



Procedures used for correction of isolated penile torsion: are they competitive or complementary?

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Abstract

Objectives To report our experience in starting the correction of penile torsion, whatever its degree (moderate or severe) with one or more simple procedures either separately or complementary in the same session.

Patients and methods Between 2013 and 2018, 62 patients who have significant isolated penile torsion ($> 45^\circ$) were involved in this study. Those patients were subjected to either simple degloving with skin reposition, degloving with skin overcorrection and/or dartos flap procedures. Those procedures were performed either separately or complementarily. All patients were examined postoperatively after 7 days and followed up at 3, 6, and 9 months postoperatively.

Results 37 out of 62 patients had a moderate degree ($45\text{--}90^\circ$) of penile torsion; 21 of them were corrected using skin degloving–reattachment technique, 11 patients were corrected by degloving with skin overcorrection, and in the remaining 4 patients dartos flap technique was used for correction. In 25/62 patients who had severe degree ($> 90^\circ$) of torsion; 9 patients were managed by degloving with skin overcorrection, while in 13 patients the procedure was shifted to dartos flap technique, and the remaining 3 patients, 2 of whom had 180° torsion, were managed by dartos flap with added skin overcorrection.

Conclusion Performing degloving and skin reattachment with or without skin overcorrection procedure and dartos flap procedure either separately or complementarily in the same patient whatever the degree of torsion (moderate or severe) is associated with good results and can protect some patients from exposure to more difficult and extensive procedures as corporopexy and corporal plication.

Keywords Penile torsion · Degloving · Dartos flap · Corporopexy

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Introduction

Congenital penile torsion is rotation or twist of the penile shaft along its longitudinal axis. It is usually counterclockwise and may occur independently or in association with other penile anomalies such as hypospadias. Torsion of the penis can vary in severity ranging from 30° in mild cases to 180° . The true incidence of this anomaly is unknown; however, the incidence of isolated penile torsion is 1.7–27%, and torsion of more than 90° is reported in 0.7% of the cases [1, 2].

Most of the children who present with penile torsion are asymptomatic; however, the parents usually wish to correct the penile torsion for the cosmetic defect and their concern about future functional defect. Actually, it is hard to know how much of a functional problem this malformation causes in adults. It has been reported that no patient has complained of sexual dysfunction related to penile torsion [3].

The etiology and pathogenesis of congenital penile torsion are not exactly known [4–6]. It might be due to abnormal skin attachment, or abnormal development of the dartos fascia that causes disorientation of the penile shaft and corporeal torsion around its longitudinal axis [4].

Several techniques have been described to correct penile torsion, but none of them has gained consensus as an optimal, ideal and versatile technique. Those techniques vary from simple degloving of the penis with repositioning of the penile skin to more complex techniques involving the corporeal tissue. If the penile torsion is less than 45°, surgical correction is not considered. Correction of penile shaft skin torsion by skin degloving and realignment [7] can be sufficient for correction of mild torsion of less than 90°. However, when it comes to cases of 90° or more, another procedure should often be done such as suturing the tunica albuginea to the periosteum of the pubis (corporopexy) [5], dorsal dartos flap rotation [8], or diagonal corporeal plication sutures parallel to and away from the neurovascular bundle [9].

From our point of view, a simple technique (skin degloving) should be started in any patient with isolated penile torsion. If penile torsion persists after artificial erection, more techniques should be considered in the same session till complete correction of penile torsion is gained. The aim of this study is to report our experience in starting the correction of penile torsion, whatever its degree, with one or more simple procedures either separately or complementarily in the same session.

Patients and methods

All patients who came asking for circumcision between 2013 and 2018 were examined for any penile abnormalities. In those who had penile torsion, the degree of penile torsion was calculated after putting the penis in a straight upright position with a simple protractor. Only patients who had isolated penile torsion were categorized according to the angle of torsion to mild (<45°) torsion, moderate (45°–90°) and severe (>90°). The direction of penile torsion was also evaluated if it was clockwise or counterclockwise. Those who had mild degree of torsion were circumcised without correction, while those who had moderate or severe degree of isolated penile torsion were included in the study and scheduled for correction.

Usually, we correct penile torsion at the age of 6 months and thereafter. According to the algorithm shown in Fig. 1, our policy is to start correction of any case of penile torsion, whatever the degree of torsion (moderate or severe), with the skin degloving–reattachment technique. If the penile torsion is not resolved with degloving of the shaft skin, the skin is reattached in an over-rotated fashion to allow the penis to be

straight at the end of the repair. If this technique is not enough and significant penile torsion persists, the procedure is shifted to dartos flap technique.

