Two-stage versus single-stage repair for severe hypospadias with moderate chordee

Mohamed E. Hassan[a,b]

Introduction **Modern approach in hypospadias repair is to preserve the urethral plate if possible. The aim of the current study was to compare the final outcome for repair of severe hypospadias with moderate chordee using single-stage Snodgrass repair versus two-stage repair with dermal graft corporoplasty and to measure the degree of parent's satisfaction for both procedures.**

Patients and methods **A retrospective review was performed for all cases of severe hypospadias during the period from February 2006 to February 2013. Cases of severe hypospadias were defined as proximal penile, penoscrotal, and scrotal. Moderate chordee was defined as a chordee between 30 and 50°. Exclusion criteria included chordee more than 50°, perineal hypospadias, and cases in whom the chordee was corrected by division of the urethral plate. Two-stage repair was performed with dermal graft corporoplasty and single-stage repair was performed using Snodgrass repair.**

Results **A total of 39 patients were included in the study. The mean age at surgery for single-stage repair was 18 months versus 21 months for the two-stage repair. There was statistically significant less duration for completion of the surgical procedures for single-stage repair. Postoperative complications were 47 versus 12.5% for single-stage and two-stage repair, respectively, which was statistically significant. There was statistically significant better parents' satisfaction for the two-stage repair.**

Conclusion **Repair of severe hypospadias with moderate chordee using two-stage dermal graft corporoplasty was associated with statistically significant less postoperative complications and more parents' satisfaction than single-stage Snodgrass urethroplasty repair. *Ann Pediatr Surg* 10:125–129 © 2014 Annals of Pediatric Surgery.**

Annals of Pediatric Surgery 2014, **10**:125–129

Keywords: chordee, hypospadias, satisfaction, severe

[a]Department of Pediatric Surgery, Faculty of Medicine, Zagazig University, Zagazig, Egypt and [b]Al Qassimi Hospital, Sharjah, UAE

Correspondence to Mohamed E. Hassan, MD, PhD, FEBPS, FAAP, PO Box 441103, Dubai, UAE
Tel: +971 502 459 456; fax: +971 042 515 232; e-mail: dmia88@hotmail.com

Received 6 February 2014 **accepted** 6 July 2014

Introduction

The goals of primary hypospadias repair include straightening the curvature of the penis, extending the meatus to the glans tip, and revising the abnormal prepuce by either circumcision or foreskin reconstruction to allow satisfactory cosmetic and functional results regarding urination and sexual function [1].

Modern approach in hypospadias repair is to preserve the urethral plate if possible [2]. Given the relative simplicity of the operative concept for Snodgrass repair, low complication rate, and good cosmetic results in distal hypospadias, the tubularized incised plate procedure has been progressively applied to more proximal defects [3,4].

Although Snodgrass believes in the preservation of the plate as far as possible, he acknowledged that the urethral plate cannot be preserved in all cases of severe or proximal hypospadias [5,6].

The aim of the current study was to compare the final outcome for repair of severe hypospadias with moderate chordee using single-stage Snodgrass repair versus two-stage repair with dermal graft corporoplasty and to measure the degree of parent's satisfaction for both procedures.

Patients and methods

A retrospective file review (after hospital administration approval) was performed for all cases of severe hypospadias during the period from February 2006 to February 2013 operated by a single surgeon.

Cases of severe hypospadias were defined as cases with proximal penile, penoscrotal, and scrotal. Moderate degree of chordee was defined as a chordee between 30 and 50° [7,8].

Exclusion criteria included cases with chordee more than 50°, perineal hypospadias, and cases in whom the chordee was corrected by division of the urethral plate.

The following data were collected: type of surgery, type of hypospadias, age at surgery, degree of chordee, postoperative complications, the duration to finish all the surgical procedures (including the surgical repair for postoperative complications), follow-up period, and parents' satisfaction.

The data were analyzed and statistical significance was calculated using SPSS 17 (SPSS Inc., released 2008. SPSS Statistics for Windows, Version 17.0, Chicago, USA). The χ^2-test and the t-test were used to test for statistical significant differences between the groups, and P value less than 0.05 was considered as statistically significant difference.

Parents' satisfaction was measured using the answers to the degree of satisfaction for the final surgical outcome and cosmetic appearance, through a telephone call conducted by a social worker who was blinded to the performed surgical procedure. Excellent, very good, good, and poor were the answers given to the parents to choose from.

