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Original Article

COMPARISON OF DARTOS FLAP AND DARTOS FLAP PLUS SPONGIOPLASTY TO PREVENT FISTULA IN TUBULARIZED INCISED PLATE URETHROPLASTY

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Abstract

Introduction: Hypospadias is one of the most common congenital anomalies and more than 300 operation techniques have been described for primary hypospadias. The complication rate varies with the complexity of the repair and the surgeon's experience level. To decrease fistula rate, an additional tissue cover after neourethra reconstruction has been described using various tissues. This technique of spongioplasty with dartos flap interposition allows a better quality of the intermediate layer, with the object of preventing fistula.

Aims and Objectives: The aim of our study is to evaluate the role of paraurethral spongial tissue plus dartos flap using an additional tissue cover to prevent fistula formation in patients who underwent urethroplasty with the Snodgrass technique.

Materials and Methods: It's a prospective study, performed on 60 patients aged 15 months to 144 months who underwent mid penile and distal hypospadias repair using the Snodgrass technique. The patients were assigned to one of the two groups. In Group I (30 patients), neourethra was covered with dartos flap, and in Group II (30 patients), the neourethra was covered with dartos flap plus spongioplasty.

Results: Urethral fistula were encountered in twelve cases (40%) in Group I, and five cases 16.7%) in Group II (p value 0.045).

Conclusions: Considering the results of this study, approximation of the corpus spongiosum along with dartos flap as an intermediate layer in urethral coverage as part of Snodgrass technique reduces the rate of fistula formation. This procedure can be applied easily and effectively to prevent the formation of fistula.

Key words: Hypospadias, UC fistula, Dartos flap, Spongioplasty.

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Introduction:

Hypospadias is one of the most common congenital anomalies occurring in approximately 1 of 200 to 1 of 300 live births[1]. Surgical treatment is necessary, and more than 300 operation techniques have been described for primary hypospadias. The objective of all of these methods is the formation of a functionally normal urethra and a cosmetically acceptable penis[2]. The success rates depend on the severity of the malformation, use of adequate tissues for reconstruction and experience of the surgeon[3]. The tubularized incised plate (TIP) urethroplasty for hypospadias repair has become popular for correction of both distal and proximal hypospadias. Since its introduction in 1994 by Snodgrass, the procedure has been shown to be reliably safe and effective and cosmetically pleasing to its recipients, with a low rate of complications[4]. The complication rate varies with the complexity of the repair and the surgeon's experience level[5,6]. The common complications include fistulae, urethral stricture, meatal stenosis, persistent chordee, infections, and

wound dehiscence. Urethrocutaneous fistula (UCF) after hypospadiasrepair remains a significant problem for pediatric urologists despite advances in surgical techniques. The incidence of UCF varies from 4 to 28%[3,7-9]. The use of neourethra covering flaps in hypospadias surgery is widely considerd as an important factor leading to better results in terms of post-operative complications like wound dehiscence and UCF formation[10]. The corpus spongiosum provides a well-vascularized, spongy protective covering to the normal urethra[11]. This study aimed to evaluate the use of paraurethral spongial tissue plus the dartos flap for additional urethral coverage to prevent fistula formation in patients undergoing surgery with the Snodgrass technique.

Materials and Method

Type of study: Prospective, interventional study.

Place of study: The study was conducted in the Department of Pediatric Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka.

Duration of the study: 24 months (January 2015 to December 2016).

Study subjects: The study included children with mid penile and distal hypospadias.

Sample size: 60 (30 in each group).

Ethical consideration: Ethical clearance was taken from ethical review committee (ERC) of Dhaka Medical College. Dhaka.

Data collection method: The principal investigator collected the data and the relevant investigations in the Department of Pediatric Surgery, DMCH. A Data sheet was filled up during data collection. In each case, information about the patient was collected in a prescribed questionnaire after getting written consent from the parents in a preformed consent form.

Processing and statistical analysis of data: Statistical analysis was performed using the Statistical Package for Social Science (SPSS) version 22.0. A descriptive analysis was performed for clinical features and results were presented as mean ± standard deviation, X^2- test for differences in proportion for categorical variables und unpaired Student's t-test for the differences in mean for continuous variables. All values were two sided and considered as statistically significant if $p < 0.05$.

