

REDUCING THE RISK OF URETHROCUTANEOUS FISTULA WITH MODIFIED SNODGRASS HYPOSPADIAS REPAIR: A RETROSPECTIVE STUDY IN MISURATA

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ABSTRACT

The Snodgrass surgical procedure is one of the methods for hypospadias repair. Currently it is the most commonly used hypospadias repair technique, especially for distal hypospadias. It has resulted in significant improvement in the outcome of hypospadias repair. Multiple modifications to the original procedure are introduced, which may further limit and reduce the risk of complications. In this paper, we review our experience with the modified technique with respect to postoperative complications and outcome, with emphasis on fistula formation. We reviewed the results of 61 cases treated by Snodgrass urethroplasty by the same surgeon, between August 2017 and May 2019 at Alnokhba hospital in Misurata-Libya. We divided the patients into three groups, we used in each group a different surgical method. The three methods differed in the type of flap used. In group A (20 boys), the neourethra was covered by a preputial flap. In group B (23 boys), the neourethra was covered by a lateral dartos flap. In group C (18 boys), the neourethra was covered by double flap formed by lateral dartos flap and preputial flap. After tubularization of the urethral plate and a circumferential incision proximal to the coronal sulcus from each edge of the urethral plate, the penile skin was degloved from 1 cm proximal to the hypospadiac meatus in all groups. A total of 61 boys underwent repair by at a mean age of 3.98 years (range 4 months to 11 years). At follow up 3 months, 8 patients had urethrocutaneous fistula as a complication (13.1%), in group A, fistula occurred in 4 cases (20%), in group B, it occurred in 3 patients (13%), while in group C, it occurred in only one patient (5.5%). Snodgrass procedure has markedly improved the outcomes for management of hypospadias. The modifications to the Snodgrass hypospadias repair described combined with proper patient selection permit a high rate of success with minimal complications. Use of a double flap (lateral dartos flap and preputial flap) to cover the neourethra in Snodgrass urethroplasty reduce the rate of fistula formation.

INTRODUCTION

Hypospadias is one of the most common congenital abnormalities of the male genital system. The reported incidence in the USA in 2001 was 1 per 200-300 live male births,⁽¹⁾ while the rate in the Netherlands in 2002 was 3 per 1000 live male births.⁽²⁾ It is characterized by the abnormal position of the urethral meatus on the ventral penile surface and it is usually associated with ventral curvature of the penis (chordee). Hypospadias causes psychological problems for patients and their parents, in addition to the functional problems. Many techniques have been described for repairing hypospadias, but none was considered the standard method. In 1994, Snodgrass described tubularized incised plate (TIP) urethroplasty for distal penile hypospadias repair. It was subsequently also applied to proximal hypospadias, with encouraging results.^(3,4) Snodgrass introduced the longitudinal split of the urethral plate which represents significant progress in urethral plate-preserving surgery, allowing tension-free tubularization of the urethral plate to form a neourethra of adequate size. The technique is now widely accepted.⁽⁵⁾ The principal

steps are a deep longitudinal incision of the urethral plate to allow tubularization, and addition of a layer between the neourethra and the overlying skin to avoid urethrocutaneous fistula.^(6,7)

The surgical goals of hypospadias repair are formation of a hairless urethra of uniform caliber and adequate size, attaining a fully straight penis, positioning of the external meatus at the tip of the glans and normal penile appearance with minimum complications. Although, complications such as fistula, meatal stenosis, urethral flap necrosis and dehiscence are still encountered.

Surgeons introduce some modifications to the original procedure in order to minimize the complications. The distal limit of the deep longitudinal incision may be either the mid-glans or the tip of the glans. The covering flap of the neourethra is usually raised from the preputial skin; however, this may result in penile torsion and devascularization of the preputial skin that is often used in reconstruction of the penile skin.⁽⁸⁾ A ventral dartos flap has been used to cover the neourethra aiming to avoid such complications. Despite these variations, complications of hypospadias repair, such as fistulae, urethral stricture, meatal stenosis, penile torsion, persistent chordee, infections and wound dehiscence, are still reported.⁽⁹⁾ In this paper, we describe our experience with modi-

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fied technique in performing Snodgrass TIP urethroplasty with respect to postoperative complications and outcomes, with emphasis on urethra-cutaneous fistula formation.

