Mitchell’s technique for epispadias repair: Our preliminary experience

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ABSTRACT

Aim: We present here experience of a single surgeon with Mitchell’s procedure for correction of epispadias.

Materials and Methods: Nine boys (mean age 5½ years, range 9 months to 16 years) underwent Mitchell’s repair in Department of Pediatric Surgery over a period of 5½ (September 1999 to March 2005) for correction of epispadias. Six of these patients had come for the second stage of extrophy-epispadias repair after primary bladder closure; the other three had incontinent penopubic epispadias.

Results: The penis was cosmetically acceptable as regards to size, glans shape and peno-pubic angle in all the patients. However, there was a high incidence of penopubic fistula (44%). These patients with penopubic fistula also required postoperative urethral dilatations, at times repeated. One of the common factors to these subset patients was their younger age when Mitchell’s urethroplasty was performed.

Limitations: The series is descriptive in nature, short in numbers and does not provide statistical comparison of Mitchell’s procedure with the previously done procedures.

Conclusions: Mitchell’s complete penile disassembly technique for epispadias repair is more acceptable anatomical procedure that results in near-pendulous penis. However, when performed at young age, it is fraught with the complication of penopubic fistula similar to that as seen with Cantwell-Ransley’s procedure. Mitchell’s procedure creates a hypospadiac meatus initially and the meatal advancement is required as for any other distal penile/coronal hypospadias.

KEY WORDS: Epispadias, extrophy bladder, Mitchell’s repair, urethroplasty

INTRODUCTION

Successful correction of epispadias has been a challenge for pediatric surgeons. Various modifications have been advised in last century for epispadias repair in order to improve the results in terms of fistula formation, incontinence, cosmetically acceptable glans shape and adequacy of sexual functions [Table 1]. We have analyzed outcome of Mitchell’s technique of epispadias repair in our 9 patients.

MATERIALS AND METHODS

Nine boys (mean age 5½ years, range 9 months to 16 years), underwent Mitchell’s repair in Department of Pediatric Surgery over a period of 5½ (September 1999 to March 2005) for correction of epispadias. Six of these patients had come for the second stage of extrophy-epispadias repair after successful primary bladder closure; the other three had incontinent penopubic epispadias.

The patients were admitted a day before surgery and were given pre-operative antibiotic. All patients were operated under general anesthesia. The operative technique used was first described by Mitchell and Bagli in 1996. It involves complete penile disassembly into 3 unique and separate parts 1) the urethral plate, 2) right corpus cavernosum with hemiglans and 3) left corpus cavernosum with hemiglans [Figure 1]. This disassembly is based on paired dorsal arteries and neurovascular bundles to each hemiglans, the deep cavernous arteries to the corporal bodies and the spongiosum tissue supplying the proximal urethral plate. The urethral plate is tubularized and placed ventral to the corporal bodies. The corpora are now rotated to correct the dorsal chordee. The corpora cavernosa are sutured together with delayed absorbable sutures on the dorsum. The urethra is positioned in the ventral groove between the corpora cavernosa and a hypospadiac meatus is constructed at corona.

The dressing was opened on the 7th post-op day and the
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Table 1: Results of Mitchell’s repair in treatment of epispadias

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Age at surgery</th>
<th>Shaft angle $^\circ$</th>
<th>Glans shape</th>
<th>Penopubic fistula</th>
<th>Continence $^\text{hr}$</th>
<th>Voiding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epispadias</td>
<td>1$\frac{1}{2}$ y</td>
<td>90$^\circ$</td>
<td>Good</td>
<td>No</td>
<td>3</td>
<td>Good stream</td>
</tr>
<tr>
<td>Epispadias</td>
<td>8 y</td>
<td>100$^\circ$</td>
<td>Good</td>
<td>No</td>
<td>3</td>
<td>Good stream</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>9 y</td>
<td>90$^\circ$</td>
<td>Good</td>
<td>No</td>
<td>2</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>16 y</td>
<td>90$^\circ$</td>
<td>Good</td>
<td>Yes</td>
<td>1</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>8 m</td>
<td>110$^\circ$</td>
<td>Good</td>
<td>Yes</td>
<td>2</td>
<td>Good stream</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>2 y</td>
<td>120$^\circ$</td>
<td>Good</td>
<td>No</td>
<td>3</td>
<td>Good stream</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>10 y</td>
<td>100$^\circ$</td>
<td>Good</td>
<td>No</td>
<td>4</td>
<td>Good stream</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>10 m</td>
<td>90$^\circ$</td>
<td>Good</td>
<td>Yes</td>
<td>1</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Exstrophy</td>
<td>2$\frac{1}{2}$ y</td>
<td>90$^\circ$</td>
<td>Good</td>
<td>Yes</td>
<td>1</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

Figure 1: (a, b and c) Total penile disassembly into right corpora cavernosa with hemi-glands and urethral plate. Also note the reconstructed urethra is shorter than the corpora.

catheter was removed on 10th post-op day. The children who did not develop penopubic fistula were discharged the following day. The patients underwent regular follow-up examinations and were evaluated for penile size, penile position, fistula formation and continence.

