Two different suturing techniques in distal hypospadias repair using tubularized incised plate urethroplasty: a prospective randomized study

Ahmed M. Abdelmoneim Gafar

Background **Hypospadias is one of the most common congenital anomalies, occurring in ~one of 200 to one of 300 live births. Tubularized incised plate (TIP) urethroplasty or the Snodgrass procedure has gained worldwide acceptance for distal hypospadias repair because of its low complication rate and technical simplicity.**

Objective **We compared two refinements in TIP repair for primary distal hypospadias, namely, a subcuticular uninterrupted suturing technique and full-thickness interrupted sutures. In addition, we compared the impact of these surgical modifications on the complication rate and surgical outcome of the Snodgrass procedure.**

Patients and methods **Eighty boys with primary distal hypospadias were treated using the TIP procedure between January 2009 and December 2011. Patients were prospectively randomized into two equal groups on the basis of the suturing technique. A neourethra was constructed using a subcuticular uninterrupted suturing technique (group A) or using full-thickness interrupted sutures (group B). All patients were subjected to the same preoperative, operative, and follow-up protocols. Both groups were compared as regards the complication rate.**

Results **The age ranged between 8 and 48 months, with a mean age of 13.6 ± 6.9 months at the time of repair. The overall success rate was 90% (97.5% for group A and 82.5% for group B). Late complications in the form of a urethrocutaneous fistula, meatal stenosis, and wound dehiscence or infection developed in eight (10%) patients (one patient of group A and seven of group B). The mean follow-up duration was 8.1 ± 2.4 months (range 4–13 months).**

Conclusion **The subcuticular uninterrupted suturing technique seems to have a lower complication rate when compared with the use of full-thickness interrupted sutures in the repair of distal hypospadias by TIP urethroplasty. *Ann Pediatr Surg* 9:117–121 © 2013 Annals of Pediatric Surgery.**

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Pediatric Surgery Unit, Surgery Department, Faculty of Medicine, Sohag University, Sohag, Egypt

Correspondence to Ahmed M. Abdelmoneim Gafar, MD, Pediatric Surgery Unit, Surgery Department, Faculty of Medicine, Sohag University, Postal code 82524, Sohag, Egypt
Tel: +20 93 232 3228; e-mail: agafar3@yahoo.com

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Introduction

Hypospadias is one of the most common congenital anomalies occurring in ~one of 200 to one of 300 live births [1]. The urethral meatus lies ectopically on the ventral surface of the penis, proximal to its normal position, and various degrees of chordee may be observed [2]. Many classifications of hypospadias have been published, mainly based on the position of the ectopic meatus [3].

The purpose of hypospadias repair is to construct a urethra and to achieve a penis with a satisfactory cosmetic result and that is adequate for sexual intercourse [4]. Repair of hypospadias is challenging, as complication rates for this procedure are higher than those for other reconstructive procedures. The most common and significant complication of hypospadias repair is the formation of a urethrocutaneous fistula (UCF) [5,6].

Any technique to repair distal hypospadias should be simple and easy, with few complications [7]. The introduction of tubularized incised plate (TIP) urethroplasty by Snodgrass in 1994 resulted in a revolution in the management of different types of hypospadias [8–13]. It has gained worldwide acceptance for distal hypospadias repair because of its low complication rate and technical simplicity. As a result, several articles have been published on the various aspects of and subtle variations in this procedure [14]. Despite the obvious surgical success with this technique, some complications still exist, and constant efforts are being made to achieve better results [15]. Although there is a general agreement on the use of absorbable sutures, the method (continuous or interrupted) remains debated [16]. In addition, although some studies reported no influence on the outcome [17], others concluded that the suturing pattern may affect the results and complication rates [18].

The aim of this study was to compare two refinements in TIP repair for primary distal hypospadias, namely, a subcuticular uninterrupted suturing technique and a full-thickness interrupted technique. Moreover, we observed and compared the potential impact of these surgical modifications on the complication rate and surgical outcome of the TIP procedure.