MATERIALS AND METHODS

We reviewed the results of Snodgrass TIP urethroplasty in hypospadias repair performed by one surgeon, between August 2017 and May 2019 at Alnokhba hospital in Misurata- Libya. Cases of hypospadias with severe chordee and patients who had undergone previous urethroplasty were excluded. Distal hypospadias in 61 boys aged 4 months to 11 years were included, with data on the demography of the patients, type of hypospadias, presence and degree of chordee and the surgical outcome and follow-up for fistula formation. All operations were performed with the patient in the supine position under general anesthesia A stay suture was placed on the dorsal side of the glans for handling, and the urethral plate was outlined at a width of 6–8 mm.

We divided the patients into 3 groups, we used in each group a different surgical method. The three methods differed in the type of flap used. In all groups, the urethral plate defining incisions and the sagittal deep longitudinal incision were extended from the posterior edge of the hypospadiac meatus to the mid-glans

In group A (20 cases), the neourethra was covered by a dorsal preputial flap. In group B (23 cases), the neourethra was covered by a lateral dartos flap. In group C (18 cases), the neourethra was covered by combination of lateral dartos flap and preputial flap. In all groups, the urethral plate was tubularized over an 8-10 Fr fenestrated silicone catheter (depending on the child's age) with a continuous 4-0 vicryl absorbable suture to create the neourethra, and the catheter was left for 5 days postoperatively. The glandular wings were approximated by a 4-0 vicryl absorbable suture, and the distal ends were fixed to the underlying neourethra at 5 and 7 o'clock with the same type of suture. After the completion of repair, a urethral stent was fixed to the glans penis with a 3/0 silk suture. All patients were admitted to the hospi-

tal postoperatively and usually discharged at the 3rd day postoperatively. Urethral catheter was removed 5 days after operation. A slit, vertically oriented, oval meatus and a conical glanular shape with a direct urinary stream were the criteria for good results.

Data were collected and entered into the computer with the SPSS program.

RESULTS

The mean age of the 61 cases was 3.98 years (range 4 months to 11 years). The positions of the urethral meatus in the sample and in each group are shown in (table 1). An adequately functioning neourethra with a slit-like meatus at the tip of the glans was achieved in 53 (86.8%) patients.

(Table 1) types of hypospadias and number of cases studied.

Coronal	14
Subcoronal	29
Peno-scrotal	8
Mid-shaft	10

On follow-up after 3 months from operation, urethro-cutaneous fistula as a complication found in 8 patients, at a rate of 13.1% (table 2). In group A, fistula occurred in 4 cases (20%), in group B, it occurred in 3 patients (13%), while in group C, it occurred in only one patient (5.5%). A lower rate of fistula formation occurred with group C, in which we used double flap (lateral dartos flap and preputial flap).

(Table 2) percentage of fistula formation in each group of patients.

	Group A	Group B	Group C	Total
Number of cases	20	23	18	61
Fistula formation (%)	4 (20%)	3 (13%)	1 (5.5%)	8 (13.1%)

In correspondence with type of hypospadias, no urethrocutaneous fistula occurred with coronal hypospadias (0%), while fistula occurred in 3 cases with subcoronal type (10.34%), 3 cases with peno-scrotal type (37.5%) and 2 cases with mid-shaft type (20%). (table 3)

(Table 3) percentage of fistula formation within each type of hypospadias.

