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## Surgery in Motion

# Shaeer's Corporal Rotation III: Shortening-Free Correction of Congenital Penile Curvature—The Noncorporotomy Technique

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### Abstract

**Background:** Shortening-free correction of congenital ventral penile curvature by rotation of the corpora cavernosa was first introduced in 2006 (Shaeer's corporal rotation I). The basic principle was shifting the concavity of both corpora cavernosa from the ventral aspect of the penis to the lateral aspects, in opposition. Rotation was achieved by approximating short parallel incisions on the dorsum of both corpora cavernosa. In 2008, we reported modification of the technique (Shaeer's corporal rotation II), in which the incisions spanned the whole length of the corpora cavernosa.

**Objective:** The current modification, Shaeer's corporal rotation III (the noncorporotomy technique) simplifies corporal rotation further and addresses shortcomings.

**Design, setting, and participants:** This is a retrospective study of 127 cases of congenital ventral penile curvature 25–90° operated at Kamal Shaeer Hospital, Cairo, Egypt, from 2009 to 2015.

**Surgical procedure:** The neurovascular bundle was mobilized, and the corpora were rotated by approximating premarked respective points on either side of the deep dorsal vein using polyester sutures without incising the tunica albuginea.

**Outcome measurements and statistical analysis:** Intraoperative postrotation angle and erect length and girth.

**Results and limitations:** On-table measurements showed a mean prerotation erection angle of  $66.5^\circ \pm 17.9^\circ$  (range: 25–90°; median 65°). Following rotation, the angle was  $0.47^\circ \pm 1.8^\circ$  ( $p < 0.001$ ) and length was  $0.06 \pm 0.25$  cm longer ( $p = 0.007$ ), whereas girth was  $0.77 \pm 0.9$  cm narrower ( $p < 0.001$ ). Complications included 11 cases (8.7%) of ventral wound gaping and 3 (2.4%) with mild recurrence not requiring correction. The International Index of Erectile Function was  $24.99 \pm 0.9$ , with an increase of  $13.35 \pm 3.4$  over the preoperative state ( $p < 0.001$ ).

**Conclusions:** Shaeer's corporal rotation III enables correction of any degree of ventral congenital penile curvature, with neither shortening nor erectile dysfunction.

**Patient summary:** Shaeer's corporal rotation is a surgical technique for correction of severe degrees of innate downward curvature of the penis, without shortening.

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## 1. Introduction

Correction of penile curvature usually comes at a cost, whether a loss of length if the tunica albuginea shortening procedures [1–4] are applied or a relatively high possibility

of erectile dysfunction if the incision and grafting option is used [5]. Shortening-free correction of congenital ventral penile curvature (chordee without hypospadias) by rotation of the corpora cavernosa was first introduced in 2006 (Shaeer's corporal rotation I [Shaeer I]) [6]. The basic

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principle was shifting the concavity of both corpora cavernosa from the ventral aspect of the penis to the lateral aspects in opposition, such that the flexion forces act against each other rather than synergistically, thereby neutralizing their curvature-inducing effect [6].

The neurovascular bundle was mobilized for a short distance at the point of maximum curvature. The dorsal aspects of the corpora cavernosa were approximated to each other in the midline by incising pairs of parallel longitudinal incisions on either side of the midline and suturing them together. To avoid narrowing of the urethra, minimal dissection was used to develop the groove on either side of the corpus spongiosum. A case of 90° congenital ventral curvature was fully corrected with no impact on length or rigidity, although with minor indentation at the point of approximation and rotation [6].

In 2008, we reported evolution and modification of the technique (Shaeer's corporal rotation II [Shaeer II]) and described our 3-yr experience with 22 patients [7]. Two long incisions were cut in the tunica albuginea, one on the dorsum of each corpus cavernosum. The incisions were longitudinal, spanning the whole length of the corpora cavernosa. Edges of the incisions were approximated, medial to medial and lateral to lateral, with a continuous running polyglactin (Vicryl; Ethicon, Somerville, NJ, USA) 1/0 suture reinforced by interrupted polydioxanone (PDS) sutures.

The penis-long incisions in Shaeer II avoided indentation and girth asymmetry at the points of approximation, in contrast to the short incisions aggregated around the point of maximum curvature in Shaeer I. We also omitted the partial mobilization of the corpus spongiosum because it proved unnecessary. Full correction of curvature was achieved in 20 of 22 patients with congenital ventral curvature, with no shortening, asymmetry, or erectile dysfunction. Residual curvature in two patients was no more than 10° [7].

