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Surgery

A PROSPECTIVE STUDY OF PENILE TORSION WITH HYOSPADIAS: PRACTICAL ALGORITHM FOR MANAGEMENT

KEY WORDS: Hypospadias, penile torsion, management, treatment algorithm

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ABSTRACT

INTRODUCTION: Penile torsion is a rare, less researched topic of urology, owing to its innocuous nature and is commonly associated with hypospadias. Several procedures are performed for the management of penile torsion. However, there is scarcity of literature with proper protocol plan, simplified and easy flow of algorithm for its management.

AIM: The aim of the study was to evaluate the adequacy of correction of torsion and chordee with each step of correction and also determined the association of degree of penile torsion with the type of hypospadias and severity of chordee.

MATERIALS AND METHODS: This is a prospective study of all patients who have presented with penile torsion with or without hypospadias from January 2015 to December 2018 and with most patients being previously operated. Demographic and clinical details including age, type and severity of hypospadias, severity of chordee, degree and direction of torsion, and routine blood investigation was recorded. Patients were followed for 9 to 48 months (mean 26 months).

RESULTS: Out of the 316 patients operated during the study period, 100 patients had torsion of > 15 degrees with distal (n=71), mid (n=19) and proximal penile hypospadias (n=10). The incidence of torsion with hypospadias was pretty high 31.64%. The degree of torsion was ranged from 15 to 115 degrees with an average of 52.87 degrees. Left sided torsion was seen in 71% of the patients and 29% had right sided torsion. Torsion was severe (>90 degrees) in 12.67% of patients, moderate (45-90 degrees) in 44% and mild (15-45 degree) in 45% cases. Ventral chordee was present in 58 patients and ranged from 20 to 122 degrees with an average of 47.27 degrees. The methods of choice for the correction of torque were, periosteal anchoring of tunica albuginea (28%), division of the urethral plate (28%) mobilization of the urethral plate into the glans (25%), mobilization of the urethral plate and the corpus spongiosum (18%), mobilization of the proximal urethra (16%), correction of the torque were penile degloving (7%), and dorsal plication (2%) performed in step by step manner, ending with the step when satisfactory correction was achieved.

CONCLUSION: Evidence suggests that though penile torsion is often neglected aspect of reconstructive urology, it deserves better space in the present literature due to its significant effect in patients with moderate to severe degree of torsion. A simple step by step algorithm showed effective outcomes in management of patients with penile torsion.

INTRODUCTION

Penile torsion is helical rotation of corporal bodies of penile shaft with penile curve fixated to pubic rami. Previous studies reported the incidence of isolated penile torsion ranged from 1.7% to 27% and that of severe torsion (>90) as 0.7% [1,2]. A recent study reported an incidence of isolated penile torque to be 19.7 per 1000 births (1.97%) [3]. Penile torsion has failed to generate much interest in medical fraternity and the public at large due to its innocuous nature and no perceived threat. Isolated penile torsion with <60 degree is not a major concern except a cosmetic problem. The total incidence of penile torsion reported in the literature is not high, either because the actual incidence is low or may be because of low rate of seeking medical help for the same.

Penile torsion is commonly associated with anterior hypospadias [4,5]. Torsion may also be associated with epispadias or chordee without hypospadias [6]. However, isolated penile torsion is a rare entity. In penile torsion the median raphe ascends spirally from the base of the penis ventrally to the glans and around the penile shaft [1]. Usually the direction of penile torsion is counterclockwise (towards left) and urethral meatus is obliquely placed [1,2].

Torsion is classified as mild (<45 degree), moderate (45-90 degree) and severe (>90 degree) [4]. Usually, minor torsion does not require treatment as it is primarily of cosmetic

significance. The correction is indicated when isolated penile torque is >60 degree from midline and if associated with hypospadias and chordee. Some of the techniques reported in previous studies for the repair of penile torsion include penile degloving with skin re-attachment [5,7,8], dorsal dartos flap rotation [4,9], pubic periosteal stitch [10], untwisting plication sutures [11] and mobilization of the urethral plate and urethra [5], lateral suturing tunica albuginea to the pubic periosteum [10] and many others.

Till date there are few studies in literature reporting the incidence, association of degree of penile torsion with the type of hypospadias and severity of chordee. Isolated penile torsion and penile torsion with hypospadias are to be separately categorized and studied for more complete understanding of its etiology and management. In this study, we have assimilated the data collected on penile torsion shedding more light on penile torsion and hypospadias which will add to better understanding and management strategy. The aim of the study is to determine the incidence of penile torsion with hypospadias, and to evaluate the adequacy of correction of torsion and chordee with each step of surgical correction. The association of degree of penile torsion with the type of hypospadias and severity of chordee was also assessed.