	Coronal	Subcoronal	Peno-scrotal	Mid-shaft	Total
Fistula	0 (0%)	3 (10.34%)	3 (37.5%)	2 (20%)	8
No fistula	14 (100%)	26 (89.66%)	5 (62.5%)	8 (80%)	53
Total	14	29	8	10	61

DISCUSSION

There are multiple variations in surgical techniques introduced by surgeons to modify Snodgrass procedure aiming to improve outcomes and decrease complications. Most common complications are urethra-cutaneous fistula, meatal stenosis, penile torsion and

wound dehiscence. We will discuss fistula formation in our study and review literature for comparison. The interposition of a barrier layer (flap) between the neourethra and the overlying skin is an important part of the Snodgrass repair, its role is to decrease the rate of urethra-cutaneous fistula formation. The most

popular flap used is the preputial flap; however, mobilization and ventral transposition of the flap around one side of the penile shaft may lead to penile torsion, especially if the flap is of inadequate length and laid on with tension. Moreover, dissection of the flap may affect the blood supply to the dorsal skin, which is often used for re-surfacing closure, and may thus predispose to skin loss and failure of the repair.

To avoid penile torsion, a modification of the way in which the preputial flap is immobilized has been described.⁽¹⁰⁾ A window is created in the flap at the midline, and the penile shaft is pulled through it in order to transfer the dartos flap ventrally over the neourethra. The size of the flap may, however, be inadequate to cover the repair when the ventral skin is deficient, and another modification in flap creation was described, which is to raise the ventral dartos flap to cover the neourethra. This technique was claimed to be associated with a low fistula rate and easier harvesting and mobilization of the flap to cover the neourethra^(7,11). Jayanthi⁽¹²⁾ reported statistically significantly higher rates of fistula formation with preputial flap than that with lateral dartos flap. He found that the lateral dartos flap is usually easily

raised and mobilized to the midline. It is also a good option in cases in which the child has been circumcised before urethoplasty, as there is no preputial flap.

In our study, we used three different modified techniques for Snodgrass procedure, to cover the neourethra we used preputial flap, lateral dartos flap and combined double flap (preputial and lateral dartos), we found better outcomes with double flap technique and less urethrocutaneous fistula formation. Coronal hypospadias had the best outcome with no cases of fistula formation, while percentage of cases that had fistula complication increased the higher the degree of hypospadias. However, this technique (combined double flap) can be used only in selected patients, it cannot be used in already circumcised patients. Another factor that determines the selection of the type of flap is the position of external urethral meatus, Mid-shaft and subcoronal hypospadias are more suitable for combined double flap technique.

In (table 4) a review of other modifications of the tissue covering TIP urethoplasty and the rates of fistula formation published in the literature.

(Table 4) types of supportive tissue covering TIP urethoplasty and rates of fistula formation.

Tissue covering TIP repair	Reference (No.)	Date	No. of patients	No. of fistulas (%)
Lateral dartos flap	Al-Hunayan et al. ⁽⁷⁾	2003	83	4 (5)
De-epithelialized preputial flap	Jayanthi ⁽¹²⁾	2003	110	1 (1)
De-epithelialized preputial flap	Baccala et al. ⁽¹³⁾	2005	101	2 (2)
Para-urethral dartos flap	Mustafa ⁽¹⁴⁾	2005	15	1 (7)
Double dartos flap	Bakan and Yildiz ⁽¹⁵⁾	2007	45	0
Combined Mathieu and Snodgrass	Elganainny et al. ⁽¹⁶⁾	2010	101	8 (7.9)
Modified preputial flap	El-Kassaby et al. ⁽¹⁷⁾	2012	764	16 (2)

Another topic of controversy in TIP urethoplasty is the use of a urethral stent. Proponents of stenting argue that it keeps the dorsal midline incision stretched open and limits premature healing, which would obviate the benefit of the dorsal incision.⁽¹²⁾ In descriptions of cases with no stenting, however, no cases of urethrocutaneous fistula, urethral stricture or meatal stenosis have been reported⁽¹⁸⁾. We stented all patients for 3-5 days, which allowed drainage of the urinary bladder. It also helps hemostasis, reduces post-operative bleeding and in the same time this short period, avoids the problem of catheter blockage, bladder irritation and long hospital stays.

The retrospective nature of this study limits its generalization, and a prospective comparative study is recommended.

CONCLUSION

Use of preputial- lateral dartos combined double flap in Snodgrass urethoplasty reduce the rate of fistula formation. The use of a stenting

catheter should not exceed 5 days post-operatively in order to avoid its complications.

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