Under general anesthesia, penile degloving was performed by circumferential incision 5 mm proximal to the coronal sulcus, followed by degloving of the penile skin up to the penile base and skin reattachment and assessment of post-correction penile torsion by artificial erection.

To perform the dartos flap technique, after a subcoronal circumferential incision, the dartos flap is created by dissection between the undersurface of the dorsal penile skin and the Buck's fascia downward up to the penopubic junction (Fig. 2). The flap was rotated around the penis against the direction of penile torsion (Figs. 3, 4) and then sutured to the ventral aspect of the shaft of the corpus cavernosum with absorbable sutures PDS 5/0 with an amount of tension. The dartos flap can be sutured to the lateral side of the corpus cavernosum or even to the dorsum of the corpus if needed for proper correction of the penile torsion. The amount of flap rotation was adjusted during the operation until satisfied correction was reached. The catheter was fixed in the first two cases who needed dartos flap technique aiming not to injure the urethra during fixation of the dartos flap on the ventral surface of the penis and it was removed at the end of the procedure. Later on during the study, we did not use Foley catheter.

Residual penile torsion more than 30° after dartos flap positioning could be managed by skin overcorrection procedure in which the skin realigned with some degree of overrotation against the direction of residual penile rotation by suturing of the penile skin using Vicryl 5/0 at 6–7 o'clock (point 1) to the glanular skin at 1–2 o'clock (point 2) ventrally as shown in Fig. 5a and/or suturing the penile skin at 12–1 o'clock (point 1) to the glanular skin at 10–11 o'clock (point 2) dorsally as shown in Fig. 5b to bring the penis in a straight non-rotated position.

The residual penile torsion less than 30° was considered as a satisfactory result. At the end of the procedure, the penile skin was refashioned and the excess skin was excised. The penile skin was realigned using Vicryl 5/0 sutures (Fig. 6), and then fucidin ointment was applied to the suture line followed by application of a simple gauze around the penis. This simple dressing was removed on the first postoperative day.

All patients were seen after 7 days and followed up at 3, 6, and 9 months postoperatively.

Results

From the 1650 children who came for circumcision, 514 (31.2%) had isolated penile torsion. 452 of them (27.3%) had penile torsion less than 45°, while 62 patients (3.7%) were found to have significant isolated penile torsion (more 45°).