1687-4137 © 2014 Annals of Pediatric Surgery DOI: 10.1097/01.XPS.0000452989.89735.fa

Surgical techniques

Two-stage repair

Dermal graft corporoplasty was used for the two-stage repair for chordee correction. The graft was harvested from the nonhairy inguinal skin area.

The first-stage surgical technique: After complete degloving of the penis, release of all the tethering tissues around the urethral plate was performed. Artificial erection was performed to measure the degree of residual chordee. If the chordee degree was between 30 and 50°, the urethral plate was divided at the maximum chordee angle and the urethral plate was separated proximally and distally from the corpus cavernosum.

Artificial erection was reperformed, if the chordee was less than 30°; a tabularized preputial flap was harvested from the inner surface of the prepuce to bridge the defect of the urethral plate; and the original urethral plate was tabularized proximally and distally then anastomosed to the preputial tube flap (those cases were excluded from the study).

If the degree of chordee was between 30 and 50° after urethral plate division, the tunica albuginea of the corpus cavernosum was excised at the angle of maximum curvature, taking great care not to injure the central corpus cavernosum artery, to achieve a straight penis. The defect of the corpus cavernosum was measured and the same size of the defect was replaced with a diamond-shape dermal graft.

The dermal graft was de-epithelialized completely then sutured in a water-tight continuous sutures manner, to the edges of the tunica albuginea, then artificial erection was performed to ensure absence of leak.

The preputial skin was incised as a Bayer's flap; the inner layer of the prepuce was excised; and the outer preputial skin was moved ventrally to be sutured to the midline over the dermal graft and to the edges of the urethral plate. No extra skin was excised at this stage.

A Foley catheter was left in the meatus for 5 days and a compressive circular dressing was applied for the penis postoperatively.

The second-stage surgical technique: It was performed after 6–9 months from the first stage. An 8 mm width of the urethral plate was fashioned. Tubularization of the urethral plate was performed around 8-Fr urethral stent with 7/0 polyglactin two layers interrupted sutures; local flaps were created from the surrounding penile tissue to cover the sutures line of urethroplasty. The suprapubic midline fat deficiency was repaired by approximating the lateral suprapubic fat together in the midline. A suprapubic catheter was used for 12 days and the urethral stent was kept for 10 days postoperatively (Figs 1a–e and 2).

Single-stage repair

Tubularized incised plate Snodgrass urethroplasty was used for all cases of single-stage repair. The chordee was corrected using Nesbit's dorsal plication procedure.

Urethral stent was inserted for 7 days postoperatively.

For single-stage repair, the degree of chordee was measured after complete degloving of the penile skin, excision of the fibrous tissues around the urethral plate, and mobilization of the splayed corpus spongiosum.

Preoperatively, parents were fully explained the pros and cons of both procedures; parent's informed consent was obtained for both procedures in all cases. Selection of the type of the procedure was performed in a random manner (a group of parents preferred to perform a single stage if possible for social reasons; other groups of parents preferred to get the best cosmetic results).

All cases received a single preoperative dose of amoxicillin/clavulanic acid and continued postoperatively as well as enema on the night of surgery. Oxybutynin (2.5 mg) twice daily was given postoperatively until the stent was removed.

Follow-up visits included calibration of the urethra at 2 weeks, 1 month, 2 months, and 3 months postoperatively, then every 3 months for 1 year to exclude any urethral or meatal stenosis.

Results

During the study period, 52 patients were operated for severe hypospadias and 39 patients were found to have a moderate degree of chordee, and their data were included in the study.

The mean age at surgery for single-stage repair was 18 months versus 21 months for the two-stage group; the type of surgery and the mean degree of chordee are shown in Table 1.

The duration for completion of all the surgical procedures was 10 and 18 months in the single-stage and two-stage groups, respectively (Table 2).

In all, 87 and 83% of the parents in single-stage versus two-stage repair, respectively, were accessible for a telephone questionnaire for the degree of satisfaction (Table 3).

Follow-up period for both procedures ranged from 15 to 36 months.