Surgical procedure: After painting and drapping, a traction suture was applied to the glans by 4/0 round body proline. A U-shaped incision was made around the urethral plate border and hypospadias orifice. Then circumcoronal preputial incision was made and the penis was degloved. Two parallel longitudinal incisions were made to separate the lateral edges of the urethral plate from the glans wings. In Group II, the corpus spongiosum alongside the urethral plate was dissected from the underlying corpora cavernosa taking care not to damage the corpus spongiosum or corpus cavernosum. An artificial erection test performed to assess for residual ventral curvature. Any chordee if present was corrected by midline dorsal tunica albugineal plication. The incised urethral plate was tubularized using 6/0 polyglactin sutures over a stent in one layer, turning all of the epithelium into the neourethral lumen. Tubularization of the urethral plate started from the proximal end to the midglanular level. In Group II, the previously mobilized corpus spongiosum was approximated with 6/0 polyglactin by suturing the edge of mobilized spongiosum. In Group I, the corpus spongiosum was not approximated. Dartos flap was taken from the dorsal preputial and penile skin that was given in both Group I & Group II and divided in two wings and laterally twisted. The glans wings were approximated with no tension, and the penile skin was sutured. All patients were then circumcised. The stent was secured to the glans with the traction suture. Pressure dressing was applied in all cases with cotton guaze and adhesive tape.

Ceftriaxone and Amikacin in injectable form was given in all the patients upto 3rd postoperative day (POD). Syrup Cefixime was given from 4th to 10th POD. First dressing was checked on 4th POD, wound was kept open and Mupirocin ointment was applied on the wound 3 times daily for 14 days. Stent was removed on 10th POD on both the group. Patients were discharged on 14th POD with advice of meatal calibration.

Follow up consisted of a first visit at the end of 1st month and second visit at the end of 3rd month.

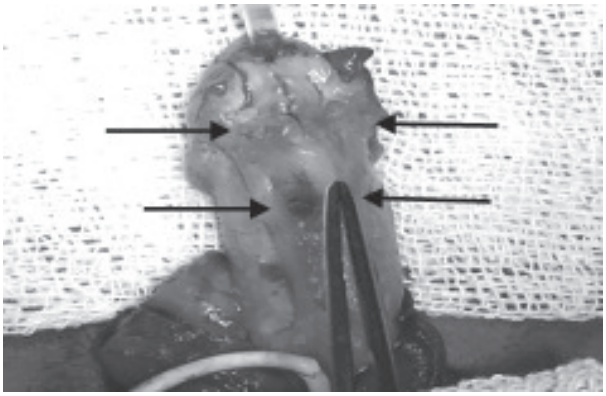

Fig.-1: *Showing the corpus spongiosum on both sides*

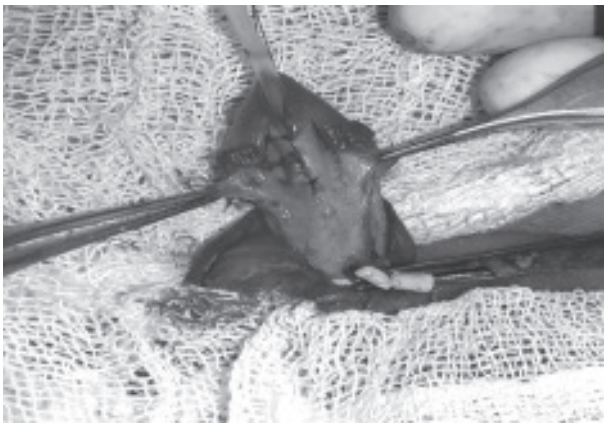

Fig.-2: *Showing the mobilized corpus spongiosum on both sides*

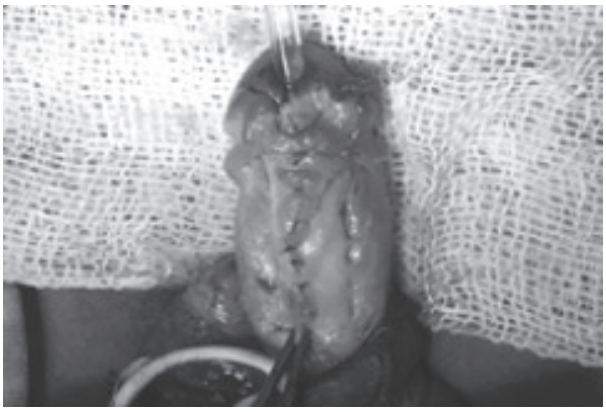

Fig.-3: *After completing the spongioplasty*

Results:

In both groups, age ranges from 15 months to 144 months. The mean age were 72.5 months in Group I and 90.6 months in Group II. The mean operation time of Group I and Group II were 116.3 minutes and 127.2 minutes respectively. The operation time was significantly associated with operation procedure (p value was 0.003). This difference was due to an extra time required for mobilization and approximation of corpus spongiosum and also due to new exposure of spongioplasty. In Group I, 12 cases (40%) urethral fistulae and in Group II, 5 fistulae (16.7%) were encountered. Here significant difference was found (p value 0.045). Maximum fistulae were detected on 10th POD after removal of urethral stent. Five fistulae were found during hospital stay from 11th to 14th POD. After discharge, 2 patients developed fistulae. Two patients in Group I and 1 patient in Group II developed meatal stenosis that was successfully managed by dilation.