Fig. 1 Algorithm used for penile torsion corrections

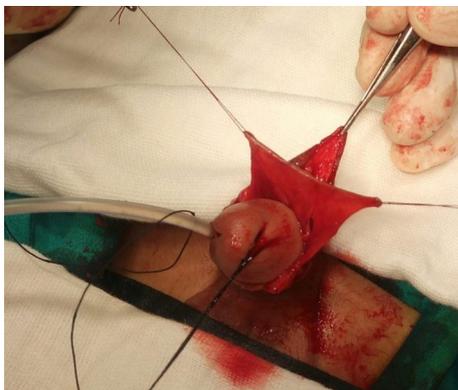
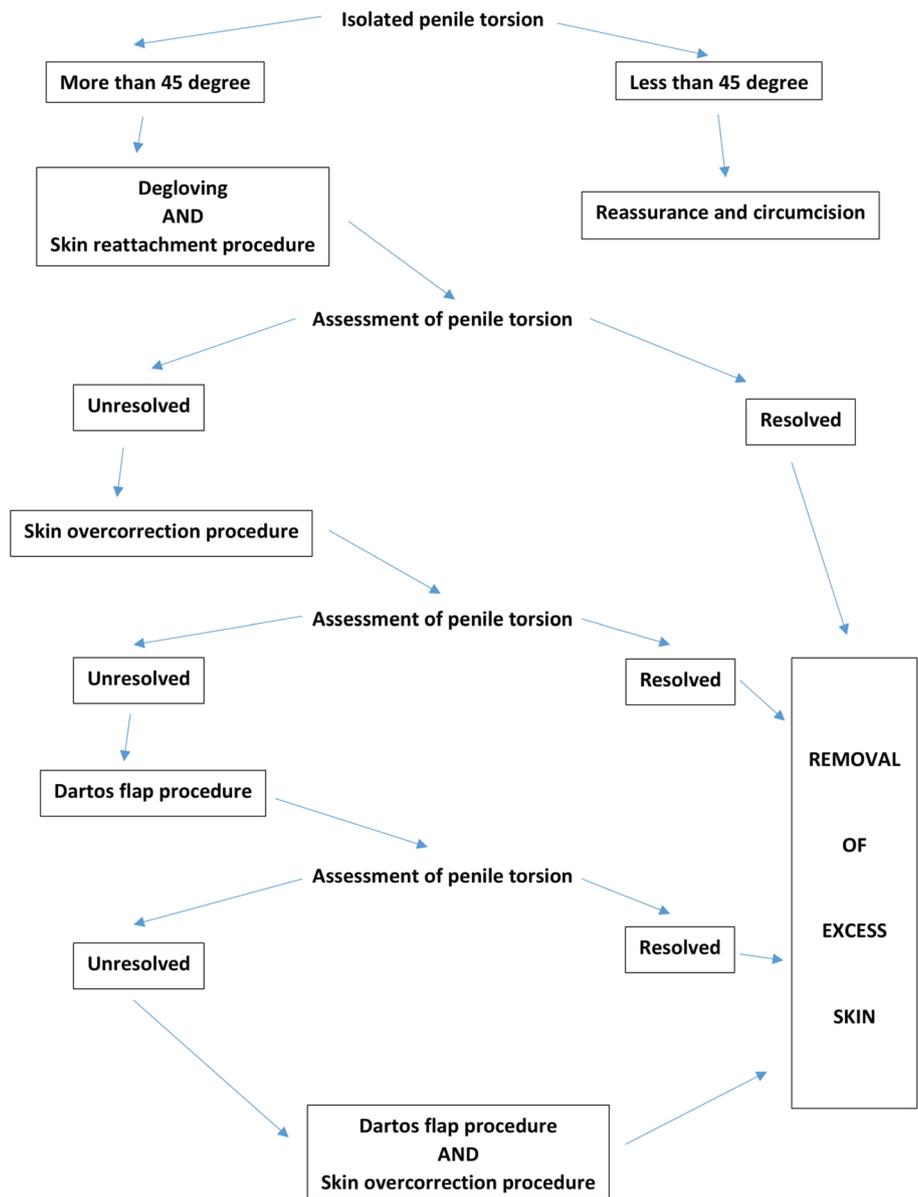


Fig. 2 Creation of dorsal dartos flap in a patient who had clockwise penile torsion

In 37 patients (2.2%), the torsion was moderate (from 45° to 90°) and in the other 25 patients (1.5%) the torsion was severe (more than 90°). 2 of them had 180° penile torsion. Of the 62 patients, 3 had clockwise torsion and the remaining 59 had torsions in the counterclockwise direction. Patients with penile torsion less than 45° were circumcised without correction.

Surgical correction was performed on 62 patients at the age ranging from 6 months to 4 years with a mean age of (11.7 months). For patients who had moderate degree of torsion (37/62), 21 patients were corrected with the degloving–reattachment technique and 11 patients needed skin overcorrection, while in the remaining 5 patients dartos flap rotation was used for penile correction as



Fig. 3 Rotation of the dartos flap around the penis against the direction of penile torsion



Fig. 4 Rotation of the dartos flap around the penis against the direction of penile torsion

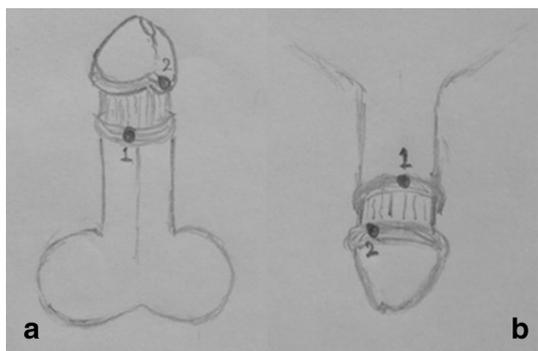


Fig. 5 Skin overcorrection by suturing of the penile skin using PDS 5/0 at 6–7 o'clock (point 1) to the glanular skin at 1–2 o'clock (point 2) ventrally as shown in (a) and/or suturing the penile skin at 12–1 o'clock (point 1) to the glanular skin at 10–11 o'clock (point 2) dorsally as shown in (b)



Fig. 6 Removal of the excess of foreskin followed by reattachment of the penile skin at the end of the procedure

degloving and skin reattachment or overcorrection was not enough for penile torsion correction (Table 1).

