

# CONGENITAL DORSAL PENILE CURVATURE: A POTENTIAL PROBLEM OF THE LONG PHALLUS

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## ABSTRACT

**Purpose:** We report the results of surgical correction of severe congenital dorsal penile curvature associated with a long slender phallus.

**Materials and Methods:** In the last 7 years we treated 16 boys with a mean age of 2 years 10 months who had severe dorsal penile curvature. The series included 5 patients with megameatus variant hypospadias and a full foreskin, 3 who presented with hypospadias and 8 who were referred when dorsal penile curvature was noticed by the family or primary physician. Mean penile length was 6.5 cm. without stretching. In each case length was greater than 2 standard deviations above the mean for patient age. Penile circumference decreased from a mean of 4.2 cm. at the base of the shaft to 4.1 cm. at the mid shaft and 3.7 cm. at the corona. Penile circumference was generally normal for patient age until corrected for length, when it was revealed to be small. Surgical correction of severe curvature was performed in 14 patients, while 2 who presented as newborns had remarkable spontaneous improvement in the first year of life. In each case curvature was due to corporeal disproportion.

**Results:** All patients have erections postoperatively. There has been no residual or recurrent curvature and cosmetic results are good.

**Conclusions:** Congenital dorsal penile curvature is a potential problem of the long phallus. In severe cases surgical repair improves the appearance of the penis but it must also address the problem of corporeal disproportion.

KEY WORDS: penis, abnormalities, hypospadias

Congenital curvature of the phallus is most commonly noted in the ventral direction and associated with hypospadias. Penile chordee in hypospadias may be the result of tethering of the ventral penile skin, atretic development of the corpus spongiosum, tethering of the urethral plate onto the corpora or corporeal disproportion.<sup>1</sup> Recognition that such chordee is often due to the development of the spongiosum or tethering of the plate and spongiosum to the corpora has allowed preservation of the urethral plate in greater numbers of hypospadias repairs.<sup>2</sup> However, it may be associated with corporeal disproportion in severe cases. Ventral penile curvature may occur without hypospadias, and may be associated with a normal or deficient spongiosum in what is likely a variant of hypospadias.

We recently reported on 87 patients who had ventral chordee without hypospadias and found a fairly equal distribution of skin tethering (32%), fibrotic dartos tissue (33%) and corporeal disproportion (28%). Tethering from the urethra is thought to be responsible for only 7% of cases.<sup>3</sup> Kelami reported 100 cases of congenital penile curvature without hypospadias, in the majority of which curvature was ventral.<sup>4</sup> The incidence of dorsal curvature was only 5% and 3 of 5 patients with dorsal curvature also had epispadias. Dorsal curvature in epispadias is associated with unique and difficult problems. Most dorsal and lateral penile curvature develops secondarily in adults with Peyronie's disease. The etiology of those later changes is now thought to be traumatic in most cases. Resultant fibrosis in the dorsal tunica may cause upward curvature of the phallus.

We have treated a series of patients with congenital dorsal curvature of the penis. During evaluation of the first few patients it became apparent that each had a long phallus. At early surgical repair we noted that the corpora were narrow

relative to length and seemed to taper distally. After treating several such patients we began to obtain careful measurements of penile length and circumference to document our impression. Since recognizing this association, we have noted that many if not most boys with a relatively long phallus also have mild upward curvature during erection. As in most congenital anomalies, the mild forms are much more common, and most mild curvature likely does not need any intervention.

## MATERIALS AND METHODS

During 7 years 16 boys 1 month to 11 years old (mean age 2 years 10 months) presented with significant dorsal curvature not associated with the exstrophy-epispadias complex, including 12 younger than 4 years. The angle of deflection was generally between 45 and 90 degrees (fig. 1). Five patients had megameatus variant hypospadias with a full foreskin. All patients were referred because of the penile anomaly initially noticed by the patient, family or primary physician. In 3 patients with hypospadias the urethral defect was of primary concern, and in the remainder obvious dorsal curvature was the reason for evaluation. In 1 case obstructive megareter had been noted prenatally. There were no other associated genital or medical problems.

Two patients presenting as newborns had dramatic spontaneous improvement in dorsal curvature in the first year of life. Six other patients initially seen before age 4 months were followed for a year without improvement before surgical repair. Older patients and families universally believed that dorsal curvature became more apparent with increasing age and growth.

