

# A Critical Analysis of Hypospadias Patients; Management and Complications

Sunil V Revankar

## 1. Introduction

Hypospadias is a congenital penile defect in which the urethra opens onto the ventral part of the penis, scrotum, or perineum. It is an abnormality of anterior urethral development. Hypospadias has an overall incidence of 1 in 125 to 1 in 300 live male births [1-2]. The disease entity can vary from mild variants with a distal meatus to very severe forms associated with chordee and complete penoscrotal transposition.

Timely surgery in expert hands remains the mainstay of treatment. Cure may require multiple procedures and thus treatment could be demanding on patient and more significantly on parental compliance in our setting.

More than 300 distinct techniques of repair exist in the world literature with innumerable variations to each one of them. The results thus vary expectedly from center to center and from one technique to another.

The hypospadias repair underwent a paradigm change with the recognition of urethral plate and its potential in repair of hypospadias. The Snodgrass repair or the Tubularized Plate urethroplasty has since then been applied to all variants of hypospadias and has been suitably modified by various workers such as to minimize the complications. Moreover it has been used in multistage procedures and is increasingly being used in redo procedures following failure or complications of same or other techniques. The cosmetic appearance of a vertical meatus and the option of preserving prepuce or giving a circumcised end result denotes the versatility of the procedure, thus making it a popular choice of pediatric surgeons [3].

In this study we used different commonly used surgical procedures and analyzed the outcomes on the basis of results and complications.

## 2. Material and Methods

The study will be carried out in General surgery tertiary care hospital. The selection of patients is as per the following inclusion/ exclusion criteria.

This was a retrospective and prospectively designed study. A total of 162 patients ( median age for repair- 4.6yrs) were included in the study and randomly assigned for different surgical management procedures.

Informed consent will be taken from the patients to participate in the study.

### Inclusion Criteria

All new cases of hypospadias presenting to our institution.

### Exclusion Criteria

Failed hypospadias repair

All patients underwent thorough clinical evaluation and findings were recorded as per Barcat's classification for hypospadias, and were used to classify the different types of hypospadias.

All patients were managed as inpatients and discharged when deemed fit for domiciliary care. As the patient populous was from heterogeneous socio-economic background this also ensured uniform postoperative care and removed the inherent bias influencing outcome.

Different surgical procedures (Fig 12B 1-5) were offered randomly based on the type of hypospadias. A dorsal pedicle flap, prepuce flap or ventral urethral split were used according to the surgical procedure performed (Fig 12A-F).

### Follow up

As a routine the patients were admitted for 10-12 days post op, they being discharged after having removed the urethral catheter. The immediate and the late complications were recorded. The patients were followed up monthly for six months postop over telephone and on Out Patient Department basis and the data recorded.

### Analysis

Percentage comparison using the statistical data analysis was carried out.

## 3. Results

A total of 162 boys with hypospadias underwent Tubularized Incised Plate Urethroplasty. They were randomly operated using different surgical techniques. The patients included in this prospective study were operated between May 2004 till Nov 2009 a total period of 06 yrs.

### Presenting Complaints

Passing urine from the undersurface of the penis formed the chief complaint from the parents apart from the abnormal location of urethral meatus. Most, if not all did complain about a splayed urinary stream which forced the child to sit and urinate to avoid spoiling their clothes. Abnormal, distorted appearance of the penis was also highlighted by a significant number of parents.

### Associated anomalies

None of the children in this study had any other congenital abnormalities such as undescended testes or congenital hernias.

**Age**

The youngest patient taken up for Snodgrass repair was 09 months old and the oldest 13 years. The overall median age for repair being 4.6 years.

**Clinical findings**

Anterior and middle variants of hypospadias were operated for in this series. It is also evident that the anterior variety of hypospadias is the commonest (78% of the overall population treated). Clinical findings of the patients as per different types are detailed in table 4.

**Table 4:** Clinical findings of the patients

| Site of hypospadias      | Patients |
|--------------------------|----------|
| Glans                    | 12       |
| Coronal                  | 74       |
| Subcoronal-distal penile | 53       |
| Mid penile               | 20       |
| Baseof penis             | 01       |
| Penoscrotal              | 02       |
| Total                    | 162      |

Surgical procedures offered to different types of hypospadias patients is as in table 5