For those patients who had a severe degree of torsion (25/62), 9 patients were managed by degloving with skin overcorrection, while in 13 patients the procedure was shifted to dartos flap rotation technique and the remaining 3 patients, 2 of whom had 180° torsion, were managed by dartos flap with added skin overcorrection (Table 1).

All patients had a smooth uncomplicated postoperative course. After the 7-day follow-up, there were also no complications with normal slit-like meatus without penile torsion. All patients were normal, the meatus was normally oriented without any penile torsion at 3, 6, and 9 months follow-up, and parents were satisfied with the results.

Discussion

Penile torsion is a congenital rotational defect of the penile shaft on the longitudinal penile axis and in most cases the shaft is rotated in a counterclockwise direction in most cases [10]. Penile torsion can be encountered independently or in association with other penile and urethral malformation, such as chordee and hypospadias [11]. The true incidence is unknown and the etiology is unclear [2, 4, 5]. The incidence of isolated penile torsion ranges between 1.7 and 27% [1, 2, 6]. Although the overall incidence is high, mild and severe forms that need treatment are less frequent [1, 2].

One of the biggest studies in the literature that was done in North India [12] over more than 5000 newly delivered

Table 1 Incidence of different types of penile torsion and the procedures used for correction

Number of patients	Mild torsion <45°	Moderate torsion 45°–90°	Severe torsion >90°
514/1650 (31.2%)	452/1650 (27.3%)	37/1650 (2.2%)	25/1650 (1.5%)
Procedure			
Degloving with skin reattachments	–	21/37	0/25
Degloving with skin overcorrection	–	11/37	9/25
Dartos flap	–	5/37	13/25
Dartos flap with skin overcorrection	–	0/37	3/25

neonates to detect the incidence of isolated penile torsion concluded that the incidence was about 1.9 for torsion for penile torsion more than 30° after exclusion of the mild cases less than 30°. In this study, isolated penile torsion, even after exclusion of mild cases less than 30°, is quite frequent and its incidence is higher than reported. We examined 850 children who came for circumcision between 2 weeks and 6 years old. We found that the incidence of overall isolated congenital penile torsion was 33.8%; most of them were mild, less than 45°, while the incidence of moderate torsion (between 45° and 90°) and severe forms (more than 90°) that need surgical correction were 2.2% and 1.5%, respectively. The higher incidence of penile torsion in this study is related to the obligatory genital examinations of all male neonates and children by urologist and/or pediatric surgeon before or at the time of circumcision as all males in our community should be circumcised due to religious issue. This is not the case in other communities in which circumcision is not obligatory and a good number of male children miss genital examination.

Other important observation by a North Indian study [12] which has not been mentioned before in the literature is the presence of a strong association between the incidence of penile torsion with the age of the mother and parity, but not with the weight of the baby. This important observation needs to be investigated by more research work. However a multicentric project in which a huge number of male neonates will be evaluated by multispecialities as (urology, pediatric surgery, pediatric medicine, obstetric, and family medicine) is needed to evaluate the actual incidence of penile torsion.

The etiology of penile torsion is not known. Many authors have suggested that the underlying cause of congenital penile torsion is abnormal skin and dartos fascia attachment [5, 7, 13]. This can be proved by the high incidence of penile torsion with distal hypospadias (32.8%), while it is 0% in proximal hypospadias cases, where the ventral skin is completely absent [14]. Other authors have suggested involving other tissues, such as Buck's fascia, corpus cavernosum and corporeal tunica albuginea [5, 7, 15, 16] as in some cases the degloving and skin reattachment technique is not always enough to correct the anomaly.

Asymmetrical development of the corpora cavernosa around the longitudinal axis of the penis, and/or a fibrous band that tightly attaches the left corpus cavernosum to the pubic periosteum might be another cause of persistent penile torsion as described by Zhou et al. who related the penile torsion to an intrinsic longitudinal disorientation of the corpora cavernosa around the longitudinal axis of the penile shaft [5]. Bauer and Kogan [17] related penile torsion to fibrosis of Buck's fascia, but their finding lacked histological evidence.

Most of the published data indicate that penile torsion is mostly toward the left [5, 6, 18].

Sarkis and Sadasivam [2] reported that penile torsion was counterclockwise in 99% of affected infants. This phenomenon is not fully understood.

Congenital penile torsion may need no treatment especially for its mild degrees [19], while moderate and severe forms need surgical correction. Since the exact cause and pathogenesis of penile torsion is unknown, there are several antitorsion techniques that have been used for correction.