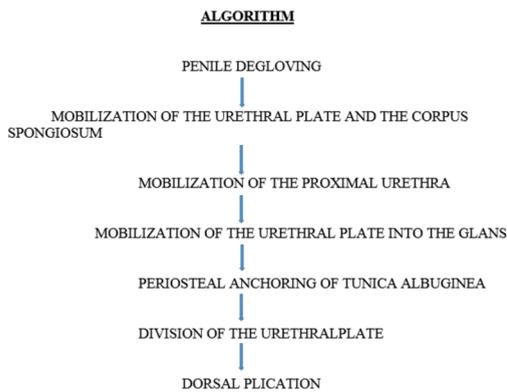
MATERIALS AND METHODS

This was a prospective study of all patients who had presented

with penile torsion with or without hypospadias from January 2015 to December 2018 and with most patients being operated upon. Only few patients with isolated mild torsion were satisfied with only their fears annulled and refused any intervention. All patients and patient's attenders (parents) were counselled about the condition of the patient and after explaining them in their vernacular language their consent was obtained before enrolling into the study.

Patients were evaluated with routine blood investigations, and necessary anesthetic clearance was also obtained. Other details including history and examination, age, type and severity of hypospadias, severity of chordee, degree and direction of torsion were noted. The degree of penile torsion was measured using a sterile modified small protractor placing around the penile shaft. Adequacy of correction of torsion and chordee with each step was assessed intraoperatively.

Figure 1. A step-by-step approach towards management of patients with penile torsion



Patients were operated by a step-wise method as shown in an algorithm (Figure 1). The initial step in all the patients was complete penile degloving, after every step the amount of correction achieved was checked by performing Gittle's test. If satisfactory results were obtained then the procedure to correct hypospadias was continued and in isolated torsion the procedure was deemed complete. If after penile degloving, there was torsion left, then the next step according to the algorithm mentioned was followed until satisfactory results were obtained. The patients were followed for 9 to 48 months (mean 26 months). The mean ± SD degree of torsion or chordee was correlated with type of hypospadias and was analyzed using the Student's t- test. The p<0.05 was considered to be statistically significant.

RESULTS

Out of the 316 patients operated during the study period, 100 patients had torsion of more than 15 degrees. Among these 100 patients, 71 had distal, 19 had mid and 10 had proximal penile hypospadias. The degree of torsion varied from 15 to 115 degrees with an average of 52.87 degrees. Left sided torsion was present in 71% of the patients and 29% had right sided torsion. Left sided torsion varied from 15 to 115 degrees with an average of 56.87 degrees, and right torsion varied from 15 to 100 degrees with an average of 46.98 degrees. Torsion was severe (more than 90 degrees) in 12.67%, moderate (45-90 degrees) in 44% and mild (15-45 degree) in 45% of patients. Ventral chordee was present in 58 patients and varied from 20 to 120 degrees with an average of 47.27 degrees. The incidence of torsion with hypospadias is 31.64% which is fairly high. The degrees of torsion in distal penile hypospadias (n=71) varied from 20 to 110 with an average of 61.28 ± 23.03 degrees. Of 71 patients with distal penile hypospadias, 30.98% had mild, 56.33% moderate and 12.67% had severe torsion. Left-sided torsion was observed in 77.10% and 22.90% had right-sided torsion. Chordee varied

from 15 to 90 degrees with an average of 38 ± 18.55 degrees; 38.02% had mild, 12.67% moderate and none had severe chordee.

The degree of torsion in mid penile hypospadias (n=19) varied from 25 to 90 with an average of 38.04 ± 18.50 degrees. Of 19 patients with mid penile hypospadias, 78.94% had mild and 21.06% had moderate torsion with none having severe torsion. Left-sided torsion was found in 65.67% and 34.33% had right-sided torsion. Chordee varied from 15 to 90 degrees with an average of 43.88 ± 21.11 degrees; 47.36% had mild, 15.78% moderate and none had severe chordee. Of the 10 patients of proximal penile hypospadias, torsion varied from 15 to 25 degrees with an average of 18.25 ± 3.33 degrees with all having mild torsion. Left and right sided torsion was observed in 50% each. Chordee varied from 25 to 125 degrees with an average of 73.58 ± 32.96 degrees; 20% had mild, 30% moderate and 50% had severe chordee (Table 1).

