

Original Article

Corporeal Derotation for the Management of Dorsal Penile Curvature Associated with Epispadias or Bladder Exstrophy



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ABSTRACT

Background: Dorsal penile curvature is a common association with epispadias or bladder exstrophy anomaly.

Methods: The degree of dorsal penile curvature was assessed after artificial erection using a goniometer. Then degloving of the penis. Three to five sutures using non-absorbable suture material were arranged on either side of corpora cavernosa from the ventral aspect. Preoperative assessments of penile stretch length and urinary continence were reported.

Results: Twenty-four cases were included. Group A cases with isolated epispadias and group B cases of bladder exstrophy. The main operative time was 67.3 minutes \pm 12.5 vs. 70 min. \pm 10.3 respectively. The mean increase of penile stretch length was 1.4 cm in group A and 0.8 cm in group B. Five correcting sutures were required in group B. Two cases developed postoperative fistula in group B. The mean age of dorsal penile curvature repair was 3.5 years (\pm 1.2 years). No postoperative complications as fistula, recurrence of the dorsal penile curvature developed.

Conclusion: Corporeal ventral derotation is a simple, safe, and easy technique that can be used to correct a post repair dorsal penile curvature in patients with epispadias. It is associated with an improved penile stretch length.

Key words: Corporeal derotation, dorsal penile curvature, epispadias.

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BACKGROUND

Udall was the first to describe three cases of congenital dorsal penile curvature (DPC) and their management^[1].

DPC is commonly associated with epispadias alone or epispadias with bladder exstrophy. In these patients the repair of this complex anomaly has priority over the management of associated DPC^[2,3].

Even with corporeal assembly as a step of either the Cantwell-Ransley or Mitchell techniques during the repair of epispadias, DPC remains, which may result in patient dissatisfaction^[4].

In addition, the occurrence, recurrence, or even worsening

of previously present DPC may occur due to the contraction of the dorsal midline scar with the use of the Payers flaps of the ventrally situated prepuce^[5].

Several techniques were prescribed to manage DPC in either acquired or congenital cases. However, their success depends mainly on the aetiology of DPC and its associations with the complex anomaly of epispadias^[6].

METHODS

Study design

This is a retrospective study that carried out in the King

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Abdulaziz University Hospital (KAUH) from March 2010 to December 2023. All patients were operated using Thiersch Duplay urethroplasty technique. Of whom nine cases were isolated epispadias anomaly (group A) and fifteen cases were epispadias associated with bladder extrophy (group B).

Cases of complicated epispadias repair were excluded. Also, cases with recurrent or staged epispadias repair were excluded.

Preoperative evaluation of DPC

A history of DPC on erection of the penis by the parents was documented during examination for all infants and children. The external meatus was examined for complications such as stenosis or retraction, mean stretch length of the penis in mm, and any dorsal midline scars.

Operative technique

All patients were operated on by the author.

Under general anaesthesia using endotracheal intubation, all patients received a dose of 3rd generation cephalosporin (100 mg/kg body weight). A stay suture using a propylene 4/0 round needle was passed through the glans and a urethral stent size 8 F was inserted. A tourniquet was applied at the root of the penis or external perineal compression was applied to induce corporal congestion. The degree of DPC was assessed using an artificial erection test (Figure 1).

The degree of curvature was measured using a goniometer and patients with DPC > 30° underwent correction. The penile skin was degloved to the root of the penis, artificial erection was performed again, and DPC was re-assessed. Neurovascular bundles are identified on both sides of the corpus and preserved (Figure 2).



Fig. 1: Assessment of the Degree of Dorsal Penile Curvature

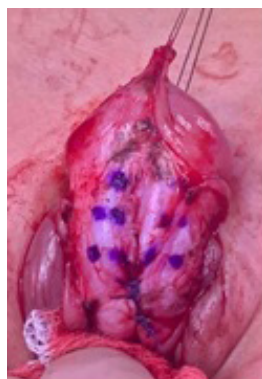


Fig. 2: Penile Degloving

of the curvature, two–four sutures were placed proximal and distal to the first sutures to make the correction symmetrical. These sutures help distribute the plication tension along all sutures and decrease the effort exerted by the dorsal curvature on the first suture, thus reducing the chance of recurrence (Figures 3,4,5).