This was followed by reports from other experts describing successful correction of severe degrees of congenital curvature done without shortening by using corporal rotation [8,9]. Navarro [8] described a modification of Shaeer's technique in which the procedure was performed under local anesthesia, the neurovascular bundle was fully mobilized, and the incisions were further apart. Poliglecaprone (Monocryl; Ethicon) and PDS II were adopted for approximation of the incisions. Ten patients with congenital penile curvature 60–90° ventrally were operated between June 2009 and June 2011. More than 90% penile straightening was observed in all cases, with minimal shortening of the penis (0.5–1 cm) [8]. Another group reported on the results of rotation in two cases of ventral curvature >60°. At 6 mo, residual curvature was <20°, and penile shortening was <1 cm [9].

Based on experience with our cases and feedback from other experts who reproduced the technique, we modified and enhanced the procedure, simplifying it further and addressing shortcomings with Shaeer's corporal rotation III [Shaeer III], the noncorporotomy technique.

## 2. Patients and methods

From 2009 to 2015, we applied the Shaeer III technique in 128 cases of congenital penile curvature, 25–90°, ventral in direction, without hypospadias. Average age was  $24.8 \pm 3.2$  yr. All patients had normal penile rigidity as per self-report of normal daytime and nocturnal erections; however, average International Index of Erectile Function (IIEF-5) score was  $11.6 \pm 3.4$ , reflecting failure of intromission in those with the more severe degrees of curvature.

### 2.1. Surgical technique

Shaeer III is a noncorporotomy technique in which the corpora are rotated using permanent suture material for approximation, without the dorsal incisions of Shaeer I and II.

### 2.2. Induction of erection

The penis is degloved through a circumferential subcoronal incision. Partial erection is induced by intracorporal injection of low-dose prostaglandin E1 (PGE1), up to 10 µg, to be supplemented up to full erection by saline injection through a butterfly cannula in the glans. This enables alternation between the fully erect state (for evaluation of erection angle before and after correction) and the semierect state (to be able to approximate and rotate the corpora without resistance). We opted to use PGE1 and saline rather than saline alone to induce veno-occlusion, omitting need for a tourniquet on saline infusion.

### 2.3. Measurements

In full erection (Fig. 1), angle of erection is measured using a metal protractor. The curved penis has a proximal axis and a distal axis pointing in different directions, and the intersection of both axes is the point or segment of maximum curvature. The base of the protractor is aligned with the proximal axis, base up. The angle of curvature is determined on the protractor according to where the distal axis points. The point of maximum curvature is identified. Erect dorsal length (from the symphysis pubis to the tip) and girth are measured using flexible tape.

### 2.4. Markings

The neurovascular bundle is mobilized either fully from lateral to medial or partially from medial to lateral (in cases with mild to moderate curvature). In the fully erect state, a sterile marker is used to mark the points to be approximated by the rotating sutures along the longitudinal axis of the penis. The points are marked along two pairs of lines, one pair 3–5 mm on either side of the deep dorsal vein (DDV) (the *close lines*) and

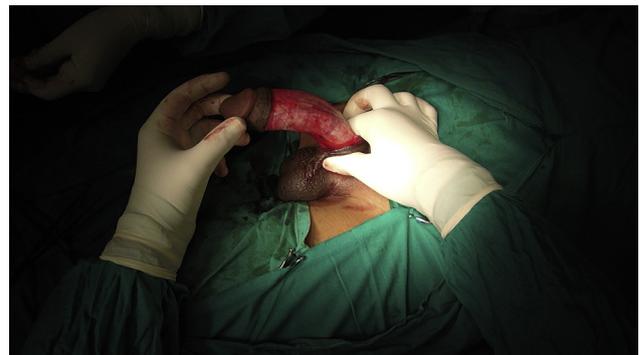


Fig. 1 – Congenital ventral curvature.

