ONE-STAGE CORRECTION OF CONGENITAL COMPLEX PENILE CURVATURE BY TUNICA ALBUGINEA Plications

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Penile curvature can be either congenital or acquired as a consequence of Peyronie’s disease. In about 10% of cases of congenital and more than 20% of cases of acquired penile curvature, the deformity becomes complex due to the presence of concomitant deviation, torsion, or corporal narrowing [1]. No restricting fibrous band, as found in chordee without hypospadias, is present in congenital complex penile curvature. Surgical correction is necessary only when the deformity is so severe as to cause difficulty in intromission, discomfort during sexual intercourse, and significant psychologic trauma.

Few authors have reported their experiences in treating congenital complex penile curvature [2, 3]. Previously, we successfully corrected isolated penile torsion by identifying a parabolic curve along the course of the torsion first, and then shortening the curve with a modified plication technique [4, 5]. The operative technique was developed further in an attempt to correct congenital complex penile curvature.

Complex penile curvature is the combination of penile torsion (a three-dimensional malrotation) and penile curvature (a two-dimensional deformity). As the most effective way of treating congenital complex pe-
Plications for Complex Penile Curvature

Five patients, with a median age of 28 years, who complained of difficulty in intromission or pain during intercourse, were diagnosed as having congenital complex penile curvature between November 1999 and February 2001. Various degrees (30–45°) and directions of penile curvature associated with 45° to 60° counterclockwise rotations (inspected by an examiner facing the penis of the patient) were demonstrated in these patients (Table). One-stage surgical correction by plicating the tunica albuginea was attempted to treat these patients.

Operative techniques
A circumferential subcoronal incision of the prepuce was first performed and the phallus was degloved with the overlying skin retracted toward the penile base in standard fashion. Artificial erection was induced by restricting the penile base with a rubber band and normal saline infusion into the corpus cavernosa of the penis. Penile deformity was inspected carefully. Penile curvature was identified immediately and the orientation of the urethral meatus was used as a reference to determine the direction and degree of penile torsion (Fig. 1). A parabolic curve was made from the twisted and elongated corporal surface, crossing the dorsal midline and extending toward the penile shaft obliquely to the counter-direction of the torsion [5]. Along the curve, two points were chosen for plications to correct the torsion. The first point was selected at the maximal curvature of the penis (Fig. 2). The choice of the second point for plication depended on the direction of penile curvature. For patients with ventral curvature, the second point was picked at the midpoint between the first point and the coronary sulcus along the curve (Fig. 2). For patients with lateral curvature, the second point was chosen at the intersection of the lateral line of the penis on the convex side with the parabolic curve.

Minimal dissection of the overlying neurovascular bundles at these two points (1 x 1 cm) was performed cautiously. Allis clamps were applied perpendicularly to the parabolic curve on the tunica albuginea at each point to create a bump (Fig. 3). Two interrupted U-shaped sutures, using absorbable 2-0 polyglactin (Vicryl, Johnson & Johnson, Sommerville, NJ, USA), were made parallel to the curve and underneath the tunica albuginea to secure the bump [4]. The remaining penile curvature was handled by applying an extra plication at the maximally convex area (Fig. 2). This point would be either on the dorsal or on the lateral side of the penile shaft depending on the direction of the curvature. Finally, the residual rotation of the urethral meatus, if present, was further corrected by reattaching the prepuce (Fig. 4). The wound was closed with 4-0 chromic catgut, and the penis was wrapped in

Table. Types and degrees of penile curvature and rotation in five patients with congenital complex penile curvature

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (yr)</th>
<th>Curvature</th>
<th>Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>Ventral 45°</td>
<td>Counterclockwise 60°</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>Ventral 45°, tilt to left</td>
<td>Counterclockwise 45°</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>Ventral 45°</td>
<td>Counterclockwise 60°</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
<td>Ventral 30°, tilt to left</td>
<td>Counterclockwise 60°</td>
</tr>
<tr>
<td>5</td>
<td>31</td>
<td>Right lateral 45°</td>
<td>Counterclockwise 60°</td>
</tr>
</tbody>
</table>
Figure 2. Associated ventral angulation of 45° is evident from the lateral view. Two areas along the parabolic curve are chosen for plication: one at the maximal angulation of the penile deviation (L) and another (M) at the midway between L and the coronary sulcus. An extra plication was applied on the dorsal penile shaft at the maximum angulation (N) of the remaining ventral curvature parallel to L.

Figure 3. To correct the torsion effectively, an Allis clamp on the parabolic curve must be set perpendicularly.

light compressive dressing with a self-adhesive bandage. Every patient was advised to abstain from sex for 2 months after surgery.