Fig. 3: Distribution of the Sutures on the Ventral Aspect



Fig. 4: Completion of Procedure



Fig. 5: Final Appearance after Skin Closure

Three to five interrupted sutures using propylene 4/0 or 3/0 around the needle were inserted at 3-5 mm intervals on the ventral surface of the corpora. The first suture was made at the point of maximum curvature of the penis. This is the widest and most important suture for curvature correction. As the width gradually narrowed proximal and distal to the centre

These sutures exerted an internal rotation force on the corpora which in turn forced repair of the epispadias and elongated the penis. Artificial erection was repeated at the end of the procedure to assess both penile length and the orthostatic straight shape of the penis. The penile skin was fashioned, and sutures were placed to cover the penis.

Follow-up was scheduled weekly for one month, then monthly for the next six months and finally, a year.

The follow-up variables were arranged into an objective score, the post-epispadias repair assessment score (PERA score). It consisted of the shape of the penis in both the flaccid and erection states, presence of any degree of DPC, fistula development related to the repair of DPC, and degree of satisfaction of the parents regarding the final results. Each parameter is scored as excellent, good, fair, or poor. All variables, except parental satisfaction, were assessed by two expert paediatric urology surgeons.

RESULTS

This study included twenty four cases of DPC after repair of epispadias using the Thiersch Duplay urethroplasty technique. Of whom, nine cases presented with isolated epispadias anomaly (group A) and the remaining fifteen cases were epispadias associated with bladder extrophy anomaly, (group B). The demographic data, the degree of DPC and the anatomical location of the epispadias meatus were summarized in (Table 1).

Table 1: Preoperative Data

	Group A N= 9	Group B N=15
Age (mean in years±SD)	3.5 years ±1.2	9.5±4.2
Degree of DPC	47°±11.5	49°±10.5
Penile stretch length in cm ±SD	3.5cm± 1.4	2.7±1.6
Type of epispadias		
- Anterior penile	- 2	- 0
- Mid-penile	- 5	- 0
- Peno-pubic	- 2	- 15

The mean operative time was 67.3 ±12.5 min in group A while it was 70± 10.3 minutes in group B. This did not attain statistical significance $p\text{ value}=0.542$.

The number of corrective sutures used ranged from 3-5 stitches. In group A, seven cases (77.7%) required three correcting sutures while only two cases (22.2%) required three cases. On the other hand all the patients in group B required five correcting sutures. This mainly attributed to the anatomical location variant of the epispadias meatus. This attained a statistical significance where $p\text{ value}$ was 0.03 and 0.05 respectively. Urinary catheters were used in all cases (Table 2).

Table 2: Operative Data

	Group A N= 9	Group B N=15	$p\text{ value}$
Mean operative time in minutes	67.3minutes ±12.5	70 min.± 10.3	0.542
Number of derotating sutures			
- 3	- 7	- 0	- 3*
- 5	- 2	- 15	- 0.05*
Injury of neurovascular bundles	None	None	-----

The mean duration of hospital stay was 2.4 ±1.3 days in group A while it was 3±0.8 days in group B without statistical significance. The mean increase of the penile stretch length was 1.4 cm in group A while it was 0.8 cm in group B. Although there was an improvement in the penile stretch length in patients of group A when compared to the patients in group B, the difference was not statically significant. In addition the improvement was mainly related to the anatomical type of the epispadias. In group B two cases developed fistula during follow up period. The site of the fistula med-penile. Those patients were operated upon after six months (Table 3).

Table 3: Postoperative Data

	Group A N= 9	Group B N=15	$p\text{ value}$
Hospital stay (mean in days ±SD)	2.4± 0.5	3±0.8	0.641
Fistula (no. of cases)	None	2 cases	0.251
The mean increase of penile Stretch length (cm)	1.4 cm	0.8 cm	0.427
Urinary continence	-----	-----	---
- Continent	-----	- Seven cases	---
- Improved continence (not fully continent)			
- Incontinent	-----	- eight cases	----
Recurrence	None	None	-----

A score of the outcome of the repair was built up. This score helped the surgeon to assess the operative procedure. The score consists of shape of the penis, development of fistula and parents satisfaction. Two consultant of podiatric surgery with experience in the epispadias assessed the points of score (Table 4).