Table 1: Correlation of type of hypospadias with torsion and chordee

Hypospadias	Torsion			Total number of patients
	Mild	Moderate	Severe	
Distal	22 (30.98)	40 (56.33)	9 (12.67)	71
Mid	15 (78.94)	4 (21.06)	0	19
Proximal	10 (100)	0	0	10
Chordee				
Distal	27 (38.02)	9 (12.67)	-	71
Mid	9 (47.36)	3 (15.78)	-	19
Proximal	2 (20)	3 (30)	5 (50)	10

Data presented as n (%).

The most common method (28%) used for torque correction was periosteal anchoring of tunica albuginea, followed by mobilization of urethral plate into the glans (25%), mobilization of the urethral plate and the corpus spongiosum (18%) and mobilization of the proximal urethra (16%). However, penile degloving was performed in only 7% of patients, division of the urethral plate in 4% and dorsal plication in 2% of patients (Table 2).

Table 2: The methods of choice for the correction of the torque

Methods of torque correction	Total number of cases (N= 100)
Penile degloving	7
Mobilization of the urethral plate and the corpus spongiosum	18
Mobilization of the proximal urethra	16
Mobilization of the urethral plate into the glans	25
Periosteal anchoring of tunica albuginea	28
Division of the urethral plate	4
Dorsal plication	2

Tabularized incised plate urethroplasty, spongioplasty and glanuloplasty were performed in all cases. Overall, 11% of patients had complications. Infection and disruption, meatal stenosis and urethral fistula was observed in three patients followed by urethral stricture (n=2). Infection and disruption healed with time and urethral stricture responded well to urethral calibration. Urethral fistula in three patients had good results after second surgery.

DISCUSSION

Penile torsion is a rare anomaly especially when isolated. It can be congenital or acquired after circumcision. Most of the cases of isolated penile torque is treated by penile degloving and reattachment. However, treatment was not needed in patients with <60-degree torque [12]. Few data exist in the literature about congenital penile torsion. The true incidence

is unknown and the etiology is unclear [2,10,13]. Previous studies reported the incidence of penile torsion varied from 1.7% to 27% and 0.7% in severe cases [2,14]. However, in India, the incidence was reported to be 1.97% [3]. One of the previous studies showed the primary defect of penile torsion is caused by abnormal penile skin attachment [4] in addition to the presence of fibrous bands that allows tight adhesion of left corpus to the pubic periosteum; others believe that it may be due to asymmetric development of the corpora cavernosa [4,10]. Some other studies also reported involvement of Buck's fascia [15] or dartos fascia attachment [10,16] in congenital penile torsion.

The direction of torsion was commonly reported in counterclockwise manner (left sided) then clockwise (right sided) [3,5-7]. This finding was consistent with the present study. Generally, the degree of penile torsion can be ranged from 30 to 180. In the present study, of 316 patients 100 were found to have torsion with more than 15 degree and the degree of torsion was ranged from 15 to 115 with an average of 52.87 degree. Patients with left sided torsion had an average torsion of 56.87 degree while right sided torsion had 46.98 degree. This increase in the degree of torsion in left side may be due to neglect of mild torsion as reported in earlier studies [6].

The torsion was mild in 45%, moderate in 44% and severe in 13%. Similarly, previous study showed the average degree of torque as 51.46 [3]. The mild and moderate torsion was observed in 30% and 69%, respectively. However, only one patient had severe degree of torsion. This difference may be due to varied range of mild, moderate and severe degree of torsion.

In the present study, majority of the patient had distal penile hypospadias (71%) followed by mid (19%) and proximal hypospadias (10%). This finding was consistent with other studies [5-7]. The present study showed degree of torsion in distal, mid and proximal hypospadias was ranged from 20 to 110, 25 to 90 and 15 to 25, respectively. However, the degree of chordee was comparatively higher in distal (15 to 90) than in mid penile hypospadias (25 to 90) and proximal hypospadias (25 to 125). Similar results were reported in previous studies [6,7]. This may be due to the abnormal attachment of the penile skin which is considered as a one of the causes of penile torsion.

Present study showed the degree of torsion in distal penile hypospadias was ranged from 20 to 110 which was higher as compared to patients with mid penile hypospadias (25 to 90) and proximal penile hypospadias (15 to 25). The incidence of torsion and chordee was associated with the type of hypospadias. Present study reported 11% of complication with most of the patients reporting infection and disruption, meatal stenosis and urethral fistula (n=3 each), urethral stricture (n=2). One study reported three complications of dorsal dartos flap in which two of them had urethrocutaneous fistula which was treated tabularized incised plate urethroplasty and postoperative bleeding treated by pressuring the bleeding point. Other study reported massive oedema (n=3) and small subcutaneous hematoma (n=2) [17]. No complications or minor complications were reported in patients treated with dorsal dartos flap rotation [4,12,18]. Therefore, this technique is considered as safe, simple and effective.