Discussion

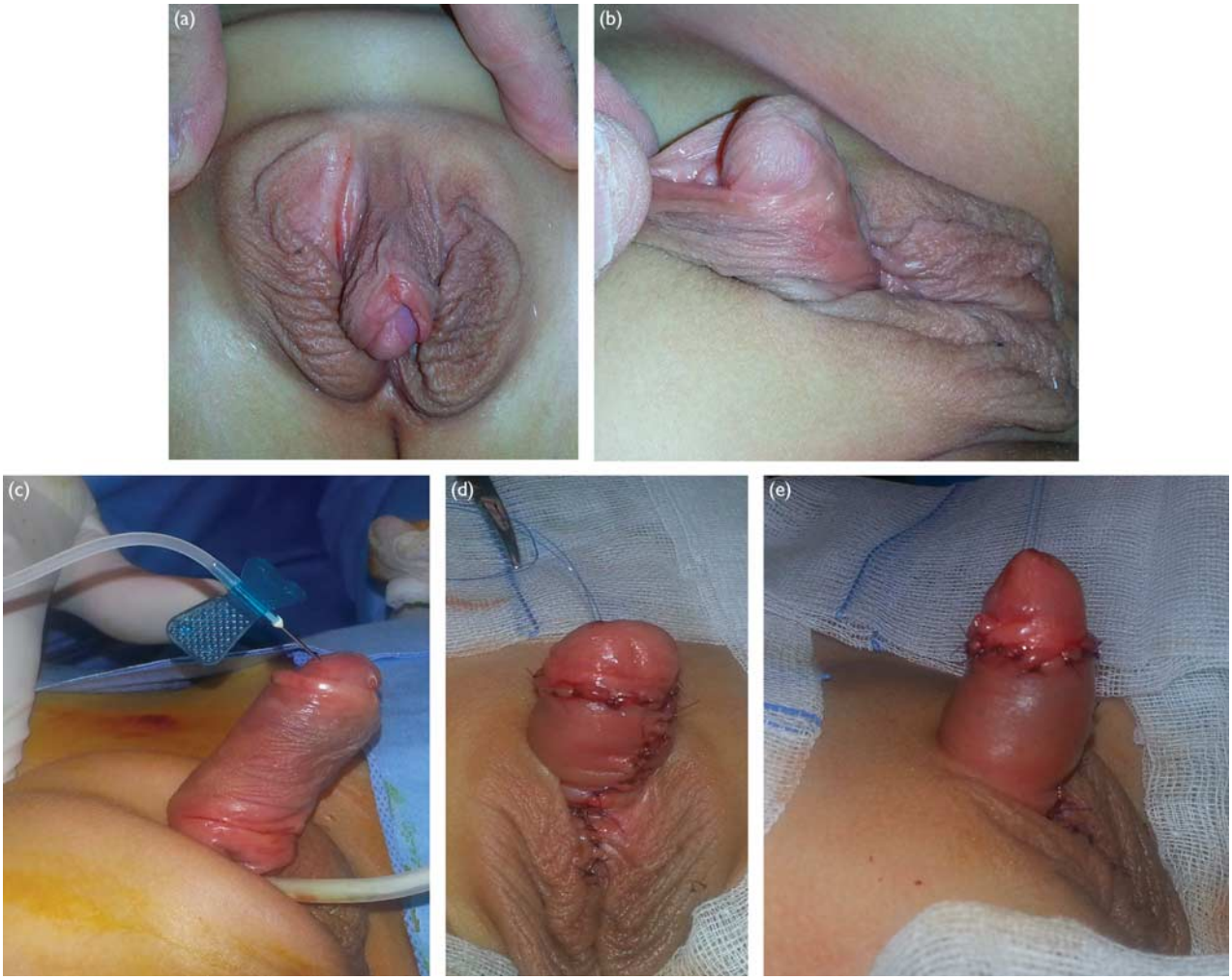
There is some reluctance to use dermal grafts for augmenting the tunica albuginea to correct severe forms of chordee. The main concern is that, by violating the integrity of the tunica albuginea, venous leakage could presumably ensue and result in erectile dysfunction [9].

In 1983, Kogan *et al.* [10] and in 1998 Lindgren *et al.* [11] suggested an interpositional dermal grafting in patients with persisting severe chordee of $\sim 30^{\circ}$ or more after conventional techniques, especially when the penis was short. The results of this technique were satisfactory without postoperative erectile dysfunctions.