Patients and methods

This prospective randomized study was carried out at the Pediatric Surgery Unit of Sohag University Hospitals, Local Health Insurance Hospital and Private Sector, Sohag, Egypt, between January 2009 and December 2011.

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Ethical committee approval was obtained, and the parents were counseled.

Eighty patients with primary distal isolated hypospadias were included in the study after their parents signed an informed consent form. Recurrent cases, patients with more proximal defects, and patients who missed follow-up were excluded from this study. The ages of the patients ranged from 8 to 48 months (mean 13.6 ± 6.9 months). All patients underwent repair using the Snodgrass technique performed by the same surgeon.

In a randomized manner, using closed envelopes before surgery at the time of hospital admission, the patients were allocated prospectively into two groups according to the suturing technique used in repair. In 40 patients, the subcuticular uninterrupted suture technique was used (group A), and in the remaining 40 boys, the full-thickness interrupted suturing technique was used (group B).

Table 1 Demographic and other baseline characteristics

	Group A ($n=40$)	Group B ($n=40$)	P-value
Age (months)			
Range	8–48	8–42	0.276
Mean ± SD	14.4 ± 6.8	12.8 ± 7.1	
Hypospadias type			
Distal penile	26	29	0.315
Coronal	14	11	
Hypoplastic urethra	3	7	0.155
Suture size			
5/0	14	17	0.323
6/0	26	23	
Operative time (min)			
Range	45–70	50–75	0.1
Mean ± SD	58 ± 7.7	60.5 ± 7.4	
Acute PO edema	7	13	0.098
Hospital stay (days)			
Range	4–8	3–7	0.14
Mean ± SD	5.1 ± 0.9	4.8 ± 0.9	
Follow-up (months)			
Range	4–13	5–12	0.127
Mean ± SD	7.7 ± 2.5	8.5 ± 2.5	

PO, postoperative.
$P<0.05$ was considered significant.

Surgical technique

Preoperative assessment and medical checkups were performed. The parents were also counseled. Preemptive analgesia and prophylactic intravenous antibiotics (amoxicillin–clavulanic acid) were administered routinely. All operations were performed by the author using the same key steps for both groups. The operations were performed under general anesthesia with caudal analgesia to decrease the postoperative pain. The incised urethral plate was tubularized over a catheter of an appropriate size (6–8 Fr) using 5/0 or 6/0 polydioxanone subcuticular uninterrupted sutures (group A) or full-thickness interrupted sutures (group B). In patients with a hypoplastic urethra, the thin urethra was preserved and spongioplasty was performed. In all patients, a vascularized dartos fascia flap was used to cover the urethroplasty as a second layer. The lateral glanular wings were reapproximated over the neourethra and the skin was closed. A compression dressing was applied thereafter. The duration for which the catheter was left inserted ranged from 5 to 7 days postoperatively.

Patients were evaluated at follow-up visits weekly for 4 weeks, then once monthly for at least 4 months postoperatively. The evaluation included examination for complications, urine stream, calibration, and meatal site and shape. The rate and type of complications of each technique were reported and compared. Statistical analysis was carried out using SPSS. Data are summarized and expressed in terms of percentages and mean ± SD. A P-value less than 0.05 was considered significant.

Results

The mean age, type of suture, presence of a hypoplastic urethra, suture size, mean values for operative time, early postoperative complications, hospital stay duration, and follow-up period all showed statistically insignificant differences between the two groups. Demographic and other baseline characteristics are shown in Table 1.

With regard to acute postoperative complications, there was no significant bleeding or hematoma. Postoperative edema, which resolved spontaneously, was reported in 20 patients.

