A comparative study of distal hypospadias repair combined with preputioplasty vs repair using conventional circumcision technique

Chhabra A1, Thakur D2, Khichy S3, Nazki S4

1Associate Professor, Department of Pediatric Surgery, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India
2Junior Resident, Department of Surgery, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India
3Professor & Head, Department of Surgery, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India
4Assistant Professor, Department of Pediatric Surgery, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India

Email: drashishchhabra@yahoo.co.in
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Abstract

Background: Hypospadias is one of the most common congenital anomalies characterised by underdevelopment of the ventral anatomical structures of the penis including skin, urethra, corpora spongiosum and prepuce and urethral opening can occur anywhere from the perineum to the ventral aspect of penis. This study evaluated and compared short-term cosmetic and functional outcomes and complications of distal hypospadias repair combined with preputioplasty with the repair using circumcision. Materials & Methods: Patients were divided in two groups with 25 patients in either group. Group A patients underwent urethroplasty with circumcision whereas Group B patients were offered preputioplasty as an additional procedure. Clinical examination included location of the urethral meatus on the ventral aspect of the penis, presence or absence of associated chordee, stretched penile length, penile circumference, glans girth, depth of the navicular fossa or glans groove, urethral plate width, status of the preputial hood and testicular examination. Post-operatively, penis was examined for the location and shape of the neo-meatus, any complications in the form of meatal stenosis, urethrocutaneous fistula, preputial dehiscence and phimosis. Results: Both the groups were comparable with respect to the age at presentation and status of the urinary stream. Distal penile hypospadias predominated in both the groups and it was present in 21 patients in group A and 24 patients in group B. Rest of the babies had sub-coronal hypospadias. Preputial hood and navicular fossa/glans groove were good in either group. Mean stretched penile length in group A was 5.14 cm and it was 4.78 cm in group B children (p value - 0.141). Mean penile circumference of group A and group B patients were 3.88 cm and 3.68 cm respectively (p value - 0.139). Girth of the glans and mean urethral plate width were also comparable (p values - 0.258 and 0.621 respectively). Final meatal appearance was slit shaped and wide in 22 patients in group A and 21 patients in group B. Urethro-cutaneous fistula was observed in two babies in group A and a single child in group B. One of the children was noted to have preputial dehiscence after two weeks. Prepuce was retracting well in 24 children during the 3rd follow up whereas one patient developed phimosis and thus results of the preputioplasty as an adjunct procedure were found to be satisfactory. Conclusion: Preputioplasty is a safe procedure and should be offered to all children undergoing single-stage distal penile hypospadias repair as it provides a near normal penile appearance at the cost of additional approximately 8% foreskin related complication rate.

Keywords: Distal penile hypospadias, Preputioplasty, Circumcision, Preputial hood.

INTRODUCTION

Hypospadias is one of the most common congenital anomalies of the urogenital system affecting 1 in 250 live births. This spectrum of anomalies is characterised by underdevelopment of the ventral anatomical penile structures including the urethra and the external urinary meatus can occur anywhere from the perineum to the ventral aspect of penis.1 The prepuce here presents with a ventral gap with the apex lying below the abnormally located hypospastic meatus and dorsally, the prepuce is hooded over the glans in the form of redundant skin. In addition, a subset of these patients can even present with associated chordee.2 Distal penile hypospadias formulates the most common variety and it can be glandular (in which meatus is present on the ventral surface of the glans penis), coronal (where meatus is present in the balano-penile furrow) or distal penile (where meatus is present along the distal third of the penile shaft).3 While most of the patients suffer from isolated hypospadias, there are few patients who have syndromic presentation in the form of complex urogenital abnormalities and sometime other organ systems are affected too.4
Hypospadias repair combined with a circumcision has been conventionally considered as standard surgical procedure, yet a number of patients/parents often demand preservation of the prepuce. Hypospadias repair combined with a preputioplasty adds to the near-normal to normal penile appearance. The aim of this study was to evaluate and compare short-term cosmetic and functional outcomes and complications of distal hypospadias repair combined with preputioplasty with the repair using conventional circumcision. This study might be helpful to decide if preputial reconstruction can be advised to all the patients presenting with distal penile hypospadias repair after duly explaining additional risks and associated complications to the parents, who wish to have their wards’ prepuce to be preserved.