Congenital penile torsion may not need treatment in cases with mild degrees of torsion [19]. Isolated penile torsion correction is not necessary if the degree of torsion is >60 degree as the patients are asymptomatic. However, parents are more concerned about the appearance and future associated problems. Studies have reported torsion to be associated with hypospadias or chordee [6]. In case if mild torsion is present with hypospadias and chordee, the

condition should be treated along with hypospadias repair to achieve better cosmetic outcome.

In the present study, we found majority of the patients were treated with periosteal anchoring of tunica albuginea and mobilization of urethral plate into the glans. Other methods used were mobilization of the urethral plate and corpus spongiosum, mobilization of proximal urethra, penile degloving, division of the urethral plate and dorsal plication. Previously, penile degloving and skin reattachment was considered as the important method of management of penile torsion as it is simple, reliable and less complicated method [8,13].

Sometimes residual or recurrent torsion occurs due to lack of sustained effects of these techniques. Another study reported a new technique for penile torsion which has recurred even after the skin has completely degloved [11]. The patients with congenital isolated penile torsion with degree of rotation ranged from 45 to 90 degree were successfully corrected using untwisting with plication and diagonal plication with artificial erection was performed when involvement of Buck's fascia [20].

One study reported a novel technique of dorsal dartos flap rotation in cases of penile torsion. In this method the dorsal dartos fascial flap was sutured on the ventral aspect to correct eight cases of penile torsion. This technique has the advantage of being easily adapted with other penile surgeries like hypospadias and chordee repair. The dartos flap is used to cover the urethroplasty suture line and thus reduces the risk of urethra-cutaneous fistula [4]. However, this technique is quite versatile in patients with mild and severe penile torsion. Another study reported treatment of congenital penile lateral curvature with penile torsion with excision of angular ellipses of tunica albuginea in the direction that can counter-rotate the corpora cavernosa. This technique failed to achieve wide acceptance due the complicated procedure with increased risk of injury to the neurovascular bundles or erectile tissue. Moreover, these techniques may not be efficient in severe cases of penile torsion [21].

In the last few years many modified techniques have evolved with improved functional and cosmetic outcomes and less complications associated with the procedure. One of the studies showed satisfactory results described modified Nesbit procedure [22] in which asymmetric excision of ellipses of tunica albuginea excisions was performed in patients with complex congenital penile curvatures with age ranged from 27-63 years. Though this procedure was simple, safe, bloodless and effective, shortening of the penis and decreased sensation were reported as complications in some cases. In some cases, complete dissection of the skin from the penile shaft improved chordee but not the torque, nevertheless, Buck's fascia dissection and relocation resulted in elimination of torque [15].

Previous study reported extensive common use of mobilization of the urethral plate into the glans, mobilization of urethral plate and corpus spongiosum and mobilization of proximal urethra [5]. The step wise approach to penile torsion can help to overcome the different causes associated with the torsion and results in successful management.

Another study retrospectively analyzed the patients with moderate to severe (at least 60 degree) penile torsion [9]. In most severe cases of penile torsion, the involvement of Buck's fascia is the common cause and is corrected mostly by degloving alone. Some patients were managed by degloving alone and patients with severe torsion were treated with dorsal dartos flap rotation. Some other studies showed that mobilization of the urethral plate and corpus spongiosum or resection of the underlying fibrous bands, might correct the

chordee with or without division of the urethral plate [5,23]. However, another study showed recurrent torsion even after complete removal of chordee in patients with hypospadias with chordee and penile torsion [24].

The current findings suggest that there have been multiple attempts made by various authors in advocating one particular method of torsion correction, while few arguing that a particular method to be superior to others. In the present study a step by step approach showed satisfactory correction of torsion. This method showed simple guide towards management of patients with penile torsion. However, there are few limitations in the study that the exact embryological basis for this condition was not studied and due to this it may impact the approach towards management of a particular case.

CONCLUSION

Evidence suggests that though penile torsion is often a neglected aspect of the reconstructive urology, it deserves better space in the present literature as its effect in the individual is significantly found in patients with moderate to severe degree of torsion. A step by step algorithmic approach showed satisfactory correction of penile torsion. This method may guide the reconstructive surgeon in his endeavor.

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