For our 80 patients, the overall success rate (patients free from complications) was 90% (97.5% for group A and 82.5% for group B). Among the 80 boys, the overall complication rate was 10% in eight patients – one patient (2.5%) in group A and seven patients (17.5%) in group B. UCF developed in four (5%) patients, meatal stenosis in two (2.5%), and wound infection developed in two (2.5%) patients. Although there was a significant difference between the two groups with regard to the overall complication rates ($P = 0.028$), there was an insignificant difference as regards individual complications (Table 2).

Although only one patient in group A had UCF, three patients had UCF as a complication in group B. Two of the three fistulas in group B were associated with meatal stenosis. All patients had a single UCF, except one patient, belonging to group B, who had two fistulae. The size was less than 3 mm in diameter in all patients. All cases of UCF presented during the first 2 months postoperatively. Surgical repair, after 9–12 months, was successful in all cases.

Meatal stenosis occurred in two (5%) patients of group B, and both responded well to regular urethral dilatation. Wound infection occurred in two patients of group B and was managed nonsurgically by local wound care.

The postoperative cosmetic outcome was satisfactory to all parents of patients in whom there were no complications. Except for patients with fistulae and/or metal stenosis, all boys voided with a forward straight single stream and had a slit-like meatus at the tip of the cosmetically normal looking glans (Figs 1–3).

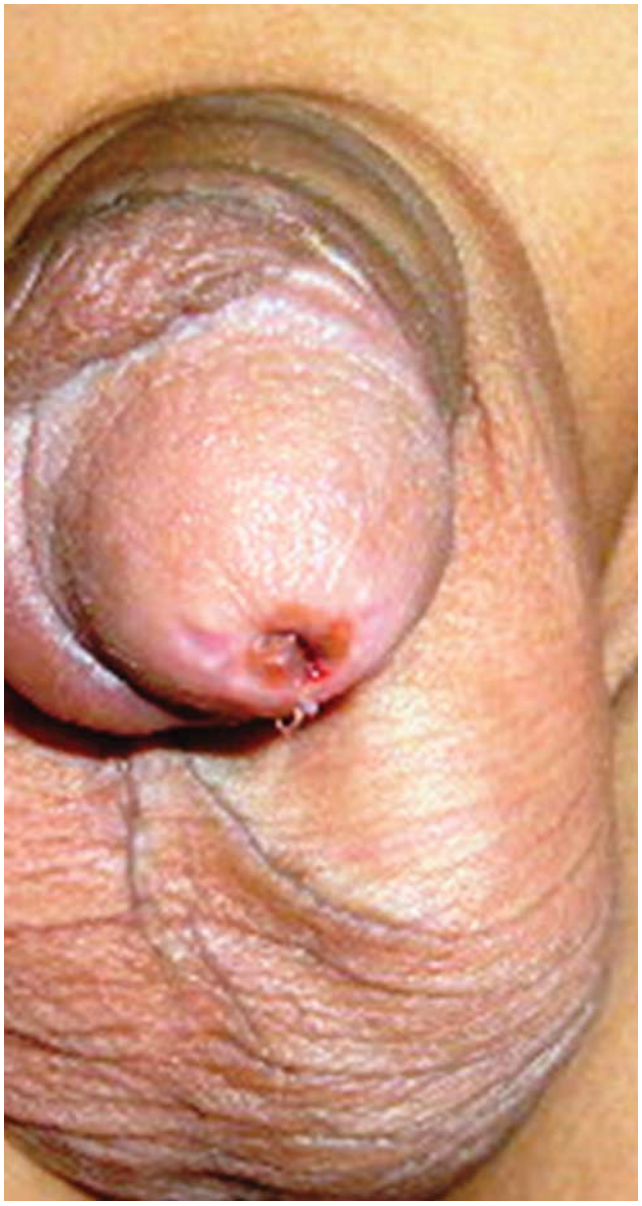
Statistical analysis showed that there was a statistically significant difference between the two groups as regards the overall rate of late complications ($P = 0.028$). Although group B had higher frequencies of individual complications compared with group A, there was an

Table 2 Postoperative complications evaluated using the χ^2-test for comparison between the two groups as regards complications

	n (%)			
	Group A (*n*=40)	Group B (*n*=40)	*P*-value	Total (*n*=80) [*n* (%)]
Fistula	1 (2.5)	3 (7.5)	0.308	4 (5)
Meatal stenosis	–	2 (5)	0.247	2 (2.5)
Wound infection	–	2 (5)	0.247	2 (2.5)
Total	1 (2.5)	7 (17.5)	*0.028*	8 (10)

P<0.05 was considered significant.