**Table 5:** Surgical procedures offered to different types of hypospadias patients

| Site of hypospadias      | Surgical procedure - Patients        |   |           |   |                             |                 | total |
|--------------------------|--------------------------------------|---|-----------|---|-----------------------------|-----------------|-------|
|                          | Meatal advancement and glanuloplasty | Modified Snodgrass with onlayprepucial flap | Snodgrass | Modified Snodgrass with dorsal free graft Asopa | Mathieu flip flap procedure | Thiersch duplay |       |
| Glans                    | 12                                   |   |           |   |                             |                 | 12    |
| coronal                  |                                      | 21  | 17        | 3   | 15                          | 18              | 74    |
| Subcoronal-distal penile |                                      | 12  | 17        | 2   | 9                           | 13              | 53    |
| Mid penile               |                                      | 4   | 10        |   | 2                           | 4               | 20    |
| Baseof penis             |                                      | 1   |           |   |                             |                 | 1     |
| penoscrotal              |                                      | 1   |           |   | 1                           |                 | 2     |
| Total Patients           | 12                                   | 39  | 44        | 5   | 27                          | 35              | 162   |

**Outcome assessment**

The chief parameters to assess the outcome of intervention by different surgical procedures being compared herein was the incidence of complications. Complications studied were grouped into immediate; including edema, bleeding, infection and fistula formation. The late complications which included those occurring in the first follow-up and thereafter were fistula formation, meatal stenosis, wound dehiscence and diverticulae formation.

Fistula formation was the most commonly reported complication in the hypospadias repair in this study. No case of meatal stenosis was reported during the follow-up. Diverticulae which are generally natural sequelae of the stenosis were also not reported.

Hence the late complications were the important markers of the whole analysis and were used for further comparison of different surgical procedures. Late complications were studied during the initial 6 month follow up.

**Table 7:** Depicts the immediate complication in each of the groups.

| complications procedure                              | Early Patients (%) |           |
|--|--------------------|-----------|
|  | Edema              | infection |
| A -Meatal advancement and glanuloplasty-12           | 04<br>33%          | 03<br>25% |
| B-Modified Snodgrass with onlayprepucial flap-39     | 12<br>31%          | 09<br>23% |
| C-Snodgrass-44                                       | 13<br>29%          | 12<br>27% |
| D-Modified Snodgrass with dorsal free graft Asopa-05 | 1<br>20%           | 2<br>40%  |
| E-Mathieu flip flap procedure 27                     | 5<br>19%           | 3<br>11%  |
| F-Thiersch duplay-35                                 | 10<br>29%          | 3<br>9%   |

**Table 8:** Late complications

| Complications Procedure-(patients)                     | Late Patients (%) |            |
|--|-------------------|------------|
|  | fistula           | dehiscence |
| A -Meatal advancement and glanuloplasty-(12)           | 3<br>(25%)        | 1<br>(8%)  |
| B-Modified Snodgrass with onlayprepucial flap-(39)     | 8<br>(20%)        | 1<br>(2%)  |
| C-Snodgrass- (44)                                      | 12<br>(27%)       | 5<br>(11%) |
| D-Modified Snodgrass with dorsal free graft Asopa-(05) | 2<br>(40%)        | 1<br>(20%) |
| E-Mathieu flip flap procedure – (27)                   | 12<br>(44%)       | 1<br>(4%)  |
| F-Thiersch duplay-(35)                                 | 13<br>(37%)       | 2<br>(6%)  |

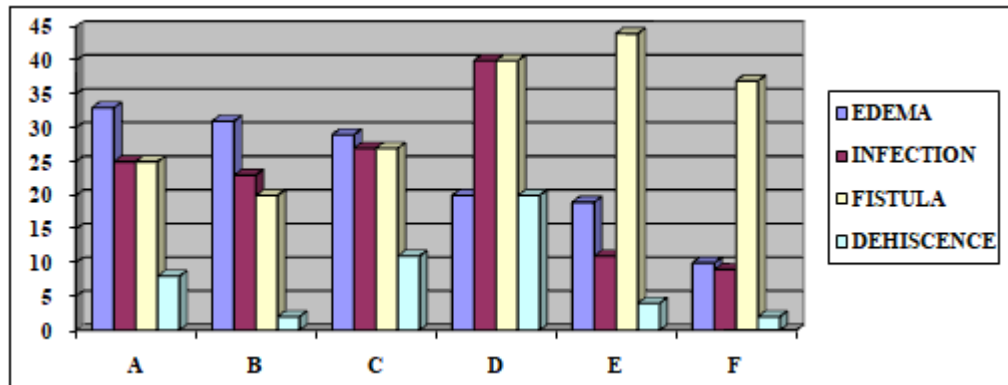


Figure 15: Comparison of complications

Outcome of different surgical procedures (A-F as above) a comparative chart is as under

#### 4. Discussion

Hypospadias has an overall incidence of 1 in 125 to 1 in 300 live male births. The disease entity can vary from mild variants with a distal meatus to very severe forms associated with chordee and complete penoscrotal transposition.