Caesar and Caldamone [12] and Gershbaum *et al.* [13] reported better results for dermal graft than tunica vaginalis graft for chordee correction with severe hypospadias.

There were no statistically significant differences in the mean age at surgery, degree of chordee, and type of hypospadias between single-stage versus two-stage repair.

Fig. 1



(a) Penoscrotal hypospadias; (b) after first-stage dermal graft corporoplasty and penoscrotal transposition repair; (c) artificial erection after reconstructing the urethra and before excising extrapenile skin (note the suprapubic midline fat deficiency); (d) after excision of the extra skin, ventral view; (e) after excision of the extra skin, lateral view (note the absence of the suprapubic midline fat deficiency).

There was statistically significant less time for the single-stage repair compared with the two-stage repair for the duration required to finish all the surgical procedures.

Incidence of postoperative urethral fistula was 27 versus 12.5% for single-stage and two-stage repair, respectively. The higher incidence of fistula in the single-stage repair may be attributed to the aggressive dissection around the urethral plate to release the chordee as much as possible, which is not required in the two-stage repair.

Meatal stenosis was not encountered in the two-stage repair versus 13% in single-stage repair. There was one case (7%) of complete repair dehiscence in the single-stage repair, which was due to trauma on the third postoperative day.

There was statistically significant less incidence of total postoperative complications in the two-stage versus single-stage repair.

Ozturk *et al.* [14] reviewed their 15-year experience with one-stage repairs and have come to a similar conclusion that severe chordee and proximal hypospadias are associated with higher complication rates.

Snodgrass and Lorenzo [15] reported 33 patients who had severe hypospadias in which they were operated using his technique with dorsal plication. He reported an incidence of 21% fistula, 6% complete repair dehiscence, and 3% meatal stenosis with a total complication rate of 33%.

Parents' degree of satisfaction posthypospadias repair is very rarely highlighted in the pediatric surgery literatures, although it is a very good landmark for the cosmetic appearance of the procedure used from the parents' point of view. Pope *et al.* [16] showed an excellent parents' satisfaction with the use of dermal graft to correct the chordee in severe hypospadias. Snodgrass *et al.* [17] used a standardized questionnaire to parents and operating surgeon to determine their opinion regarding outcomes from tubularized incised plate hypospadias repair.

Telephone questionnaire for parents' satisfaction for both types of repair was conducted after completing all the surgical procedures including postoperative complications.

There were statistically significantly more parents' satisfaction for the two-stage versus single-stage repair. This result of parents' satisfaction indicates that the main concern for parents of hypospadias children is the cosmetic appearance regardless of the time required to reach this target.

The current study was a retrospective experience with no standardized patient selection, with small number of patients, and the questionnaire used for parents' satisfaction is not a validated questionnaire. For the above drawbacks of the study, giving the small numbers of this type of hypospadias, a prospective multi-institutional study should be conducted in the future. A validated questionnaire to measure the parents'/patient satisfaction and the patients' quality of life, especially after puberty, should be a scope of future studies.

Fig. 2

Penoscrotal hypospadias after single-stage Snodgrass urethroplasty.

Table 1 Mean age at surgery, type of hypospadias, and mean degree of chordee

	Single-stage repair ($n=15$ patients)	Two-stage repair ($n=24$ patients)	χ^2-test/ t-test, P
Mean age at first surgery (months)	18	21	$t=1.9$, $P>0.05$
Type of hypospadias [n (%)]			
Proximal penile	8 (53)	10 (42)	$\chi^2=0.51$, $P>0.05$
Penoscrotal	4 (27)	8 (33)	
Scrotal	3 (20)	6 (25)	
Mean degree of chordee (deg.)			
Proximal penile	33	35	$t=0.7$, $P>0.05$
Penoscrotal	39	43	$t=1.4$, $P>0.05$
Scrotal	40	45	$t=1.7$, $P>0.05$

Table 2 Mean duration for completion of all the surgical procedures and postoperative complications

	Single-stage repair ($n=15$ patients)	Two-stage repair ($n=24$ patients)	χ^2-test/t-test, P
Mean duration for completion of all surgical procedures (months)	10	18	$t=12.2$, $P<0.001$
Postoperative complications [n (%)]			
Fistula	4 (27)	3 (12.5)	
Meatal stenosis	2 (13)	0	
Complete dehiscence	1 (7)	0	
Total	7 (47)	3 (12.5)	$\chi^2=4.1$, $P<0.05$