Table 4: post dorsal penile curvature correction score (PDPC-score)

	Group A	Group B
Shape of the penis		
- Excellent	- 4	- 0
- Good	- 5	- 6
- Fair	- 0	- 9
Fistula		
- Present	- 0	- 2
- Absent	- 9	- 5
Parents satisfaction		
- Excellent	- 6	- 3
- Good	- 3	- 8
- Fair.	- 0	- 4

DISCUSSION

As the penis is normally straight, any deviation in the penis is referred to as penile curvature, which may be congenital or acquired after circumcision. Dorsal curvature is either isolated from the normal urethral meatus or associated with epispadias, or bladder exstrophy experience with the dorsal chordee is much more limited. Unlike the ventral curvature, the pure congenital dorsal curvature does not follow a known embryological precursor^[6].

It has been proposed that congenital dorsal or lateral curvatures may be due to a defective corpus spongiosum^[7] or urethral plate^[8], tethering skin, tethering Buck's fascia, Dartos fascia^[8], a defective tunica albuginea of the corpus cavernosum on one side (corporal disproportion)^[7], or its trabeculae^[9].

Acquired penile curvature may be the result of iatrogenic causes, trauma, or burns and is associated with bladder and cloacal extrophy.

Different surgical techniques of penile curvature correction, whether ventral or dorsal have been described. Surgical correction of the penile curvature starts with the release of the tethering tissues (chordee), after which the penis is reassessed. If the curvature persists, it is corrected by shortening the longer side of the tunica albuginea, as in the Nesbit technique^[3], modified Nesbit techniques^[10], and tunica albuginea plication^[4]. Alternatively, correction can be achieved by elongating the shorter side through grafting^[11]. Considering that the Nesbit technique results in a shorter penis in some cases^[12], grafting of the shorter side is a better option in severe cases. However, grafting comes at a cost. Long-term follow-up data have shown that grafting can be complicated by graft contraction and erectile dysfunction^[13]. The 2012 European Association of Urology guidelines on penile curvature state that plication techniques are used almost exclusively for congenital cases^[14].

Artificial erection, introduced in 1974 by Gittes and McLaughlin^[1], has been a very significantly contributed to orthoplasty. A tourniquet is placed at the base of the penis and the corpus cavernosum is injected with normal saline. Both corpora were filled to determine the extent of curvature before and after resection of the fibrous tissue and surgical repair. Complete correction of curvature is essential for further urethroplasty.

In 1984, Koff *et al.* presented a surgical technique that uses corporal rotation to correct persistent penile curvature. They suggested that the principle of mirror rotation of the corpora in the dorsal or ventral direction (depending on the desired directional correction) might be useful in the surgical management of chordee that are refractory to conventional treatment^[15].

Shortening-free correction of the penile curvature in adults by corporal rotation for correction of the ventral curvature

was first described by Shaeer in 2006. The basic principle is to shift the concavity of both corpora cavernosa from the ventral aspect of the penis to the lateral aspects in opposition such that they flex against each other rather than synergistically neutralising their curvature-inducing effect^[16].

In 2016, Shaeer et,al published an updated noncorporotomy technique (called Shaeer III) in which the corpora are rotated using permanent suture material for approximation, without the dorsal incisions of Shaeer I and II^[16,17,18] Corporal rotation for the correction of penile curvature achieves a full correction without sacrificing length^[15,19,20], contrary to the principle of "shortening the longer side" applied in dorsal plication and Nesbit techniques^[3,10] that results in a shorter penis^[12]. Similarly, we were able to achieve a satisfactory result in straightening the penis in all our cases without experiencing a shortening in the length of the penis and with a better projection.

In our cases, the parents' observation of improved urinary continence can be explained by the back pressure at the centre of the dorsally de-rotated corporal bodies, which creates increased pressure on the segment of the urethra in the pubic area, thereby preventing urine leak.

LIMITATION OF THE STUDY

- Small sample size to validate both the technique and the score.
- Lack of post-operative urodynamic studies.

CONCLUSION

In conclusion corporal ventral derotation is a simple, safe, and easy technique that can be used to correct DPC in patients with bladder exstrophy and epispadias without shortening and with some improvement in the postoperative penile stretch length. In cases of bladder extrophy, an improvement in urinary continence was also observed

ETHICAL COMMITTEE APPROVAL STATEMENT

The ethical committee approval code is HA-02-J-008

DISCLOSURE STATEMENTS

Conflict of interest: The author declare no interest of conflict or any financial support or grants

Informed consent obtained from all participants

Registration and registry No.: N/A

Animal study: N/A

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