Materials & Methods

This prospective and comparative study was conducted in Paediatric Surgery of a tertiary care hospital following approval by the local Institutional Ethics Committee. The patients were divided in two groups with 25 patients in either group. Group A patients underwent urethroplasty with circumcision whereas Group B patients were offered preputioplasty as an additional procedure.

Sociodemographic and various clinical variables were studied in detail using pre designed structured proforma. Clinical examination included location of the urethral meatus on the ventral aspect of the penis, presence or absence of associated chordee, stretched penile length, penile circumference, glans girth, depth of the navicular fossa or glans groove, urethral plate width, preputial hood and testicular status. Approximately 1 ml of the blood was drawn for the estimation of haemoglobin. All the patients underwent standard ‘Tubularized Incised Plate urethroplasty’. In group B, preputioplasty was done following approximation of the corpora spongiosum. Stay sutures at the applicable spaces were taken using 4-0 silk suture on the prepuce to spread it. Lateral incisions were given from the point of stay suture towards the original meatus/urethral plate and the inner and outer layers of prepuce were separated well using both sharp and blunt dissection. The foreskin was approximated ventrally by suturing together separated inner layers on either side to mimic the normal raphe and then suturing of the outer layers in the midline was done. Patients were followed up after 7 days, 14 days, 28 days and 2 months of surgery for various post-operative short-term outcomes and complications like meatal location and its appearance, urethrocutaneous fistula, stream of the urine, dehiscence of prepuce or any other local preputial complication as mentioned in the proforma.

Data was described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations were done using (Statistical Package for the Social Science) SPSS 21 version (SPSS Inc., Chicago, IL, USA).

Results

The study comprised a total of 50 children who were sorted well after detailed local examination of the external genitalia and two well matched groups with equal number of patients were formulated. The mean age in group A was 5.58 years and it was 4.06 years in group B (p value- 0.131). Mean haemoglobin values were 10.82 g/dl and 10.52 in group A and group B respectively (p value- 0.324). All children in either group were born at full term and were having bilateral well descended testis at the time of birth as per history given by guardians. Four patients in Group A were suffering from thin preoperative urine stream and such children in Group B were three in number (p value- 0.684) (Table I).

Table I: Clinical variables

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th></th>
<th>Group B</th>
<th></th>
<th>Total</th>
<th>P-value</th>
<th>Chi-square value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
<td>%age</td>
<td>No. of cases</td>
<td>%age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maturity</td>
<td>Term</td>
<td>25</td>
<td>100.0%</td>
<td>25</td>
<td>100.0%</td>
<td>50</td>
<td>NA</td>
</tr>
<tr>
<td>Testicular status</td>
<td>Descended</td>
<td>25</td>
<td>100.0%</td>
<td>25</td>
<td>100.0%</td>
<td>50</td>
<td>NA</td>
</tr>
<tr>
<td>Urinary stream</td>
<td>Good</td>
<td>21</td>
<td>84.0%</td>
<td>22</td>
<td>88.0%</td>
<td>43</td>
<td>0.684</td>
</tr>
<tr>
<td></td>
<td>Thin</td>
<td>4</td>
<td>16.0%</td>
<td>3</td>
<td>12.0%</td>
<td>7</td>
<td>0.166</td>
</tr>
</tbody>
</table>
21 babies in group A and 24 babies in group B had distal penile hypospadias and rest of the babies were diagnosed with sub-coronal hypospadias. Preputial hood and navicular fossa were examined carefully under suitable light and most of the babies in either group were found to have good status of both anatomical structures and the data was statistically comparable (Table II). Preoperatively, stretched penile length, penile circumference and glans girth were measured in centimetres and urethral plate width was measured using 2.5 X magnifying loupe in millimetres in all the patients. The mean penile length in group A was 5.14 cm and it was 4.78 cm in group B children (p value - 0.141). Mean penile circumference was 3.88 cm and 3.68 cm in group A and group B respectively (p value - 0.139). Glans girth was also comparable in both the groups (p value - 0.258). The mean urethral width in group A patients was 3.79 mm as compared to 3.67 mm in group B children (p value - 0.621) (Table III).