One of the patients of exstrophy bladder-epispadias complex had bladder neck reconstruction along with Mitchell’s urethroplasty. He had next stage Byar’s urethroplasty for the resultant hypospadias 2½ years later.

Another patient had closure of the partially dehisced exstrophy bladder concomitant with the Mitchell’s urethroplasty.

RESULTS

The penis was longer pre- and post-operatively in the three patients with incontinent epispadias than in patients with exstrophy-epispadias complex. However, no statistically significant inference could be derived on such small number of patients. All the patients had age-related acceptable penile size and conical shaped glans post-operatively acceptable that was acceptable to the treating surgeon and the parents. The shaft angle varied from 90$^\circ$ to 120$^\circ$ in the flaccid state in standing position [Figure 2]. Again the peno-pubic angle was better for the patients who didn’t have exstrophy earlier.

Four of the six patients of exstrophy-epispadias complex developed penopubic fistula. The fistula could be closed successfully in 3 patients; the fourth patient had failure of fistula closure, but it healed spontaneously after few weeks. The common factor in these four patients was that three of them had their surgery at younger age (8 months, 9 months and 30 months).
Four patients required urethral dilatation post-operatively. Two had one dilatation each, while other two patients required multiple admissions and urethral dilatations under general anesthesia. Incidentally, three of these four patients had had penopubic fistula after the initial Mitchell’s urethroplasty. The other identifiable common factor in these four patients was that three of them had their surgery at younger age (8 months, 9 months and 2 years).

Only one of these 9 patients has undergone next stage urethroplasty to bring the neo-meatus at the tip of penis. Rest of the 8 patients micturated through a hypospadiac meatus in good stream and could hold urine for 1-4 hours. While a coronal hypospadias is acceptable to 5 older patients and they don’t want any further urethroplasty, three of the younger children with mid-penile hypospadiac meatus are waiting for next-stage urethroplasty.

DISCUSSION

Cantwell described the first epispadias repair in 1895.[3] Many modifications have been described since then to improve the results. Young’s reconstruction, most widely used in the 20th century, was complicated by fistula rates over 21% at best centers and an upwardly angulated penis in 39% of the patients.[4,5] Ransley’s modification improved the fistula rate but problem of residual dorsal chordee and short penile length persisted when the urethral plate is short.[1,6]

Mitchell and Bagli described a technique for complete dorsal chordee correction, penile shaft lengthening, repositioning of the urethra on the ventral aspect of the penis and to produce conical glans.[2] The technique is based on the anatomical fact that the vascular supply of the urethral plate with corpus spongiosum is maintained by bulbourethral arteries and the corpora and the hemiglans have adequate independent blood supply from the deep and dorsal arteries of the penis. The complete penile disassembly corrects the dorsal chordee, the medial rotation of the corpora corrects the lateral rotation, the urethral neomeatus is constructed on the ventral aspect and the glansplasty results in conical-shaped glans.

Complete penile disassembly technique provided increase in penile shaft length in all patients with cosmetically acceptable conical glans shape. Increase in penile length can be achieved by making the best use of corpora distal to their attachment to the inferior pubic rami. Adequate lengthening of penile shaft with correction of chordee and rotational deformities is required to produce a downwardly angulated penis on standing and straight erection to permit proper sexual intercourse.

In all the 9 patients in our series, the cosmetic appearance was good. Six patients had downwardly hanging penis and three had straight penis when standing. The results of their adequate sexual activity are pending. None of the patients had the problem of dorsal chordee, a situation so commonly associated with the Cantwell-Ransley’s procedure.

The penopubic fistula continues to be a problem with Mitchell’s urethroplasty, an incidence of 44% was noted in our series. This is very similar to our previous experience with Cantwell-Ransley’s procedure. One available remedial action could be to add tunica vaginalis pedicled wrap primarily along with Mitchell’s repair.[7] We also believe that ventral mobilization of skin flaps from the area of peno-scrotal disassociation in extrophy patients as suggested by Kulkarni et al from Mumbai would not only obviate the problem of penopubic fistula, but help to increase the penopubic angle further.[8]

We have found that the urethral plate is always shorter than the corpora cavernosa; the attempt to place the neomeatus at the tip of the glans will produce a bowstring effect and accentuate the dorsal chordee. All our patients had a hypospadiac meatus at the coronal level that required correction in the next stage to create an orthotopic meatus at the tip of the glans.

There are few modifications that have been described since Mitchell’s initial description of the procedure. These include leaving a small tissue bridge to avoid shortening of the urethral plate and better blood supply. Another variant described dissection of each corporal body from the glans cap and neurovascular bundle to achieve complete mobility. This procedure enables complete curvature repair.[9] Garat et al have described the Givernet trigonoplasty as a first step of a bladder extrophy repair followed by the Mitchell’s repair.[10] This modification is supposed to obviate the need of a secondary procedure for vesico-ureteric reflux that is commonly described after Mitchell’s repair.

REFERENCES

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