

## Our Experience in Chordee without Hypospadias: Results of 102 Cases

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**Purpose:** We present long-term surgical experience of 102 chordee without hypospadias cases.

**Materials and Methods:** This retrospective study included 102 chordee without hypospadias cases who were surgically treated between 1999 and 2012. Range of patients' age was from 1 month to 31 years. Seventy-two patients were adult, and 30 were children. Mean duration of follow up was 49.3 months. The patients were categorized into 4 groups including skin tethering (group 1), fibrotic dartos and Buck's fasciae (group 2), corporeal disproportion (group 3) and urethral tethering (group 4) with the aid of intraoperative artificial erection, according to the structural defect.

**Results:** Forty patients (group 1) were successfully treated with penile degloving. Except 3 (10%) of 31 (group 2) cases, extensive resection of the fibrotic dartos and Buck's fascia was needed to straighten the penis. Corporeal disproportion was identified in 27 patients of whom 2 cases (7%) had complications. One of them developed urethrocutaneous fistula, and he was treated with buccal mucosal graft urethroplasty successfully. In other one, chordee persisted after two years, and we had to do Nesbit wedge resection after tunica albuginea plication to achieve penile straightening at the same session; otherwise we avoid tunica albuginea excision or incision. Overall 96 (94%) of 102 patients were successfully treated at first operation.

**Conclusion:** We concluded that tunica albuginea plication is very effective for both prepubertal and postpubertal period and also in management of recurrence. We believe that, in experienced hands, early surgical correction can be done successfully in this condition.

**Keywords:** penis; abnormalities; urologic surgical procedures; hypospadias; male; methods.

## INTRODUCTION

Chordee without hypospadias or congenital penile curvature is a comparatively rare condition. In 1937 Young proposed that, chordee without hypospadias was due to a congenitally short urethra.<sup>(1)</sup> At the present time; it has become well acknowledged that urethral tethering is not always the cause of penile curvature, and this has led to more urethra-preserving urethroplasty procedures.

Devine and Horton classified chordee without hypospadias into three types.<sup>(2)</sup> Type 1 represents the deficiency of corpus spongiosum and Buck's and dartos fascia from the site of chordee to the glans. In type 2 the spongiosum is normal, while the dartos and Buck's fasciae are dysgenetic. In type 3 corpus spongiosum and Buck's fascia are normal but dartos fascia is deficient. Kramer and colleagues<sup>(3)</sup> added type 4, which results from corporeal disproportion and Type 5 which is termed congenital short urethra.<sup>(2)</sup>

We review our experience about the congenital chordee without hypospadias in a large series of Turkish prepubertal and adolescents/adult patients.

## MATERIALS AND METHODS

### Study Patients

From July 1991 to December 2009, 102 patients 1 month to 31 years old (median age 19.2 years) who were treated for the congenital chordee without hypospadias retrospectively reviewed. Seventy-two of the cases were adolescents/adult age and all patients in this age group were previously circumcised. Only 22 of 30 children could be followed until adolescent age. Of these patients 8, 6, 5 and 3 were in groups 1, 2, 3 and 4, respectively (**Figures 1-4**).

Cases of a paper-thin hypoplastic distal urethra were excluded from the study and managed with excision and reconstruction of the abnormal urethral segment. Patients with previous surgical corrections were excluded.

Indications for surgery included abnormalities in the prepuce, parental complaint of penile curvature at erection or a penile angle greater than 30° on examination under natural erection. Some author proposed that the correction age of chordee should be after puberty,<sup>(4)</sup> but others advocate that if diagnosed in childhood correction should be at that time<sup>(6)</sup> We follow the same principle of managing the patient whenever he presents.

### Surgical Technique

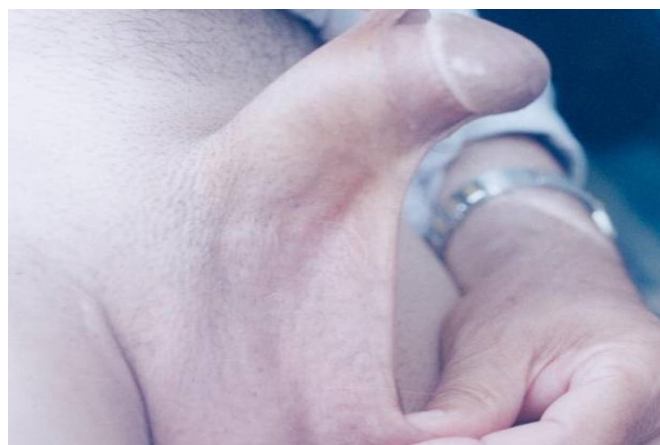
In all cases, a circumcision incision was made, and the skin was degloved down to the base of penis. Then an artificial erection was induced to assess the degree of curvature. Patients whose penis straightened after degloving were considered to have skin chordee due to abnormal dartos facial tethering of the skin to the underlying Buck's fascia (group 1) (**Figure 1**). When chordee persisted, any abnormal dense fibrous tissue was excised over the urethra. Patients in whom chordee was corrected at this point were considered to have fibrotic Buck's and dartos fasciae as the etiology of chordee (group 2) (**Figure 2**). For patients in whom 2 steps failed and curvature was not thor-