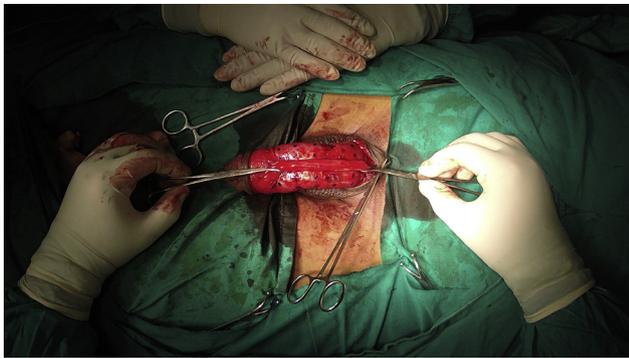


Fig. 2 – Marking the close (medial) and far (lateral) lines.

the other pair approximately 1–1.5 cm away from the DDV (the *far lines*) (Fig. 2). The points are 5–10 in number, evenly distributed along the longitudinal axis of the penis approximately 1–2 cm apart, depending on the length of the penis.

### 2.5. Noncorporotomy rotation

Erection is partially undone by letting out blood and saline through the butterfly cannula, such that the corpora can be rotated without tension in the semierect state. With the neurovascular bundle set aside, the corresponding points on the close lines are first approximated using polyester 2/0 sutures. During approximation, the midline is dipped downward with the tip of a hemostat, such that the points touch without intervening tunica albuginea. Rotation starts by approximating the three points at and around the point of maximum curvature. Full erection is then induced by saline injection to check for correction of curvature and symmetry. If curvature is not fully corrected or if asymmetry is detected, the remaining points along the close lines are approximated (Fig. 3). Angle of erection is reexamined in the fully erect state, and if residual curvature is  $>10^\circ$ , further sutures along the far lines are approximated for further rotation or tunica plication is performed if residual curvature is minimal.

Full erection is induced again to check for any asymmetry or deformity, to be corrected by readjusting the corresponding rotating suture (a possibility; not detected in this case series). After full straightening is achieved (Fig. 4), interrupted inverted polyester stitches are placed, suturing the edges of the approximated lines together to support the repair.

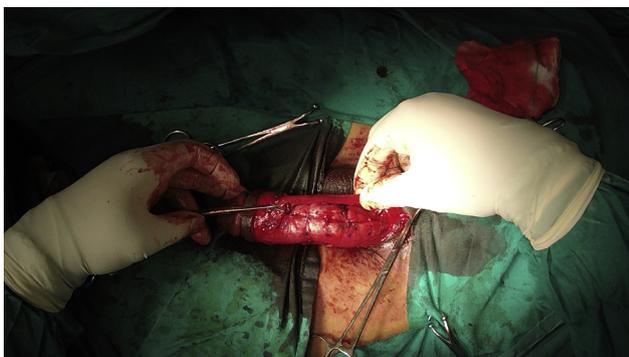


Fig. 3 – Rotation achieved by approximating all corresponding points along the close lines.



Fig. 4 – Full straightening with neither shortening nor girth asymmetry.

### 2.6. Closure and follow-up

The neurovascular bundle is spread back on the dorsum of the penis, and the edges of its Buck's fascia are sutured to each other on either side, covering the rotating suture line.

Full erection is reinduced to make sure there is no lateral deviation of the erect straight penis (LDESP) [10], which we noted to happen in some cases in which sutured Buck's fascia was tighter on one side. LDESP is correctable by relaxing that suture line.

The skin incision is closed in two layers (dartos and skin). Full erection is induced for the last time to check for possible tension on the skin suture line or LDESP. Patients are discharged the same day and permitted to commence coital activity 30 d later. Patients were followed up for 0.3–5.6 yr (mean:  $2.7 \pm 0.79$  yr) by phone interviews covering subjective impression of straightness, girth, symmetry, and IIEF-5.

## 3. Results

The close lines were sufficient for full correction in 120 of 128 cases. Seven cases (with curvature  $>80^\circ$ ) required approximation of the far lines, and one required minimal plication. Analysis was restricted to cases in which Shaeer III was performed, excluding the single case in which additional minimal plication was performed ( $n = 127$  of 128).