### TABLE II: Examination of the external genitalia

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Total</th>
<th>Chi-square value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meatus location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>21</td>
<td>24</td>
<td>45</td>
<td>2.000</td>
<td>0.157</td>
</tr>
<tr>
<td>Sub-coronal</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preputial hood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>20</td>
<td>22</td>
<td>42</td>
<td>0.595</td>
<td>0.440</td>
</tr>
<tr>
<td>Poor</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navicular fossa/Glans groove</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>23</td>
<td>23</td>
<td>46</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Poor</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE III: Preoperative penile measurements

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penile length (cm)</td>
<td>5.14</td>
<td>4.78</td>
<td>-1.498</td>
<td>0.141</td>
</tr>
<tr>
<td>Penile circumference (cm)</td>
<td>3.88</td>
<td>3.68</td>
<td>-1.503</td>
<td>0.139</td>
</tr>
<tr>
<td>Glans girth (cm)</td>
<td>4.13</td>
<td>3.98</td>
<td>-1.145</td>
<td>0.258</td>
</tr>
<tr>
<td>Urethral plate width (mm)</td>
<td>3.79</td>
<td>3.67</td>
<td>-0.497</td>
<td>0.621</td>
</tr>
</tbody>
</table>

Mean duration of foley’s catheterization in group A and group B was 10.96 days and 11.52 days respectively (p value- 0.056). All patients in either group stayed almost for equal duration in the hospital following surgical correction. Mean hospital stay was 12.08 days in group A and 12.64 days in group B (p value- 0.140).

The neo-meatus was present at the glandular tip in all the patients in either group during the follow up till two months (Figure I). Post-operative meatal appearance on 1st follow up (7th day) could not be accessed due to foley’s catheter in situ. On 2nd follow up (after 14 days of the surgical procedure), all the patients had slit shaped and wide neo-meatus. After 28 days, 22 patients in each group were having desired slit shaped and wide neo meatus while 3 patients in both the groups developed slit shaped narrow neo-meatus (p value- 1.000). On 4th follow up after two months in group A, one patient’s condition improved after repeated dilatations with 7 Fr infant feeding tube but one new patient developed slit shaped narrow meatus. Thus, three patients in total were having slit shaped narrow neo meatus at the end of two months in group A. There was also one new patient with narrow neo-meatus after two months in group B. Thus, finally 21 patients of group B were having desired slit shaped and wide neo meatus (p value- 0.684) (Figure II). Urinary stream was thus adequate in patients with desired meatal shape upon removal of the foley’s catheter.
No urethrocutaneous fistula could be appreciated in all the 50 patients on close inspection till 14 days. However, on 3rd follow up, two patients in both the groups developed urethrocutaneous fistula (UCF) (p value - 1.000). And on 4th follow up after two months, the same two patients in group A continued to have UCF. However, in group B, UCF recovered well in one patient with conservative management (p value - 0.552) (Figure III). No patient had complaint of preputial dehiscence on 1st and 2nd follow up till 14 days. On 3rd follow up after 28 days, one patient had preputial dehiscence and the same patient continued to have it at the end of two months (Figure IV). Preputial retraction was not tried vigorously till the time foley’s catheter was present in situ. On day 14th, gentle partial preputial retraction was done to have a look at the meatus. On 3rd follow up after 28 days, only one patient had difficulty in retracting the prepuce and the complaint continued in the same patient on 4th follow up also (Figure V). Thus in total, preputial related complications were seen 2 (8%) out of 25 patients in the group B.
Discussion

Distal hypospadias repair can be combined with circumcision or foreskin reconstruction during a single surgical sitting according to the desire of the parents. This study was conducted to evaluate short term anatomical and functional and complications related to distal penile hypospadias repair with circumcision vs the repair with preputioplasty. For this two groups, with 25 patients each, were formed and informed consent about all the associated risks was taken from the parents/guardians before the procedure. Patients were clinically assessed in detail preoperatively as well as during postoperative period till two months and their findings were tabulated.

All the patients were full term new-borns with fully descended testis in the scrotal sac at the time of presentation. None of the patients had used any preoperative testosterone therapy for penile size augmentation. In the present study, age range of study subjects was from 1 year to 13 years. The mean age of children undergoing urethroplasty with circumcision was 5.58 years (1.5-13 years) and the mean age of patients undergoing preputial reconstruction after urethroplasty was 4.06 years (1-12 years). In contrast, mean age was much lower in many western studies done previously and it varied from 8 months to 22 months 3, 5.