Fig. 1



Postoperative view (2 months).

Fig. 2

Wound infection.

insignificant statistical difference between the two groups with regard to each complication category.

Discussion

Hypospadiology is still recognized as an expanding and evolving specialty [19]. Surgery for hypospadias remains a challenge, and several surgical procedures have been described [20]. In distal hypospadias, the TIP repair is the preferred technique, and efforts are still being made to achieve better results [15,21]. The most suitable age for hypospadias repair is between 6 and 18 months [22]. A healthy, vascularized tissue cover over the neourethra definitely contributes to overall surgical success [19]. In 2003, Sozubir and Snodgrass [23] reported that the dartos pedicle flap can be used to cover the neourethra [24]. This approach was used in our study.

Fig. 3

Urethrocutaneous fistula.

Complications are higher in hypospadias surgery as compared with other reconstructive operations [25,26]. The success rate for Snodgrass repair is ~90% [27,28]. Complication rates after TIP urethroplasty have been reported to be 6–16% [12,29]. The rate of complications can be reduced by using polydioxanone sutures in urethroplasties [30]. The overall incidence of UCF has been reported to be 1–30% and that of meatal stenosis, 7–10%; disruption of the repair and infection are the other possible complications [31,32]. These figures are higher than those obtained in our results; this may be because of inclusion of patients with more proximal defects and redo surgeries.

UCF is the most common complication of hypospadias repair [12], although some reports have concluded that the suture technique has no influence on the outcome of TIP urethroplasty [17]. In 2012, Chung and colleagues reported the incidence rate of UCF in patients with distal hypospadias treated by TIP urethroplasty to be 7% and that in those treated using the suture technique to be 13.5 and 4.5% for interrupted and continuous methods, respectively, and 11.5 and 6.7% for full-thickness and subcuticular suture methods, respectively. They documented no significant differences in the UCF rates corresponding to the suture material or techniques in patients with distal hypospadias [33]. Our results are in accordance with these results.

In 2005, Tarkan *et al.* [15] reported UCF in 8.3% of patients, all of whom had meatal stenosis. All fistulae were single and less than 5 mm in diameter and were subsequently repaired successfully [18]. A fistula developed within 1 month after hypospadias repair in 74.6% of patients, and 85.7% of patients had only one fistula [33]. In 2008, Bhat and Mandal [6] reported that fistula closure should be undertaken after 3–6 months. Surgery for fistula repair was successful in all patients [32]. Our results are in agreement with these results.

We believe that in group A, in which subcuticular uninterrupted sutures were used, the edges of the urethral plate come in close proximity when compared with that in group B; thus, the epithelium has a lesser probability to grow out and communicate with the covering skin. Therefore, the incidence of fistula formation may be minimized in group A when compared with group B. However, local infection, local ischemia, and distal obstruction due to meatal stenosis/encrustation were considerable causes for fistula formation.

Meatal stenosis rates after TIP urethroplasty ranged between 6.2 and 12%, and most patients with meatal stenosis responded well to regular urethral dilatation [20,32]. In 2002, Elbakry [34] reported that regular urethral calibration postoperatively should be considered as an integral part of TIP urethroplasty to prevent meatal stenosis. Our results are in accordance with these results.

Conclusion

TIP urethroplasty is a safe and reliable technique for distal hypospadias repair. However, the use subcuticular uninterrupted sutures seems to improve the results and has a lower complication rate when compared with the full-thickness interrupted suturing technique.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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