There are several forms of hypospadias classified according to meatal location (1) glanular, (2) coronal, (3) penile, (4) penoscrotal and (5) perineal. About 70% of all cases of hypospadias are distal penile or coronal¹. Except in some cases with proximal types, the repair of hypospadias is generally planned as a single-stage procedure³.

Principals of repair involve straightening of penis (orthoplasty), creating a slit like meatus at the tip of the penis (urethroplasty and meatoplasty), making the glans conical looking (glanuloplasty) and proper skin coverage⁴.

Number of techniques for the repair of distal penile hypospadias such as MAGPI⁵, Mathieu⁶, Horton

Denine flip flap procedure⁷, anterior urethral advancement technique⁸, tubularized incised plate urethroplasty⁹ and other techniques have been described to repair distal penile hypospadias with varying degrees of success.

The tubularized incised plate (TIP) repair is based on an old principle of urethral plate tubularization, also known as the Thiersch-Duplay procedure^{10,11}

In this study we have evaluated procedure for the repair of distal penile hypospadias using a modification of the tubularized incised urethral plate repair for distal hypospadias without chordae

2. Materials and methods

Between January 2009 and January 2013, 16 children with distal hypospadias underwent primary repair. Their ages ranged from 2 years up to 11 years. The location of the meatus was distal penile in 11 cases, coronal in 2 cases and subcoronal in 3 cases.

Selection criteria were good urethral plate, without chordee or torsion needing complete degloving.

Diagnosis was made on clinical basis. On admission patients were thoroughly evaluated with history, physical examination and investigations. In every patient, complete blood examination, urine routine examination, renal function test and abdominal ultrasonography were done.

Operative Technique:

The procedure was done under general anesthesia with caudal nerve block using bupivacaine 0.25% plus 0.5 mg/kg ketamine or 1 mg/kg tramadol. The area was prepared with povidone and all antiseptic measures adopted. A traction suture of 5/0 polydioxanone (PDS) was placed in the glans penis. A feeding tube 6-10 Fr depending on the age of the patient was inserted in the urethra and passed into the bladder. No tourniquet was applied in all cases.

The operation started by infiltration of saline-adrenaline 1:100,000 at the edge of the meatus to aid in haemostasis and make dissection of the perimeatal skin easy and prevents urethral injury. The ventral glans is then infiltrated with 1:100,000 epinephrine along the borders of the urethral plate. A "U"-shaped incision was given around the meatal opening 2 mm proximal to the meatal edge, extended on either side lateral to the edge of the urethral plate by approximately 1-2 mm and extended up to the mid glans level. We started urethoplasty by approximating the edges lateral to the urethral plate in the midline by a continuous subcuticular or through and through 5/0 PDS sutures. Granuloplasty completed by repairing the 2nd layer by simple or mattress 5/0 PDS sutures. Skin cover was made by mobilization of distal penile skin or by a preputial skin flap. Any redundant skin was excised. Antiseptic dressing with mild pressure was done. Amoxicillin/clavulanic acid (30-40 mg/kg per day in two divided doses), as antibiotic prophylaxis, was used for 7 days. Oral analgesic was prescribed if needed.

Our principles of repair included minimal use of cautery and injection of saline-adrenaline 1-100,000 at the edge of the meatus to aid in haemostasis and make dissection of the perimeatal skin easy, no degloving of the penis and the urethral plate not incised.

3.Results

Sixteen patients were operated upon. 3 patients had associated anomalies, one patient had polydactyl and a repaired omphalocele minor, one patient had a unilateral palpable undescended testis and one patient had an operate upon inguinal hernia,. There was no associated anomalies that could contraindicate surgery or anaesthesia. The operation was completed successfully in all patients. The mean operative time was 35 minutes. Patients were observed for wound infection, oedema, fistula formation, tube disruption and meatal stenosis. First dressing was changed after

48-72 hours. Catheters were removed after 7-10 days. Among the patients with successful repair cosmetic appearance of phallus was evaluated in terms of acceptance by the parents.. It was graded as poor, satisfactory or good children were followed for mean period of 6 months.

Postoperative oedema was noticed in 3 patients which improved in few days. Superficial wound infection occurred in 3 patients, 2 healed and one developed urethrocuteaneous fistula. No dehiscence or voiding difficulty occurred in any case. One patient had leakage around the catheter. No urinary retention or meatal stenosis developed in any patient. 3 patients had urethrocuteaneous, one of them occurred because of wound infection. One of them closed spontaneously, while the others were successfully repaired. All children had good results that were described as a cosmetically acceptable penile shaft with normal meatal location. There was no urethral stricture, or other major complications that developed in any of our patients during the follow-up period.



Fig 1: Distal penile hypospadias without chordate



Fig 2: Periurethral injection of saline –adrenaline.



Fig 3: U shaped incision



Fig 7: 5 days post operative.



Fig 5: Urethoplasty.



Fig 8: Subcuticular suture urethoplasty.



Fig 6: Granuloplasty

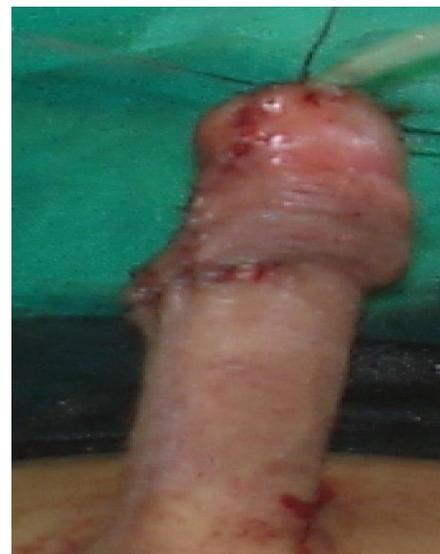


Fig 9: preputial skin flap



Fig 10:8 days postoperative, straight penis



Fig 11:8 days postoperative, good healing



Fig 12: 10 days postoperative, good voiding stream

4. Discussion

With an incidence of 1:300, hypospadias is one of the most common genital anomalies in male newborns.¹² However the etiology of hypospadias remains unknown.¹³ In the majority of cases abnormal meatus is situated at the glanular, coronal and subcoronal levels or in the distal part of the shaft^{14,15-16}.