Timely surgery in expert hands remains the mainstay of treatment. Cure may require multiple procedures and thus treatment could be demanding on patient and more significantly on parental compliance in our setting.

More than 300 distinct techniques of repair exist in the world literature with innumerable variations to each one of them. The results thus vary expectedly from centre to centre and from one technique to another.

The hypospadias repair underwent a paradigm change with the recognition of urethral plate and its potential in repair of hypospadias. The Snodgrass repair or the Tubularized Plate urethroplasty has since then been applied to all variants of hypospadias and has been suitably modified by various workers such as to minimize the complications. Moreover it has been used in multistage procedures and is increasingly being used in redo procedures following failure or complications of same or other techniques. The cosmetic appearance of a vertical meatus and the option of preserving prepuce or giving a circumcised end result denotes the versatility of the procedure, thus making it a popular choice of pediatric surgeons [3].

The Snodgrass technique in the hands of its founder has a low fistula rate, which incidentally is the commonest complication of this procedure as well as all others. A recent review places the complication rate to around 2% for distal hypospadias. However the published literature from other centers have placed the complication rate to upto 15%, The various factors leading to complication rate vary from the expertise of the surgeon in performing the repair to the technique per se. The chief step for preventing fistula seems to be the interposition of the dartos or the surrounding tissue between the neourethral suture line and the final skin closure. The calibration of urethra with urethral catheter and prevention of meatal stenosis are some of the other factors implicated for successful repair.

This study aims to compare and determine the effective surgical procedure for hypospadias repair in this present era.

#### Patient Demographics

The ideal age of patients for repair ranges from 6-15 months as the growth rate of penis is low, anaesthetic complications are less and the child is easier to manage. Also it is the ideal age with minimal emotional, psychosexual, cognitive, and surgical risks to the patient [4-6]. The median age of patients undergoing first repair of hypospadias was 54 months, which is considerably higher than the recommended ages. The same can be a result of the varied socioeconomic population being treated in our center. Based on the clinical inputs and interactions social stigmata of the disease and financial constraint for the parents seems to be the obvious causes of delay. This study did not have a quality of life questionnaire for ascertaining the interplay of complex sociopsychological factors pre and post procedure for the patients and their relatives for an accurate inference.

Although the median ages of patients in each group were dissimilar with slightly older children as not statistically significant.

#### Clinical Profile

In 12 patients hypospadias was located at Glans, 74 had it at Corona, 53 at Sub corona-distal penile, in 20 patients it was at Mid penile, 01 patient it was at Base of penis and 02 patients had at Penoscrotal location respectively.

This corroborates well to the overall prevalence of Anterior and Middle variants of hypospadias in a general population (65% – 70% for anterior and 10% - 15% for middle variants) [7] the former being more common than the latter. The distribution of each subtype in either group was equivalent as per the statistical tests of significance.

According to the reports found in the literature, cryptorchidism is associated to hypospadias in 8-9% of cases, and inguinal hernia and hydrocele in 9-16% [8-10]. In our series of hypospadiac patients however none had any congenital abnormalities in either group.

Patients with chordee were excluded from this study as often these patients would require multiple procedures for their correction. Moreover chordee could be associated with a badly tethered urethral plate or even a thinned out redundant urethral plate. These extremely variable factors would cause

a bias in assessment of the operative procedure using the two different sutures.

None of the patients in this study had penoscrotal transposition. A proximal variety of hypospadias has a lesser prevalence. Moreover a transposition by itself poses a difficult therapeutic challenge often requiring multi-stage procedures for its cure.

In all patients' ample preputial hood was present. The dartos fascia from the hood could be mobilized and buttonholed or in certain cases rotated to buttress the ventral neourethral suture line prior to skin closure. In patients with absent foreskin the soft tissue surrounding the neourethra was mobilized and interposed instead of dartos fascia.

### Outcome assessment

#### *Edema & Infection*

Some post operative edema is expected in all the cases. In this study the number of patients with post op edema noticed after removal of dressing was higher in MEATAL ADVANCEMENT AND GRANULOPLASTY (83%) even infection was higher in these patients (25%). But infection was maximal in modified Snodgrass with dorsal free graft (40%) The edema was more so in the middle variants as compared to the anterior hypospadias. This may be so as of the larger length of neourethral reconstruction in middle variety of hypospadias as compared to the more distal anterior variety.