Table-I

Clinical features of the patients:

	Dartos flap Group I (n=30)	Dartos flap plus spongioplasty Group II (n=30)
Mean Age (Month)	72.5	90.6
Meatal location		
Coronal	13	15
Distal penile	8	5
Mid penile	9	10
Chordee		
Absent	9	7
Mild (<30Ú)	15	17
Moderate(30Ú - 60Ú)	6	6
Complications		
Fistula	12	5
Meatal Stenosis	2	1
Residual chordee	1	1

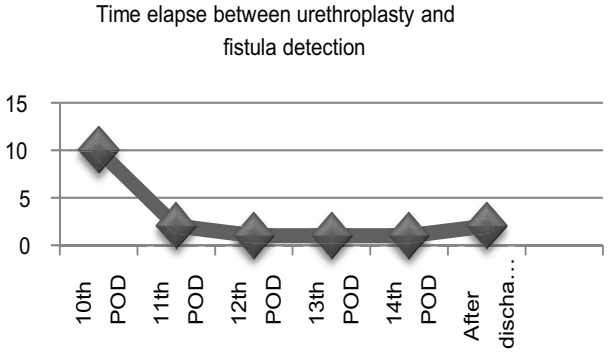

Fig.-4: *Time elapse between urethroplasty and fistula detection*

Discussion:

A tubularized incised plate urethroplasty described by Snodgrass presents the method of choice in the treatment of distal and mid shaft hypospadias with minimal complication rate[12].

A urethrocutaneous fistula is an inherent complication of hypospadias repair, and represents the most common problem after such surgery, occurring at various rates[13-16]. Many modifications in the TIP urethroplasty have been performed to decrease the rate of urethrocutaneous fistula formation but no single surgical technique can be considered a standard for preventing the formation of fistula. Different tissues and techniques have been described to solve this problem.

The use of a dartos flap as a barrier to fistula development was first described in 1994 by Snodgrass[12], and Retik et al.[17]. In this study, dartos flap was taken from dorsal preputial and penile skin and used for neourethral coverage in the same technique. The dartos flap was divided in the middle without disturbing its vascularity and transferring these two flaps to the ventral side over the neourethra and suturing of the two layers in double-layer fashion (bat wing). Using this technique, different investigators from different studies observed no fistula in double dartos flap coverage in comparison with single dartos flap. In their study, fistula rate ranging from 5.2% to 13.7% in whom single dartos flap was given[18-24]. On the other hand, Elsayed et al. reported no significant difference in subsequent UCF between a double-layered dorsal dartos flap and single layer for covering the urethra as a part of TIP urethroplasty for repairing hypospadias[25]. In the present study, post operatve fistulae were found in 40% (12/30) of the cases in Group I, in which only the dartos flap was used. These results were dissimilar with the above mentioned studies. This difference may be due to higher age of the patients, below average socioeconomic condition, poor nutritional status, poor hygenic environment in the ward or may be due to lack of maintaining proper sterility in the OT, lack of fine instruments for meticulous tissue handling, failure to use the magnification glasses or loupes etc.

Spongiosal tissue has been used by some surgeons to prevent fistula and other complications from its introduction in 2000 by Beaudoin[26] and Yerkes[27]. After that spongiosal tissue was used by different investigators and observed different rate of fistula formation[28-35] but, by using the spongiosal tissue in addition to dartos flap wrapping, Almodhen et al.[36] and Bilici et al.[2] did not observe fistula in any of the cases. Whereas in the present study, 5 patients developed fistulae among 30 patients (16.7%) using the dartos flap plus spongioplasty in the Snodgrass technique in Group II. These results were dissimilar with Kocvara et al.[37], who reported a higher complication (40%) using the spongiosal tissue for neourethral coverage of 37 patients.