In Case 1, there was ventral curvature with counterclockwise rotation. Penile curvature was corrected first by two parallel plications on the dorsal tunica albuginea. Due to the difficulty of curvature correction in the presence of penile torsion, more plications were required to straighten the penis. The remaining torsion was then untwisted by one additional plication. In total, five plications were needed to accomplish a satisfactory result. In order to simplify the operation, we decided to reverse the procedural sequence to correct future cases.

Case 2 had ventral curvature with counterclockwise rotation, tilting to the left. Untwisting the torsion with two plications on the parabolic curve corrected the rotation and part of the ventral curvature. One additional dorsal plication completely corrected the remaining ventral curvature. In total, three plications were made.

Case 3 had ventral curvature with counterclockwise rotation. This patient was managed similarly to Case 2.

Case 4, there was ventral curvature with counterclockwise rotation, tilting to the left. After the torsion was untwisted, ventral curvature and leftward tilting disappeared, but a new right-lateral curvature of the distal penis developed which was corrected using one plication on the left lateral side of the penis.

Case 5 had right lateral curvature with counterclockwise rotation. After untwisting the torsion, an extra plication on the left lateral side of the penis corrected the remaining curvature.

Results

Neither Peyronie’s disease nor cutaneous chordee was found during operations on these five patients. After surgical correction, all patients had excellent cosmetic results with remaining angles of penile torsion and curvature of less than 5° and an average postoperative follow-up of 14 months (range, 9–20 mo). No recur-
Fig. 4. After the correction, the penis is straightened and the remaining rotation of the urethral meatus is less than 15°, which is further corrected by reattaching the prepuce.

rence of curvature was reported. Postoperatively, all reported sexual potency, and the straightened erect penis improved engagement in sexual intercourse. Neither pain from the erection nor bother from the bumps was reported. One patient experienced decreased penile sensation, which resolved completely after 2 months.

Discussion

Complex penile curvature describes penile curvature associated with penile torsion [1, 3]. Penile curvature is a two-dimensional deviation, while penile torsion is a three-dimensional malrotation of the erect corporal bodies. The presence of penile torsion should be suspected when the urethral meatus of the erect penis rotates away from the neutral vertical orientation. Possible causes of congenital penile complex curvature include cutaneous chordee with malalignment of the prepuce, disproportional development of the corporal bodies, and asymmetric insertion of the suspensory ligament on the dorsal surface of the tunica albuginea [6–9].

There are few reports of the treatment of congenital complex penile curvature in the literature. Slawin and Nagler used the Nesbit procedure with excision of ellipses inclined at 45° to the longitudinal axis of the penis to treat two cases of penile curvature associated with torsion [2]. The authors did not clearly depict how to adjust the direction of the incision and the suture angle in response to different types and various degrees of curvature and torsion. Therefore, over- or undercorrection may occur. Belgrano et al proposed an asymmetrical, racket-shape tunica albuginea excision to treat complex penile curvature [3]. They applied two different sizes of Allis clamps on the longer portion of the tunica albuginea to delineate the maximum area for excision. Practically, it is difficult to estimate the exact area for resection as a racket-shape. Austoni et al corrected complex penile curvature by resuspending the ipsilateral suspensory ligament to restore the true axis [9]. Their methods may serve well to treat simple congenital malrotation of the penis in children but will not effectively correct the rotated corporal bodies with curvature in a well-developed penis.

We proposed a novel way to correct congenital penile curvature: to divide the anomaly into two components (torsion and curvature), and then to correct them stepwise. Untwisting penile torsion, the first step of the correction, will transform a three-dimensional anomaly into a two-dimensional one. By shortening the elongated parabolic curve along the torsion appropriately, the torqued penis can be untwisted with ease. Usually, two plications are sufficient to untwist the torsion. For patients with complex penile curvature manifesting ventral penile curvature, the first two plicated areas along the parabolic curve are located on the dorsal penile shaft. In most circumstances, untwisting of the torsion will simultaneously correct the associated ventral curvature to some extent. For patients with complex penile curvature manifesting lateral penile curvature, the second area for plication is located at the intersection of the lateral line on the convex surface of the distal penile shaft with the parabolic curve. Again, the lateral curvature will be partially corrected by untwisting of the torsion. The remaining penile curvature, either ventral or lateral, can be handled with ease by applying an extra plication on the maximally convex area and a straightened penis is ensured.

Applying this method, only three plications are needed to correct congenital isolated complex penile curvature, as evident in Cases 2 to 5. The sequence of untwisting first, then correcting the remaining penile curvature is crucial. If the procedure is performed in reverse order, more plications are needed to complete
the procedure: for example, in the first case, five plications were needed to correct the complex penile curvature.

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References