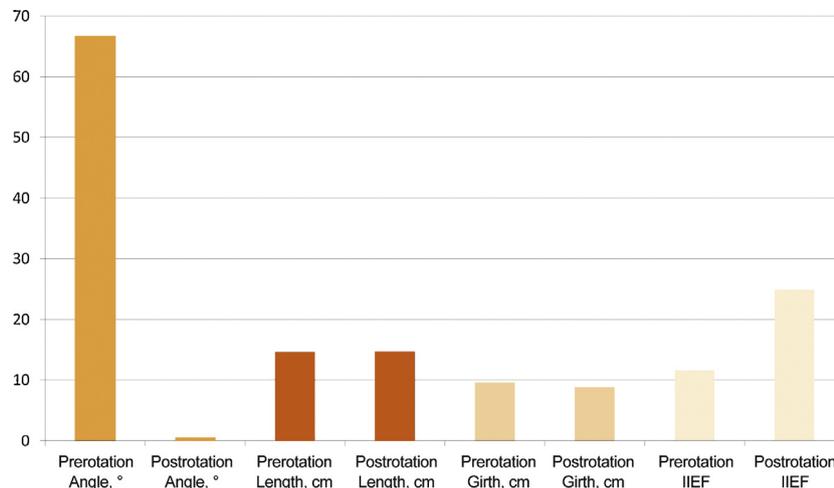
On-table measurements showed a mean prerotation ventral erection angle of  $66.5^\circ \pm 17.9^\circ$  (range:  $25\text{--}90^\circ$ ; median:  $65^\circ$ ). On-table postrotation angle of erection was  $0.47^\circ \pm 1.8^\circ$  (range:  $0\text{--}10^\circ$ ; median:  $0^\circ$ ;  $p < 0.001$ ). Following rotation, length was  $0.06 \pm 0.25$  cm longer ( $p = 0.007$ ), whereas girth at the narrowest point decreased by  $0.77 \pm 0.9$  cm ( $p < 0.001$ ) (Table 1, Fig. 5). None of the cases showed on-table girth asymmetry or LDESP [10].

During follow-up, 11 originally circumcised patients (8.7%) experienced ventral wound gaping (due to elongation of the ventral aspect beyond the capacity of ventral skin), managed by wound care in 8 patients and grafting in 3. At final follow-up, two patients (1.6%) subjectively reported mild narrowing but not asymmetry. Mild recurrence not requiring correction—from both surgeon and patient viewpoints—was reported by three patients (2.4%). None of the patients subjectively reported shortening or hyposthesia beyond 3-mo duration. IIEF was  $24.99 \pm 0.9$ , with a  $13.35 \pm 3.4$  increase over the preoperative state ( $p < 0.001$ ).

**Table 1 – Pre- and postrotation data**

	Mean	SD	SEM	Mean difference	p value
Prerotation angle, °	66.5433	17.85824	1.58466	66.07 ± 17.9	<0.001
Postrotation angle, °	0.4724	1.82933	0.16233		
Prerotation length, cm	14.6394	2.72857	0.24212	0.06 ± 0.25	0.007
Postrotation length, cm	14.6992	2.72931	0.24219		
Prerotation girth, cm	9.5701	1.07506	0.09540	0.77 ± 0.09	<0.001
Postrotation girth, cm	8.8039	0.99366	0.08817		
Prerotation IIEF	11.6457	3.40058	0.30175	13.35 ± 3.4	<0.001
Postrotation IIEF	24.9921	0.08874	0.00787		

IIEF = International Index of Erectile Function; SD, standard deviation; SEM = standard error of the mean.

**Fig. 5 – Pre- and postrotation differences.**  
IIEF = International Index of Erectile Function.

Classified by the Clavien-Dindo classification of surgical complications [11], 13 cases encountered grade 1 complications (any deviation from the normal postoperative course without the need for treatment) in the form of mild recurrence ( $n = 3$ ), mild narrowing ( $n = 2$ ) managed by reassurance, and wound gaping ( $n = 8$ ) managed by wound care. Three cases encountered grade 3 complications (requiring surgical intervention) in the form of wound gaping managed by grafting. None encountered grade 4 (life-threatening) complications.

#### 4. Discussion

Shortening of the convex side of the tunica albuginea is the classical approach for correction of congenital penile curvature. Several modifications of the original Nesbit technique have been proposed including the modified Nesbit technique, tunica albuginea plication (TAP), and the 16-dot technique [2,12–15]. Shortening is bound to occur after plication, proportionately to the degree of curvature and most pronounced in cases with ventral or ventrolateral curvature [16]. In contrast, tunica elongation procedures (ie, incision and grafting) may possibly restore length, although with a possibility of erectile dysfunction [5,17], and may require mobilization of the spongiosum.