Penile length was measured from the symphysis to the end of the glans in 14 of the 16 patients with and without stretch-



FIG. 1. Intraoperatively artificial erection demonstrates long phallus and upward curvature.

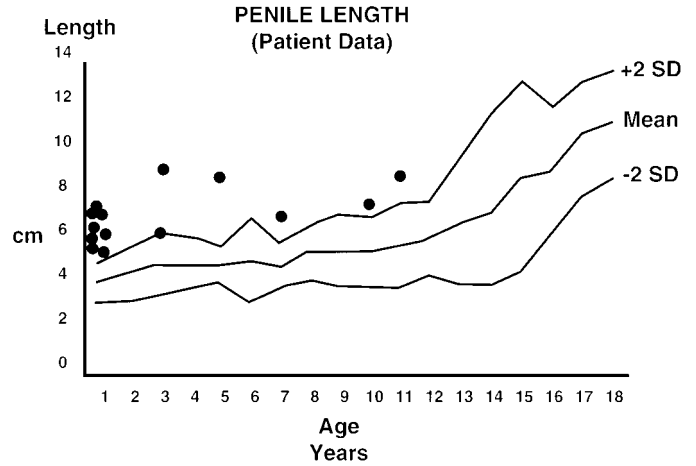


FIG. 2. Penile length in 14 of 16 patients was near or greater than 2 SD above mean for age.<sup>5</sup>

performed simple urethral advancement in 1 and tubularization of the wide plate in 4. In all 14 cases upward penile curvature was due to corporeal disproportion. Universally the ventral tunica was well developed without weakness but it was longer. In no case was skin tethering from neonatal circumcision a significant factor.

In most cases corporeal disproportion was corrected after mobilization of the urethra and corpus spongiosum away from the corpora cavernosa in the area of maximal curvature during artificial erection. In 8 cases the longer ventral tunica was shortened by wedge resection (fig. 4). In 2 cases multiple smaller ellipses were excised. After resection the corpora were reconstructed using absorbable suture. In 6 cases the tunica of the corpora was imbricated ventrally using permanent suture at the area of maximal curvature, including 3 in which the urethra and spongiosum were not mobilized. The difference in technique was based on surgeon preference. However, full wedge resection was generally performed for corpora with more severe curvature and disproportion. In no case did mobilization cause intraoperative injury to the urethra.

In 7 more severe cases dorsal orientation of the glans penis on the ends of the corpora was noted even after straightening corporeal curvature. In patients with hypospadias this glanular configuration was easily corrected by mobilizing the glanular wings around the neourethra. In those patients without hypospadias the coronal collar and ventral glans on either side of the spongiosum and urethra were mobilized off of the underlying corpora. Permanent mattress sutures were then placed firmly into the ventral glanular tissue on each side and anchored more proximal on the tunica of the corpora to correct the dorsal tilt.

RESULTS

All patients tolerated the procedure well on an outpatient basis. Mean followup is 3 years 8 months (3 years 6 months in 14 postoperatively). The 5 urethroplasties healed well without fistulas, stenosis or retraction. Postoperatively parents have noticed erections in all patients and there has been no apparent erectile dysfunction. No residual or recurrent curvature has been recognized by the families or surgeons. No patient has had palpable fibrosis or irregularity at the area of corporeal tailoring. Cosmesis has been good. All patients and families are satisfied with the functional and cosmetic appearance. Although penile length was not measured after repair or postoperatively, apparent length has remained well above average.

ing. Mean unstretched penile length was 6.5 cm. In all patients the penis was at or above 2 standard deviations (SD) greater than mean normal length for patient age, as reported by Damon et al (fig. 2).<sup>5</sup> Average increase in length with stretching was 16 mm.

Because of our impression of a long slender corpora that tapered distally, we measured penile circumference at the base, mid shaft and corona in the last 10 patients. Average circumference decreased from 4.2 cm. at the base of the phallus to 4.1 cm. at the mid shaft and 3.7 cm. distally at the corona. Mid shaft measurements were normal for patient age without considering phallic length (fig. 3, A).<sup>5</sup> When adjusted for abnormal length, the circumference in each case was at least low normal and greater than 2 SD below the mean circumference in most cases.<sup>5</sup> Figure 3, B shows that each individual circumference was noted at the age at which corresponding penile length would be average rather than according to true patient age.