In this study, out of 5 fistulae, 4 fistulae were found from the initial 15 urethroplasty and only one fistula was found from last 15 urethroplasty of Group II. This may be due to new exposure of this new technique of spongioplasty. On the other hand, in Group I, 6 fistulae were found in the initial 15 urethroplasty and 6 fistulae were found in the last 15 urethroplasty. This may be due to preveous exposure with this technique. Overall this success of dartos flap plus spongioplasty in comparison with dartos flap alone was due to additional layer of spongiosal tissue. Spongioplasty if done properly restores a near normal urethra and provides good support as it is more vascular.

The strength of this study is that it was prospective, cases belonged to similar socio-economic status, and procedure was performed in a single centre in similar circumstances and with adequate follow-up. In addition, there was no significant difference in the age, type of hypospadias and degree of chordee in both the groups.

Conclusion:

A urethral covering should be performed as a part of the Snodgrass procedure. The abortive spongiosal tissue may be preserved with careful degloving of the penis during hypospadias repair.

Considering the results of this study, approximation of the corpus spongiosum along with dartos flap as an intermediate layer in urethral coverage as part of Snodgrass technique reduces the rate of fistula formation. This new technique of spongiopasty provides a vascular tissue for coverage of the suture lines and reduces fistula formation.

Conflict of interest: We have no conflict of interest in this article.

References:

1. Baskin LS & Ebbers MP. Hypospadias: anatomy, etiology, and technique. J Pediatr Surg 2006; 41: 463-472.

2. Bilici S, Sekmenli T, Gunes M, Gecit I, Bakan V & Isik D. Comparison of dartos flap and dartos flap plus spongioplasty to prevent the formation of fistulae in the Snodgrass technique. Int Urol Nephrol 2011; 43: 943-948.

3. Nuininga JE, De gier RPE, Verschuren R & Feitz FJ. Long term outcome of different types of 1-stage hypospadias repair. J Urol 2005; 174: 1544-1548.

4. Baccala AA, Ross JJ, Detore, N & Kay R. Modified tubularized incised plate urethroplasty (Snodgrass) procedure for hypospadias repair. Urology 2005; 66: 1305-1306.

5. El-Kassaby AW, Al-Kandari AM, Elzayat T & Shokeir AA. Modified tubularized incised plate urethroplasty for hypospadias repair. A long-term results of 764 patients. Urology 2008; 71: 611-615.

6. Snodgrass WT. Tubularized incised plate (TIP) hypospadias repair. Urol Clin North Am 2002; 29: 285-290.

7. Uygur MC, Unal D, Tan MO, Germiyanoglu C & Erol D. Factors affecting outcome of one stage anterior hypospadias repair: analysis of 422 cases. Pediatr Surg Int 2002; 18: 142.

8. Demirbilek S, Kanmaz T, Aydin G & Yucesan S. Outcomes of one- stage technique for proximal hypospadias repair. Urology 2001; 58: 267.

9. Ghali AMA, El-Malik EMA, Al-Malki T & Ibrahim AH. One -stage hypospadias repair: experience with 544 cases. Eur Urol 1999; 36: 436.

10. Cimador M, Pensabene M, Sergio M, Catalano P & Grazia ED. Coverage of urethroplasty in pediatric hypospadias: Randomized comparison between different flaps. Int J Urol 2013; 20: 1000-1005.

11. Bhat A, Sabharwal K, Bhat M, Saran R, Singla M & Kumar V. Outcome of tubularized incised plate urethroplasty with spongioplasty alone as additional tissue cover: A prospective study. Indian J Urol 2014; 30: 392-397.

12. Snodgrass WT. Tubularised incised plate urethroplasty for distal hypospadias. J Urol 1994; 151: 464-465.

13. Elbakry A. Tissue interposition in hypospadias repair: a mechanical barrier or healing promoter? Arab J Urol 2011; 9: 127-128.

14. Borer JG, Bauer SB, Peters CA, Diamond DA, Atala A, Cilento Jr BG et al. Tubularized incised plate urethroplasty: expanded use in primary and repeated surgery for hypospadias. J Urol 2001; 165: 581-585.

15. Chen SC, Yang SSD, Hsieh CH & Chen YT. Tubularized incised plate urethroplasty for proximal hypospadias. BJU Int 2000; 86: 1050-1053.

16. Holland AJ & Smith GH. Effect of the depth and width of the urethral plate on tubularized incised plate urethroplasty. J Urol 2000; 164: 489-491.

17. Retik AB, Mandell J, Bauer SB & Atala A. Meatal based hypospadias repair with the use of a dorsal subcutaneous flap to prevent urethrocutaneous fistula. J Urol 1994; 152: 1229-1231.