There was a correspondingly higher rate of infection in subcoronal and mid penile or base group respectively. Not all patients with postoperative edema progressed to have frank infection. However some patients with post op infection had no edema initially. These required antibiotics to be upgraded or altered as per the culture sensitivity. All the patients except one in each group resolved with conservative management. Maximum patients in each group resolved with conservative management. The one with sustained infection had complete wound dehiscence in subsequent followup.

The rate of occurrence of dehiscence after TIP as brought out in a review of publications on TIP by Dr Snodgrass was 1% [11]. However the highest range was 3% in a study of 360 patients [12]. The present study has a small patient population and has a marginally higher percentage dehiscence viz modified Snodgrass with dorsal free graft (20%). The total patients in this group were 05 least of all other group. Further modified Snodgrass with onlay prepuccial flap had the least rate of dehiscence.

#### *Fistula and Stenosis*

Urethral Fistulas are the most common complication of tubularized incised plate urethroplasty followed by meatal stenosis and rarely neourethral strictures [11]. A literature review by Braga et al of proximal hypospadias repair by Snodgrass technique puts the rate of fistula between 0-16% with an average rate of complication being 5% [13]. A study published from India puts the rate of fistula for proximal and middle hypospadias to 50 % and that of distal hypospadias at 2% [14]. Various other studies have

highlighted the decreasing rates of fistula with the increasing experience of the operating surgeon.

The rates of fistula formation in this study were 25% in repairs done for anterior group with MAGPI And the middle variant MATHIEU FLIP-FLAP had the maximal incidence of fistula 44% and followed by Modified Snodgrass with dorsal free graft 40%. There were more fistulas in the middle variants of hypospadias repair than in the anterior variants as already notified. This could be due to a longer reconstruction in the middle variant. Although not statistically significant there was reduction in fistula formation by use of Modified Snodgrass with onlay prepuccial flap 20% while Snodgrass had a incidence of 27%.

#### *Dehiscence and Diverticula*

As complete wound dehiscence was not initially due to local infection A final outcome was monitored till the end of six months of follow up. These were also the patients with local infection in the follow up period. The infection was followed by necrosis of small area of neourethral skin covering leading to fistula formation and subsequent complete dehiscence of the reconstruction by the end of six months of follow-up. Modified snod grass with dorsal flap had a maximal dehiscence 20% and modified Snodgrass with on lay preputial flap had the least rate of dehiscence 2%.

#### *Cosmetic Appearance*

At the end of six months of follow up 85% in modified Snodgrass with on lay preputial flap had satisfactory surgical outcome. They had a vertically oriented meatus with a single urinary stream from the tip of glans. No urodynamic studies or endoscopic procedures were done in this study. The patients with fistulas were given a period of six months from the initial surgery and taken up for fistula closure.

## 5. Conclusions

In this study

- The embryology and normal anatomy of penis has been summarized
- The etiology leading to hypospadias has been considered.
- The historical development of hypospadias repair has been described.
- The various considerations when contemplating surgical repair has been reviewed with a special emphasis on TIP.
- The various complications and their pathophysiology has been delved upon in detail.
- The results have been compared with those published in international literature in detail and recommendations given.

The salient findings of this study are

- The average age of patients reporting for repair is much beyond the recommended ages (4 years as compared to recommended 6-18 mths).
- Anterior variety of hypospadias is the commonest anomaly found in clinical practice.

- The chief complaint of attending patients was a splayed urinary stream from the undersurface of penis and soiling of clothes while voiding urine.
- The commonest immediate complication noticed was local edema, evident upon opening the dressing.
- Meatal stenosis can be completely avoided by meticulous surgical technique and pre-calibration of neourethra with catheter. Sutures at the meatus and glans should be restricted.
- Completely degloving is essential for removing any subclinical chordee.
- Wound dehiscence occurred in 01 patient of each group and represents complete failure of repair. Edema and signs of infection are a pointer to its early identification.
- Fistula formation was the most important complication affecting the overall outcome of surgery. More fistula formation occurred with modified snod grass with dorsal free flap asopa technique. The difference however was not statistically significant because of the small number of patients enrolled in the study.

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It can thus be concluded that modified Snodgrass with onlay preputial flap technique of hypospadias repair is a versatile technique followed by Snodgrass repair for anterior and middle varieties of hypospadias. The repair gives the appearance of a normal penis with meatus at tip of glans.

Use of modified Snodgrass with onlay preputial flap technique is thus recommended in the repair of hypospadias.

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