Table 3 Degree of parents' satisfaction

	Single-stage repair ($n=15$ patients)	Two-stage repair ($n=24$ patients)	χ^2-test, P
Number of responders [n (%)]	13 (87)	20 (83)	$\chi^2=0.03$, $P>0.05$
Parents' satisfaction [n (%)]			
Not satisfied (poor)	7 (54)	2 (10)	
Satisfied			
Excellent	1 (8)	6 (30)	$\chi^2=5.6$, $P<0.05$
Very good	2 (15)	8 (40)	
Good	3 (23)	4 (20)	

Conclusion

Repair of severe hypospadias with moderate chordee using two-stage dermal graft corporoplasty was associated with statistically significant less postoperative complications and more parent's satisfaction than single-stage Snodgrass urethroplasty repair in our current study.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

References

1 Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. *J Urol* 1994; **151**:464–465.
2 Upadhyay J, Shekarriz B, Khoury AE. Midshaft hypospadias. *Urol Clin North Am* 2002; **29**:299–310.
3 Snodgrass W, Koyle M, Manzoni G, Hurwitz R, Caldamone A, Ehrlich R. Tubularized incised plate hypospadias repair for proximal hypospadias. *J Urol* 1998; **159**:2129–2131.
4 Braga LHP, Pippi Salle JL, Lorenzo AJ, Skeldon S, Dave S, Farhat WA, *et al.* Comparative analysis of tubularized incised plate versus onlay island flap urethroplasty for penoscrotal hypospadias. *J Urol* 2007; **178**: 1451–1457.
5 Sozubir S, Snodgrass W. A new algorithm for primary hypospadias repair based on tip urethroplasty. *J Pediatr Surg* 2003; **38**:1157–1161.
6 Snodgrass WT, Bush N, Cost N. Algorithm for comprehensive approach to hypospadias reoperation using 3 techniques. *J Urol* 2009; **182**:2885–2892.
7 Bologna RA, Noah TA, Nasrallah PF, McMahon DR. Chordee: varied opinions and treatments as documented in a survey of the American Academy of Pediatrics, Section of Urology. *Urology* 1999; **53**:608–612.
8 Cook A, Khoury AE, Neville C, Bagli DJ, Farhat WA, Pippi Salle JL. A multicenter evaluation of technical preferences for primary hypospadias repair. *J Urol* 2005; **174**:2354–2357.
9 Badawy H, Morsi H. Long-term follow-up of dermal grafts for repair of severe penile curvature. *J Urol* 2008; **180 (Suppl)**:1842–1845.

10 Kogan SJ, Reda EF, Smey PL, Levitt SB. Dermal graft correction of extraordinary chordee. *J Urol* 1983; **130**:952–954.
11 Lindgren BW, Reda EF, Levitt SB, Brock WA, Franco I. Single and multiple dermal grafts for the management of severe penile curvature. *J Urol* 1998; **160**:1128–1130.
12 Caesar RE, Caldamone AA. The use of free grafts for correcting penile chordee. *J Urol* 2000; **164**:1691–1693.
13 Gershbaum MD, Stock JA, Hanna MK, Baskin L, Hanna M, Khoury A. A case for 2-stage repair of perineoscrotal hypospadias with severe chordee. *J Urol* 2002; **168**:1727–1729.
14 Ozturk H, Onen A, Otçu S, Kaya M, Ozturk H. The outcome of one-stage hypospadias repairs. *J Pediatr Urol* 2005; **1**:261–266.
15 Snodgrass WT, Lorenzo A. Tubularized incised-plate urethroplasty for proximal hypospadias. *BJU Int* 2002; **89**:90–93.
16 Pope JC IV, Kropp BP, McLaughlin KP, Adams MC, Rink RC, Keating MA, Brock JW III. Penile orthoplasty using dermal grafts in the outpatient setting. *Urology* 1996; **48**:124–127.
17 Snodgrass W, Ziada A, Yucel S, Gupta A. Comparison of outcomes of tubularized incised plate hypospadias repair and circumcision: a questionnaire-based survey of parents and surgeon. *J Pediatr Urol* 2008; **4**:250–254.