**Figure 1.** Group 1, Skin chordee.

oughly resolved, the urethra and corpora cavernosa were checked for the cause of the curvature. Although no significant urethral tethering was shown if the penis was still ventrally curved under artificial erection, the cause was corporeal disproportion (group 3) (**Figure 3**) and patients were treated with dorsal midline plication as reported by Baskin and colleagues.<sup>(5)</sup> We frequently performed tunica albuginea plication and when it was unnecessary we stood aside tunica albuginea excision and incision in this condition. Two of group 3 patients had small penis so we made corporeal graft augmentation (inguinal dermal and rectus facial graft) and urethroplasty. Patients who had tethered urethra after complete urethral mobilization underwent urethral division and creation of a tubularized preputial or buccal mucosa graft (group 4) (**Figure 4**).

In all patients an artificial erection test was performed at the end of procedure to confirm the penile straightening. Postoperative dressing and stenting varied according to procedure. For patients who did not undergo urethroplasty, the urethral stent was removed next day after surgery and dressing removed at 3 days. For those who underwent urethroplasty, the urethral stent was removed at 7 postoperative days with dressing. For those in whom we did not perform urethroplasty we left a stent for one day because of spinal anesthesia in postpubertal patients and difficulty in urination due to pain in prepubertal patients. During the of follow up period, successful release of chordee was con-



**Figure 2.** Group 2, Fibrotic Buck's and dartos fascia.

firmed by physical examination and patient or parental observation of erection.

## RESULTS

Forty patients (39%) were categorized as group 1 chordee, 31 patients (30%) as group 2, 27 patients (27%) as group 3 and 4 patients (4%) as group 4 (Table 1). Mean duration of follow-up was 49.3 months. Only 30 of 102 cases were children and 22 patients could be followed until adolescent age.

Artificial erection test was performed in all patients at the beginning to assess the degree of curvature and at the end of the procedure to confirm the penile straightening (Figures 5-7). Except 8 patients in group 1, all had a chordee more than 30° (94%). Ninety-six (94%) of the 102 cases were cured after first operation. Management of patients according to age groups is shown in Tables 2 and 3. All group 1 patients were successfully treated at first operation. In 3 (10%) of group 2 patients chordee recurred and managed with tunica albuginea plication and one was operated in infantile age and dorsal penile curvature more than 30° was found in control at adolescent age and straight penis was gained with dorsal midline plication. One of group 3 patients who underwent corporal graft augmentation (inguinal dermal and rectus facial graft) and urethroplasty, developed urethrocutaneous fistula and treated with buccal mucosa graft urethroplasty successfully. In one of group 3 patients who were operated at child age, right 40° lateral penile curvature was found in control at adolescent age. We had to elevate dorsal vessels and nerves after penile degloving and performed Nesbit wedge resection after tunica albuginea plication to achieve penile straightening at the same session; otherwise we stood aside tunica albuginea excision or incision. Urethrocutaneous fistula occurred in 1 (25%) child of group 4 patients and successfully treated with longitudinal island flap urethroplasty.

## DISCUSSION

There are no definitive guidelines for management of chordee without hypospadias, and controversy still continues on etiology or surgical management of this entity.



Figure 3. Group 3, Corporeal disproportion.

Table 1. Classification of study patients.\*

Groups	Definition	Complications
1 Skin chordee	40 (39)	0
2 Fibrotic Buck's and dartos fascia	31 (30)	3 (10)
3 Corporeal disproportion	27 (27)	2 (7)
4 Congenitally short urethra	4 (4)	1 (25)
Total	102 (100)	6 (6)

\* Data are presented as no. (%).

In 1937 Young proposed that it was due to a congenitally short urethra and should be managed by transection and reconstruction of hypoplastic urethra.<sup>(1)</sup> Devine and Horton in 1973 proposed that chordee without hypospadias was due to abnormal development of fascial layers surrounding the urethra and majority of these patients could be treated with resection of fibrous tissue for chordee correction, transection of urethra being rarely required.<sup>(2)</sup> Kramer and colleagues in 1982 found that corporal disproportion was another principal cause of chordee.<sup>(3)</sup> They recommended that dorsal corporeal plication should be performed according to the Nesbit principle to correct this type of chordee without hypospadias. However, others suggested that elongation of the ventral corporeal bodies with graft material was superior to plication of the dorsal corporeal bodies in severe penile curvature.<sup>(7-9)</sup> In 1992 Hendren and Caesar reported disappointing results and significant recurrence of chordee after long-term follow up by Nesbit himself,<sup>(10)</sup> though Chertin and colleagues reported that dorsal tunica albuginea plication is a simple and efficient method with good long-term results for correction of chordee without any damage to neurovascular bundles.<sup>(11)</sup> In our series of 102 patients the etiology of isolated chordee



Figure 4. Group 4, Congenitally short urethra.

was evenly distributed among skin tethering (39%), fibrotic Buck's and dartos fascia (30%), corporeal disproportion (27%) and a congen