Degloving and reattachment of penile skin is a simple technique used by several authors [4, 7, 11]. Zeid [20] used the technique of degloving the penis and repositioning the skin, bringing the twisted median raphe back to its straight position. Only three cases (33%) that had an angle of rotation less than 30° achieved satisfactory correction of penile torsion. However, Tryfonas and colleagues [21] reported satisfactory results applying this technique to more severe degrees of penile torsion, but with suturing the skin in an overcorrected position. E. Egemen [22] in his study concluded that although skin degloving and reattachment is currently the easiest technique and its effectiveness is very high, it may not be enough by itself in severe cases and another technique is needed to be added.

In 2004, Fisher and Park described a technique utilizing the dorsal dartos flap rotation to correct penile torsion [8]. They reported 100% success of this technique; however, 64% achieved complete resolution of penile torsion in the series of Bauer and Kogan in 2009 [17].

Failure of penile torsion correction by the dartos flap or its recurrence might be explained by the flap becoming unattached or being inadequately placed from the start. In

severe cases of penile torsion not responding to correction by the dartos flap, deep dissection and suturing of the affected corpus cavernosum to the periosteum of the pubis can be used, a technique referred to as corporopexy [5]. In this procedure, there is some risk of trauma to the vasculo-nervous bundles when placing the stitches on the corpora.

Aldaquadossi et al. [15], in a prospective study, compared the dartos flap technique with the fixation to the periosteum. Results were good and similar in both techniques, although the authors concluded that the Fisher technique was easier and with no risk for the vasculo-nervous bundles that may occur in corporopexy, in which all the stitches are placed on the ventral part of the affected corpora to the periosteum.

Diagonal plication technique has been described by some authors [9, 18] who demonstrated that diagonal corporal plication suture is much easier to perform than suturing the corpora to the periosteum of the pubis, which requires much more dissection, and it has been very effective. Although the diagonal plication technique is promising and has some potential, long-term data on a larger number of patients is required to popularize this technique.

Slawin and Nagler [23] described the technique of angular tunical excision in the direction that can counter-rotate the corpora cavernosa. However, these techniques cannot gain wide acceptance due to the risk of injury to the neurovascular bundles and/or erectile tissue. Moreover, these techniques might not be effective in severe penile torsion.

We agree with the opinion of Azmy and his colleague who stated that, whenever surgical correction is decided, there is a consensus to start the procedure with skin degloving and realignment [7], and if there is residual torsion after correction another procedure may be added. Jean-Baptiste Marret and his colleagues [24] reported that when residual torsion exceeded 30° after skin degloving alone as the first step, an additional procedure was performed. Elbatarny and Ismail [25] proposed a staged approach reserving the use of the extensive procedure (corporopexy) to cases of incomplete correction by the dartos flap.

In this study, we started all cases whatever the degree of torsion by skin degloving and skin reposition, without or with skin overcorrection, for correction of isolated penile torsion. If degloving was not enough, we shifted to the dartos flap rotation technique without or with skin overcorrection. By performing this concept, mild cases (32/37) in whom torsion was less than 90° and 9/25 patient in whom rotation was more than 90° were corrected by simple skin degloving and reposition with or without skin overcorrection. All other patients were corrected by dorsal dartos flap rotation without or with skin overcorrection. Extensive procedures such as corporopexy or corporeal plication were not needed even for cases that had a rotation of 180°.

Conclusion

Multiple procedures were described for the correction of isolated penile torsion. Performing degloving with skin reattachment with or without skin overcorrection and dartos flap rotation either separately or complementarily in the same patient whatever the degree of torsion (moderate or severe) is associated with good results and can protect some patients with severe degree of torsion from exposure to more difficult and extensive procedures such as corporopexy and corporeal plication.

Author contributions HMEI-D and MEAI-D: protocol development, data collection data analysis, manuscript writing. MSK, MEE and SAN: data collection. MRT: manuscript editing.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participant and/or animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee. Approval was obtained from the local ethics committee of the Tanta University, Egypt, No. 345/2.

Informed consent Informed consent was signed by the parents of each patient involved in this study.