Of the 16 patients 14 underwent surgical repair of severe curvature, including all 5 with hypospadias. All repairs were done on an outpatient basis. No urethral stents or catheters were left indwelling in patients who did not undergo associated hypospadias repair. Of the 5 boys with hypospadias we

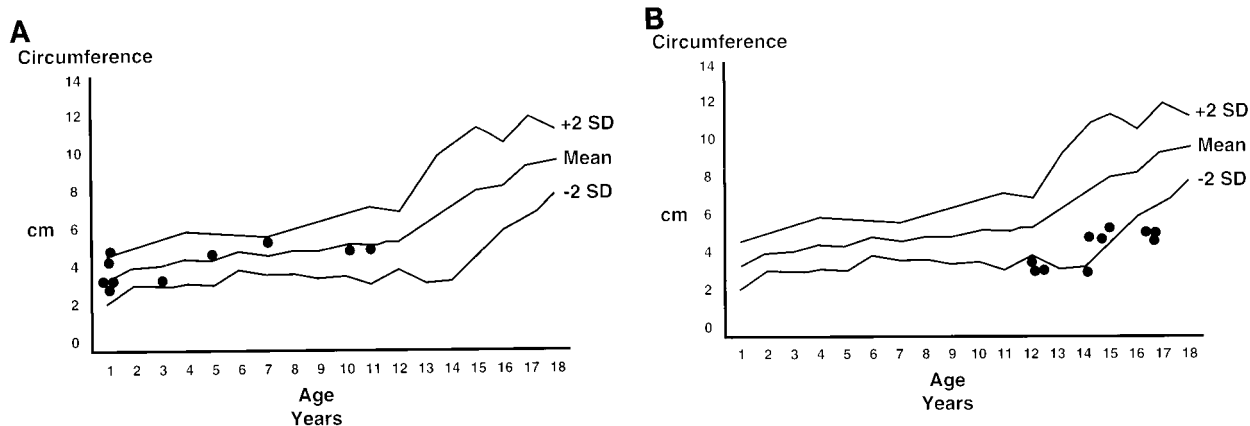


FIG. 3. Mid shaft penile circumference.<sup>5</sup> *A*, circumference was not abnormal when only considering age. *B*, when adjusted for penile length, circumference was low normal or abnormally small.

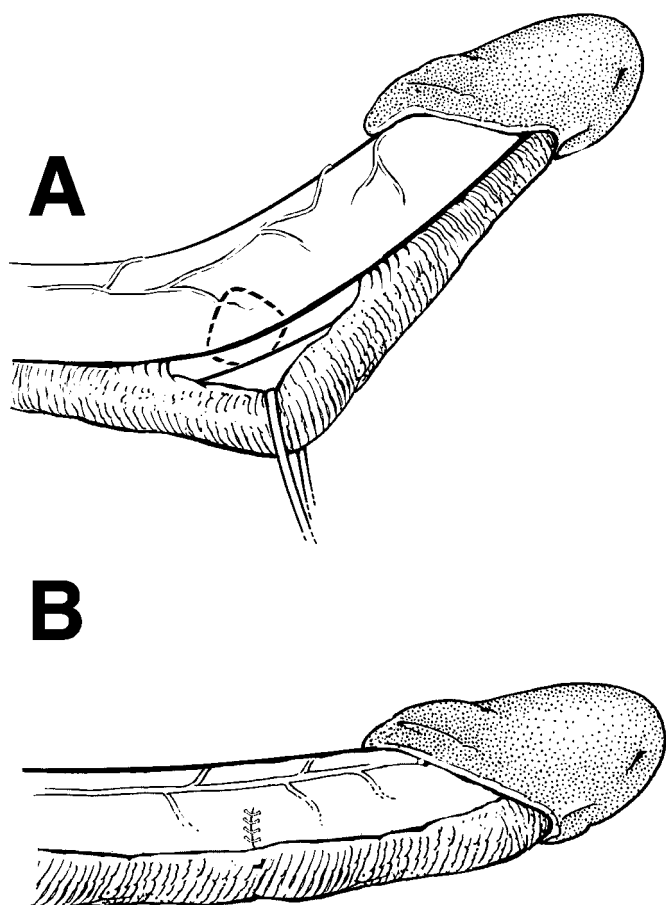


FIG. 4. *A*, in majority of cases urethra was mobilized from ventral corpora in area of maximum curvature, providing good exposure for resecting wide ellipse or ellipses of tunica. *B*, corpora were reconstructed using absorbable suture.