**Table 2.** Management methods in prepubertal patients.

Groups	No.	Procedure Performed	No./Type of Complication	Management Methods of Complications
1	16	Penile degloving	----	----
2	6	Chordectomy	1/Penile curvature	Dorsal midline plication
3	5	Dorsal midline plication	1/Penile curvature	Tunica albuginea plication and Nesbit
4	3	Urethral division and tubularized preputial graft urethroplasty	1/Fistula ---- ----	Longitudinal island flap urethroplasty ---- ----

**Table 3.** Management methods in postpubertal patients.

Groups	No.	Procedure Performed	No./Type of Complication	Management Methods of Complications
1	24	Penile degloving	----	----
2	25	Chordectomy	2/Penile curvature	Tunica albuginea plication
3	20	Dorsal midline plication	----	----
	2	Corporal graft augmentation and urethroplasty	1/Fistula	
4	1	Urethral division and Buccal mucosal graft urethroplasty	----	----

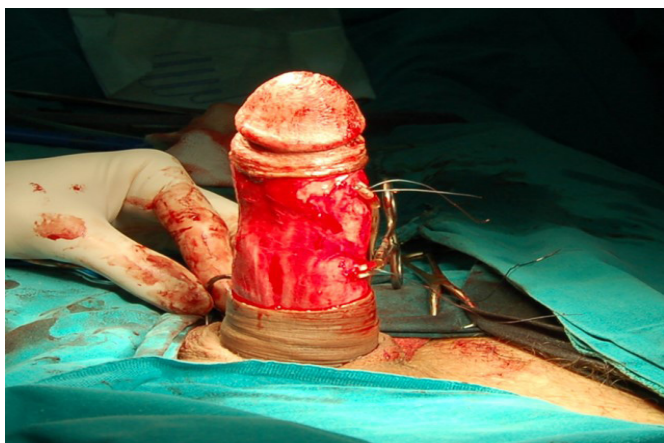
itally short urethra (4%). Paper-thin hypoplastic urethral cases (type 1) were excluded from the study, since they were considered hypospadiac variants, and were managed with excision and reconstruction of the abnormal urethral segment.

Patients with skin chordee had the best outcome in our series with no complications or recurrence. Only 3 (10%) of fibrotic dartos and Buck's fascia patients required repeat surgery for recurrent chordee and tunica albuginea plication was adequate in this condition. Patients with corporeal disproportion had also good outcome except 2 (7%) cases who one of them had small penis and underwent corporal graft augmentation and urethroplasty, developed urethral fistula. Buccal mucosa graft urethroplasty was sufficient and did not require repeat surgery, in the other patient curvature was recurred in adult age and Nesbit plication was needed to correct the lateral curvature. Only in one patient as a management of curvature recurrence we had to do Nesbit otherwise we did not need to excise or incise tunica albuginea. Cases of urethral tethering had the worst prognosis although we had only four patients in this group. Urethrocuteaneous fistula occurred 1 (25%) of 4 patients and treated with longitudinal island flap urethroplasty (**Table 4**).

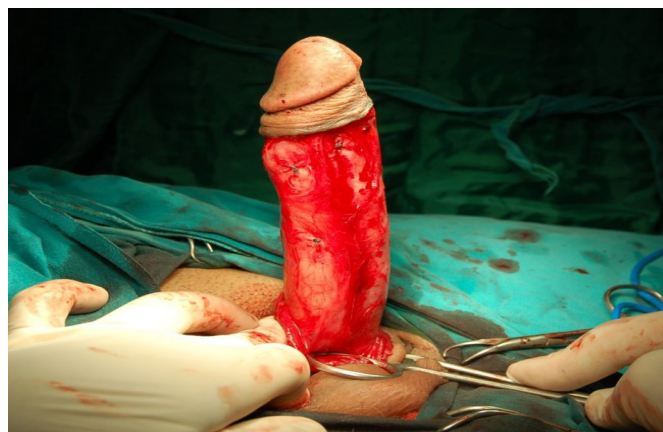
Overall 96 of the 102 patients (94%) were successfully treated at first operation. In cases of corporeal disproportion and urethral tethering there is an increased risk of fistula formation. We did not see meatal stenosis, urethral stricture and urethral diverticulum in our patients. This may be due to limited number of patients in group 4 and excluding the hypoplastic distal urethra cases from the study.

**Figure 5.** Artificial erection test.**Table 4.** Types and number of complications.

Groups	Type	Complications no.
1	----	----
2	Persistent chordee	3
3	Persistent chordee	1
	Fistula	1
4	Fistula	1
Total		6



**Figure 6.** Artificial erection test at the end of the procedure.



**Figure 7.** Artificial erection test at the end of the procedure confirms the penile straightening.

## CONCLUSION

In our experience of correction of chordee without hypospadias, tunica albuginea plication is very effective for both prepubertal, postpubertal period and also management of recurrence. We suggest that, in experienced hands, early surgical correction performed successfully in cases with chordee without hypospadias.

## CONFLICT OF INTEREST

None declared.

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