A total of 16 patients were included in this study. Their ages ranged from 2-11 years. Construction of neourethra is generally recommended to be completed before the school going age. In our study 7 patients presented above the age of 6 years. This is because of low literacy rate and attitude of the parents because of ignorance.

There are hundreds of procedures described for repair of hypospadias, almost none of these procedures can be universally applied for all hypospadias types, some are suitable for distal and some are suitable for various degrees of proximal hypospadias¹⁹.

Since its introduction in 1994, tubularized incised plate urethroplasty by Snodgrass²⁰ is the most widely done procedure for distal penile hypospadias. TIP urethroplasty has gained worldwide acceptance for distal hypospadias repair due to its low complication rate, good cosmetic result, and technical simplicity. TIP urethroplasty appears to be the best available procedure for correction of distal hypospadias in children²¹.

Most technical modifications of the Snodgrass technique have included different ways to harvest the dartos flap in order to cover the urethroplasty, not changes to the urethroplasty technique itself²¹. In this setting, the variations described include a local de-epithelialized skin flap²², a lateral skin flap²³, or a ventral-based dartos flap^{24,25}. perhaps the most creative innovation has been the *Snodgraft* procedure which consists in covering the raw surface of the incised plate with an inlay preputial or buccal graft²¹.

Corpus spongiosum being good vascular and thick structure, it is easy to take good suture bites to approximate spongiosum in midline. Suturing corpus spongiosum alone without taking edges of urethral plate is enough to roll urethral plate into a tube. By this technique Mane *et al.* (2013) had fistula rate comparable to series reported by Snodgrass who used dorsal dartos fascia to cover urethral repair²⁶. Jayanthi, suggested that the tubularization should be performed over a 10- or 12-Fr feeding tube and working from the meatus²⁷.

In tubularized incised plate repair the entire urethral plate is incised in the midline from the hypospadiac meatus distally. This incision widens the plate, so that it can be tubularized to create a neourethra of normal diameter. Furthermore, the meatus is appropriately located at the tip of the glans and it is vertically oriented²⁸. In our procedure, the urethral plate is not incised, but additional width is obtained by taking the incision about 1-2 mm lateral to the edge of the urethral plate and the resulting plate can be easily tubularized as a new urethra. Our principles of repair included also minimal use of cautery, no degloving of the penis and injection of saline-adrenaline 1-100,000 0 at the edge of the meatus

to aid in haemostasis and make dissection of the perimeatal skin easy

In a previous study we concluded that addition of 0.5 mg/kg ketamine or 1 mg/kg tramadol to caudally administered bupivacaine 0.25% provide prolonged and safe analgesia with decreased demand of postoperative rescue analgesia, also relatively attenuate the postoperative cortisol and prolactin response in children doing lower abdominal and urological surgery, and so we used it in all patients²⁹.

Urethrocutaneous fistula is the most common complication after hypospadias repair with an incidence of 10-15%, that has been treated successfully using a variety of techniques³⁰.

The incidence of fistula and stricture may be caused by suture types or technical failure and thus it can be avoided³¹. Snodgrass has recommended two-layer neourethra closure to decrease fistula formation in all types of hypospadias defects³². He has reported that his fistula rate reduced from 33 to 11% when performing two-layer urethroplasty in proximal hypospadias. We used only a single layer urethroplasty and we had a fistula rate comparable to other studies.

According to Mane *et al.* meatal stenosis can be reduced by: (1) not extending the midline urethral plate incision up to the distal end of urethral plate, one should never go across urethral plate on to the distal glans. (2) Raising the glans wings only up to the mid glans level. (3) While converting urethral plate into the tube, stop at least 5 mm proximal from the tip, do not convert urethral plate into a tube up to its distal end²⁶. In our study, no case developed meatal stenosis possibly because the urethral plate is not incised and urethroplasty stopped proximal to the tip.

There was no megalourethra or diverticulae in our series as has been reported by other authors³³.

We did not use tourniquet. Haemostasis achieved by using bipolar cautery and injecting saline adrenaline 1-100,000 at the edge of the meatus and on either side of the urethral plate which allowed easy dissection of the skin, prevent possibility of urethral injury. Blood loss also reduced to minimum as we didn't use degloving or urethral plate incision. Good haemostasis during operation reduced post-operative oedema and loose non-compressive dressing reduces post-operative pain with comfortable dressing change.

The presence or absence of chordee can also determine the suitability of various procedures. The aim is to make as nearly normal a urethra as possible, in the least traumatic manner, with the least number of complications and a good cosmetic appearance³⁴. Our technique is suitable only for distal hypospadias without chordee.

This procedure is rapid, simple and safe and successful in the majority of patients

Conclusion

-Hypospadias is one of the most common anomalies worldwide.

-Most of the hypospadias can be corrected with a single stage surgery, Most common post-operative problems are infection and formation of a fistula requiring a second surgery.

-Modified TIP repair is a reliable method and can be applied safely to repair distal hypospadias without the need for repeated dilatation, meatal stenosis or stricture. This procedure is rapid, simple and safe and successful in the majority of patients.

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