#### DISCUSSION

Dorsal penile curvature is easily recognized in boys with exstrophy and epispadias. The etiology of curvature in these cases is related to the development of the corpora and open urethral plate. Occasionally upward curvature may be acquired after poor circumcision when a shortage of dorsal penile skin is created. Dorsal or lateral penile curvature in adults is usually secondary to fibrosis in the dorsal tunica after repeat minor trauma. In our experience true congenital dorsal penile curvature related to corporeal disproportion is

occasionally present in boys with a long phallus. Phallic length in all patients in our series was well above average. After we recognized this association mild upward curvature in boys with a long phallus became evident, and may well represent a variant of the normal penis. Less severe curvature is more frequent than severe curvature, and does not require concern or intervention. One must be careful when creating an artificial erection in such cases since over filling the corpora may exacerbate the degree of curvature. We attempted to judge the degree of curvature and necessity of correction preoperatively based on history and by inducing a more normal erection at the clinic by applying constant pressure around the base of the phallus. We were concerned when the angle of curvature increased above 45 degrees and when it approached 90 degrees.

We have been impressed that these patients with significant curvature have narrow and long corpora. Measurements have revealed that penile circumference was normal for patient age but small when corrected for penile length. It has also been our impression that these corpora taper distally more than is normal. Measurement of the penile circumference at different levels of the phallus support this impression.

There was dramatic spontaneous improvement in dorsal penile curvature in 2 infants when curvature essentially resolved by age 1 year. We are aware of this phenomenon in another patient.<sup>6</sup> Although we have treated more infants who did not than did have spontaneous improvement, we presently follow such patients until at least age 1 year to allow for spontaneous improvement. In older children the patients and families have been universally impressed that the degree of curvature becomes more apparent with increasing age and growth. This observation supports the recent contention based on Laplace's law that after corporeal disproportion increased pressure at the area of curvature with repeat erections leads to increased disproportion.<sup>7</sup> A report by Udall of a patient with congenital dorsal curvature indicated worsening curvature with age and growth.<sup>8</sup> We treated 1 patient with mild upward penile curvature documented by artificial erection at distal hypospadias repair 4 years ago who since recognized progressive curvature and recently required penile straightening. Why spontaneous resolution developed in 2 young patients is unknown.

We performed surgical correction in our patients for 2 major reasons. Patients and/or families have cosmetic and psychological concerns due to these noticeable penile anomalies, which are much more obvious than mid to distal shaft hypospadias that we commonly repair. Also the degree of curvature with erection has been so significant in these cases that we have been concerned about eventual pain or buckling

with sexual intercourse. Surgical correction has been successful, at least at short-term followup. Straightening has been accomplished with apparent safety to date, although long-term observation is necessary. We have achieved good results with tailoring or imbrication of the ventral tunica after mobilization of the urethra and spongiosum. We have also found that ventral fixation of the glans improves dorsal orientation of the glans penis in some patients.

The purpose of our series is not to review techniques of corporeal tailoring or suggest that one is more favorable in this setting. In several cases the degree of disproportion and difference in tunical length on either side were dramatic. Our preference for correction in those boys was and remains excision of a large ellipse of the longer ventral tunica or even multiple small ellipses across the ventral side. It is our impression that mobilizing the urethra provides optimum exposure for aggressive tailoring. We are concerned that the urethra may be kinked if not mobilized in such cases, although we have no experience that kinking would occur or represent a long-term problem. Mobilization of the urethra and normal spongiosum in these cases was relatively easy and it was done without injury. In 6 cases, generally those of less severe curvature, we performed imbrication of the ventral tunica using permanent suture. We did not incise the tunica in these cases or bury a strip of tunica between incisions. We did not mobilize the urethra in 3 of the 6 cases and had no problems. It is possible that all boys would have been treated effectively in that manner or with any effective technique for corporeal tailoring.

Dorsal penile curvature associated with hypospadias is rare but it was present in 5 patients in our series. These boys had a megameatus variant, and to our knowledge this asso-

ciation has not been previously reported. The association emphasizes the need for artificial erection even in mild forms of hypospadias.

#### CONCLUSIONS

Congenital dorsal penile curvature is a potential problem of the long phallus. In most cases the degree of curvature is mild and likely does not require any intervention. In severe cases surgical repair of the corporeal disproportion has resulted in a normal appearing penis with straight erections.

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