18. Maarouf AM, Shalaby EA, Khalil SA & Shahin AM. Single vs. double dartos layers for preventing fistula in a tubularised incised-plate repair of distal hypospadias. Arab J Urol 2012; 10: 408-413.

19. Abolyosr A. Snodgrass hypospadias repair with onlay overlapping double-layered dorsal dartos flap without urethrocutaneous fistula: Experience of 156 cases. J Pediatr Urol 2010; 6: 403-407.

20. Erol A, Kayikci A, Memik O, Cam K & Akman Y. Single vs. double dartos interposition flaps in preventing urethrocutaneous fistula after tubularized incised plate urethroplasty in primary distal hypospadias: a prospective randomized study. Urol Int 2009; 83: 354-358.

21. Appignani A, Prestipino M, Bertozzi M, Nardi N & Falcone F. Double-cross flap protection. New technique for coverage of neourethra in hypospadias repair. J Urol 2009; 182: 1521-1527.

22. Mustafa M, Wadie BS & Abol-Enein H. Standard Snodgrass technique in conjunction with double-layer covering of the neourethra with dorsal dartos flap is the therapy of first choice for hypospadias. Int Urol Nephrol 2008; 40: 573-576.

23. Bakan V & Yildiz A. Dorsal double-layer dartos flap for preventing fistulae formation in the Snodgrass technique. Urol Int 2007; 78: 241-244.

24. Kamal BA. Double dartos flaps in tubularized incised plate hypospadias repair. Urology 2005; 66:1095-1098.

25. Elsayed ER, Zayed AM, Sayed DE & Adl ME 2011. Interposition of dartos flaps to prevent fistula after tubularized incised-plate repair of hypospadias. Arab J Urol 2011; 9: 123-126.

26. Beaudoin S, Delaage PH & Bargy F. Anatomical basis of surgical repair of hypospadias by spongioplasty. Surg Radiol Anat 2000; 22: 1339-1341.

27. Yerkes EB, Adams MC, Miller DA, Pope JC, Rink RC & Brock JW. Y-to-I wrap: use of the distal spongiosum for hypospadias repair. J Urol 2000; 163: 1536-1538.

28. Hayashi Y, Mizuno K, Moritoki Y, Nakane A, Kato T & Kurokawa S et al. Can spongioplasty prevent fistula formation and correct penile curvature in TIP urethroplasty for hypospadias? Urology 2013; 81: 1330-1335.

29. Eassa W, Jednak R, Capolicchio JP, Brzezinski A & El-Sherbiny M. Risk factors for re-operation following tubularized incised plate urethroplasty: A comprehensive analysis. Urology 2011; 77: 716-720.

30. Gamal MW, Zaki M, Rashid A, Mostafa M & Abouzeid AM. Tubularized incised-plate (tip) repair augmented by spongioplasty for distal and midpenile hypospadias. UroToday Int J 2009; doi: 10.3834/uij.1944-5784.2009.06.13.

31. Sarhan OM, El-Hefnawy AS, Hafez AT, Elsherbiny MT, Dawaba ME & Ghali AM. Factors affecting outcome of tubularized incised plate (TIP) urethroplasty: single-center experience with 500 cases. J Pediatr Urol 2009; 5: 378-382.

32. Bhat AL. Extended urethral mobilization to correct chordee in severe hypospadias: A variation of technique. J Urol 2007; 178: 1031-1035.

33. Mezzine S, Beaudoin S & Bargy F 2005. Medium and longterm evaluation of spongioplasty in hypospadias repair. Prog Urol 2005; 15: 519-523.

34. El-Sherbiny MT, Hafez AT, Dawaba MS, Shorrab AA & Bazeed MA. Comprehensive analysis of tubularized incised-plate urethroplasty in primary and re-operative hypospadias. BJU Int 2004; 93: 1057-1061.

35. Dodat H, Landry JL, Szwarc C, Culem S, Murat FJ & Dubois R. Spongioplasty and separation of the corpora cavernosa for hypospadias repair. BJU Int 2003; 91: 528-531.

36. Almodhen F, Alzahrani A, Jednak R, Capolicchio JP & Sherbiny MTE. Nonstented tubularized incised plate urethroplasty with Y-to-I spongioplasty in non-toilet trained children. Can Urol Assoc J 2008; 2: 110-114.

37. Kocvara R, Dvorácek J, Díte Z, Sedlácek J & Molcan J. Comprehensive long-term analysis of hypospadias repair using vascularized flaps and tubularized incized plates-Report on 588 cases. Cas Lek Cesk 2005; 144: 7-11.