In a study conducted by Akbiyik F et al, the mean age at surgery was 3.25 years.8 Higher mean age at presentation in our study could be because of the fact that our regional hospital is catering people of low socioeconomic status and they also lack awareness towards such congenital anomalies.

Four patients in group A were having of thin preoperative urine stream and such children in group B were three in number. This is because of the fact that hypospadiac meatal openings are narrow and hypoplastic in certain cases. In both the groups, distal penile hypospadias was the most common anomaly and the finding goes well with many studies done in the past.8 The
amount and condition of preputial hood was noted preoperatively. The condition was good in most of the babies in the study groups. This result appears to make both the groups comparable to each other and removes selection bias as all the patients selected for prepuctioplasty were based as per the request and consent of guardians instead of preputial appearance assessed by the surgeon. This removal of selection is in concordance with some previous studies like Shimada et al and Snodgrass W et al. Both the groups were having comparable preoperative measurable dimensions in the form of penile length and circumference, glans girth, urethral plate width to avoid any selection bias. The mean number of days of Foleys catheterization in group A was 10.96 days and the mean duration was 11.52 days in the group B (p value - 0.056). The number of days of hospital stay was 12.08 and 12.64 days in group A and group B respectively (p value - 0.140).

No complication related to the location of the neo-meatus occurred in this short period of observation in both the groups. Fasching G et al in their study found that the patients had vertically oriented meatus with 85% of patients having meatal location at the tip after mean follow up of 4.8 years. Post-operative desired meatal appearance is a slit shaped wide urethral opening. Three patients in group A and four patients in group B were having narrow urethral meatus at the end of two months. Meatal stenosis was one of the most frequent complications in both the groups and hypospadias repair with prepuctioplasty did not increase its frequency during short term follow up. In a study conducted by Akbyik F et al, meatal stenosis (5% cases) was the most frequent complication in post-operative period. In a similar study by Esposito C et al, 0.9% cases of preputial reconstruction group developed stenosis as compared to 1.2% cases of circumcision group. 3.8% prepuctioplasty patients developed meatal stricture in a study conducted by Papouis G et al.11

Post-operative urethrocutaneous fistula formation rate was comparable and it was in concordance with many previous studies which support preputial reconstruction with hypospadias repair like studies done by Esposito C et al, Wu Y et al, Shimada K et al and Snodgrass et al.3, 4, 6, 9 On the contrary, a study conducted by Fasching G et al had increased number of UCF formations in prepuctioplasty group as compared to circumcision group.10

One patient (4%) had preputial dehiscence on 3rd follow up after 28 days in this study. Similar results were demonstrated by Shimada K et al, Papouis G et al and Snodgrass WT et al.11, 12 Only one patient (4%) had difficulty in retraction of the prepuce. Similarly, 3.8% of patients developed phimosis in a study conducted by Papouis G et al.11 Castagnetti M et al noted secondary phimosis in 1.5% of his patients.13 Thus total 2 out of 25 patients (8%) developed specific prepuctioplasty related complications in the form of preputial dehiscence and preputial stenosis. In a study conducted by Bhatti AZ et al, additional 8.25% of complication rate was added if preputial reconstruction was done with hypospadias repair.14 Esposito C et al, Papouis G et al, Antao B et al determined the comparable data in their studies.3, 11, 15 On the contrary, a study conducted by Klijn bn AJ et al, additional 33% complication rate was added when prepuctioplasty was combined with distal hypospadias repair.16 Fasching G et al also got 24% foreskin related complications.10 To conclude, most of the searched literature is in favour of preputial reconstruction with distal hypospadias repair. In this study, prepuctioplasty combined with hypospadias repair had shown no increase in urethroplasty related complications when compared doing circumcision with distal penile hypospadias repair. The study however has certain limitations in the form of lesser subjects and a shorter follow up.

Conclusion
Distal penile hypospadias repair can be combined with prepuctioplasty or conventional circumcision. Preputial reconstruction should be considered while planning for distal penile hypospadias repair in a single sitting in accordance with the wishes of the patient and parents with additional risks duly explained to them. This procedure is safe and it provides a near normal penile appearance at the cost of additional approximately 8% foreskin related complication rate.

Conflict of interest: None

REFERENCES