References

1. Ben Ari J, Merlob P, Mimouni F, Reisner SH (1985) Characteristics of male genitalia in the newborn. *J Urol* 134:521–522
2. Sarkis PE, Muthurajan S (2007) Incidence and predictive factors of isolated neonatal penile glanular torsion. *J Pediatr Urol* 3:495–499
3. Shaer O (2008) Torsion of the penis in adults: prevalence and surgical correction. *J Sex Med* 5:735
4. Bar-Yosef Y, Binyamini J, Matzikin H, Ben-Chaim J (2007) Degloving and realignment—simple repair of isolated penile torsion. *Urology* 69:369–371
5. Zhou L, Mei H, Hwang AH, Xie HW, Hardy BE (2006) Penile torsion repair by suturing tunica albuginea to the pubic periosteum. *J Ped Surg* 41:7–9
6. Bhat A, Bhat MP, Saxena G (2009) Correction of penile torsion by mobilization of urethral plate and urethra. *J Pediatr Urol* 5:451–457. <https://doi.org/10.1016/j.jpuro.2009.05.013>
7. Azmy A, Eckstein HB (1981) Surgical correction of torsion of the penis. *Br J Urol* 53:378–379. <https://doi.org/10.1111/j.1464-410X.1981.tb03202.x>
8. Fisher PC, Park JM (2004) Penile torsion repair using dorsal dartos flap rotation. *J Urol* 171:1903–1904. <https://doi.org/10.1097/01.ju.0000120148.79867.5c>
9. Snow Brent W (2009) Penile torsion correction by diagonal corporal plication sutures. *Int Braz J Urol* 35:56–59. <https://doi.org/10.1590/S1677-55382009000100009>

10. Montag S, Palmer LS (2011) Abnormalities of penile curvature: chordee and torsion. *Sci World J* 11:1470–1478. <https://doi.org/10.1100/tsw.2011.136>
11. Redman JF, Bissada NK (1967) One stage correction of chordee and 180° penile torsion. *Urology* 7:632–633
12. Bhat A, Bhat M, Kumar V, Goyal S, Bhat AK, Patni M (2017) The incidence of isolated penile torsion in North India. *J Pediatr Urol* 13(491):e1–491.e6
13. Culp OS (1966) Struggles and triumphs with hypospadias and associated anomalies: review of 400 cases. *J Urol* 96:339
14. Abou Zeid AA, Soliman H (2010) Penile torsion: an overlooked anomaly with distal hypospadias. *Ann Pediatr Surg* 6:93–97
15. Aldaqadossi HA, Elgamel SA, Seif Elnasr M (2012) Dorsal dartos flap rotation versus suturing tunica albuginea to the perios-teum for correction of penile torsion: a prospective randomized study. *J Pediatr Urol* 9:643–647. <https://doi.org/10.1016/j.jpuro.1.2012.07.014>
16. Corriere JN Jr (1981) Involvement of Buck's fascia in congenital torsion of the penis. *J Urol* 126:410–411
17. Bauer R, Kogan BA (2009) Modern technique for penile torsion repair. *J Urol* 182:286–291
18. Hsieh JT, Wong WY, Chen J, Chang HJ, Liu SP (2002) Congenital isolated penile torsion in adults: untwist with placcation. *Urology* 59:438–440
19. Elder JS (2007) Anomalies of the genitalia in boys and their surgi-cal management. In: Wein AJ, Kavoussi LR, Novick AC et al (eds) *Campbell-Walsh urology*, 9th edn. W. B. Saunders, Philadelphia, pp 3754–3760
20. Zeid AAA, Soliman H (2010) Penile torsion: an overlooked anomaly with distal hypospadias. *Ann Pediatr Surg* 6(2):93–97
21. Tryfonas GI, Klokkaris A, Sveronis M et al (1995) Torsion of penis: a comparative study between two procedures of skin derota-tion. *Pediatr Surg Int* 10:359–361
22. Eroglu E, Gundogdu G (2015) Isolated penile torsion in newborns. *Can Urol Assoc J* 9(11–12):E805–E807. <https://doi.org/10.5489/cuaj.2833> (published online 4 Nov 2015)
23. Slawin KM, Nagler HM (1992) Treatment of congenital penile curvature with penile torsion: a new twist. *J Urol* 147:152–154
24. Marret JB, Ravasse P, Raffoul L, Rod J (2017) The Fisher tech-nique for correction of penile torsion in children: who are the candidates? *Urology* 104:179–182
25. Elbatarny AM, Ismail KA (2014) Penile torsion repair in chil-dren following a ladder step: simpler steps are usually sufficient. *J Pediatr Urol* 10:1187–1192. <https://doi.org/10.1016/j.jpuro.1.2014.05.009>

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