The European Association of Urology 2012 guidelines on penile curvature state that for congenital cases, plication techniques are used almost exclusively [18]. The use of grafting material in isolated congenital penile curvature is very limited for drawing any conclusions [18]. The guidelines analyzed the relevant studies, mostly on Peyronie's disease, and reported that shortening occurred in 4.7–30.8% of cases operated using the Nesbit technique, 41–90% of plication cases, and 0–40% of grafting cases [18]. In a study of 102 patients who underwent TAP for Peyronie's disease ( $n = 68$ ) or chordee ( $n = 34$ ) and achieved an acceptably straight penis (curve  $<20^\circ$ ), loss in length ranged from 0 to 2.5 cm, measured in the flaccid stretched state and not erect [16]. Another study of 60 patients with congenital curvature reported shortening of 1.5–3 cm in 26.6% [19].

Shaeer's corporal rotation preserves length and erectile function. The concept of rotation of the corpora cavernosa had been described for correction of congenital curvature in cases with hypospadias by Decter in 1999 [20]. This required the mobilization of the urethra (or lack thereof in cases of hypospadias) to get access to the ventral aspect of the cavernous septum, which is incised longitudinally to allow rotation of the corpora. The neurovascular bundle is mobilized such that the rotating sutures are applied dorsally. This is different from Shaeer's corporal rotation,

designed to correct cases of congenital curvature without hypospadias, in which rotating sutures are applied dorsally, the urethra is not mobilized, and the ventral midline is not incised.

Shaeer III is reported in this trial to enhance the simplicity and outcome of Shaeer's corporal rotation; to avoid asymmetry, deformity, recurrence, and LDESP; and to make the technique standardized and feasible for more surgeons.

In contrast to Shaeer I and II, Shaeer III is a noncorporotomy technique that avoids incision of the tunica albuginea, decreasing the probability of erectile dysfunction, decreasing postoperative pain, shortening the period of abstinence required, and obviating the need for a tourniquet while keeping the surgical field less bloody. Noncorporotomy rotation makes the technique easier, faster, and less invasive.

With Shaeer II, the shape of the penis resulting from suturing the tunical incisions was largely irreversible, considering that the penis-long incisions had already been cut. Consequently, if there is overcorrection, undercorrection, unnecessary narrowing, or asymmetry, they cannot be corrected or undone. Shaeer III is more flexible and less definitive because the rotating sutures can be undone and repositioned as needed, considering that no incisions have been made. The presence of the premarked close and far lines avoids unnecessary narrowing and overcorrection if the close lines suffice and avoids undercorrection by approximating the far lines, if needed.

Healing of the formerly used tunica albuginea incisions can sometimes be unpredictable, especially with postoperative erections deforming the healing incision lines, possibly making the healing process uneven and resulting in deformity or recurrence. This is avoidable using the noncorporotomy technique.

The interrupted transverse sutures with Shaeer III avoid the mild shortening that may result from the continuous longitudinal suture line, approximating penis-long incisions with the former techniques [8,9]. Finally, we opted for polyester polyfilamentous permanent suture material rather than nylon to avoid the pricking sensation from the protruding suture ends or stitch sinus formation, both reported with monofilamentous suture material.

Among the limitations of the study is that although we performed immediate pre- and postrotation measurements objectively with the penis in full erection, long-term evaluation was performed through less reliable subjective reporting, with few patients agreeing to provide postoperative photos in the erect state and even fewer agreeing to be subject to induction of artificial erection in the office.

Shaeer I and II are not obsolete. Although rotation by approximating corporotomies is more invasive, it avoids the remote possibility of recurrence due to breaking of the suture material; that was not witnessed with long-term follow-up of cases operated by Shaeer III. Shaeer II avoids asymmetry by adopting penis-long corporotomies, whereas Shaeer I is less invasive, considering that the neurovascular bundle mobilization and the incisions are only at the point of maximum curvature. With proper understanding,

the surgeon and the patient will be able to make the best choice.

## 5. Conclusions

Shaeer's corporal rotation enables correction of any degree of ventral congenital penile curvature, with minimal narrowing ( $0.77 \pm 0.9$ ) and neither shortening nor erectile dysfunction. The current modification of the technique (Shaeer III) is less invasive and has addressed the drawbacks of the former techniques.

**Author contributions:** Osama Shaeer had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* O. Shaeer.

*Acquisition of data:* O. Shaeer, K. Shaeer.

*Analysis and interpretation of data:* O. Shaeer, K. Shaeer.

*Drafting of the manuscript:* O. Shaeer, K. Shaeer.

*Critical revision of the manuscript for important intellectual content:* O. Shaeer, K. Shaeer.

*Statistical analysis:* O. Shaeer, K. Shaeer.

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*Supervision:* None.

*Other (specify):* None.

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## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.eururo.2015.08.004>.

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