

Original Research Article

Comparison between Single and Double Dartos Layers Snodgrass Technique for Hypospadias Repair : Results of Our Experience

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Abstract

To compare our results with single versus double dartous layers Snodgrass technique for hypospadias repair, a comparative study was done and the results were compared in term of : the overall success and complications rates, percentage of each complication (urethrocutaneous fistula, meatal stenosis, urethral diverticulum and glandular or complete neourethradehiscence) with final cosmetic appearance and straightening of urinary stream. The study was extended from January 2013 to June 2015; including a randomly selected forty three children with median age of 29 months (range from 12 to 66 months) with a primary hypospadias. Patients were divided into 2 groups: Group 1 include 21 patients that were selected to be operated by a single layer TIP technique. Group 2 include 22 patients that were selected to be operated by a double layer TIP technique. All patients under went Snodgrass technique urethroplasty in the surgical theater of Al-Diwaniya teaching general hospital under general anesthesia. The results shows a higher overall success rate and cosmetic appearance with lower complications for patients in group 2 in comparison to those in group 1 with no statistically significant difference. The neourethral covering in TIP hypospadias repair (Snodgrass technique) with double-dartos flap yield a better cosmetic and functional results in comparison to single dartos flap cover in terms of increasing success rate and minimizing complications specially in decreasing the rate of urethrocutaneous fistula formation which is the most common complication following this type of surgery.

Key words: hypospadias, Snodgrass Technique, fistula, dartos flap.

مقارنة بين الطبقة السليخية المنفردة والمزدوجة في تقنية سنودجراس لإصلاح ألبال التحتيا

الخلاصة

لغرض إجراء مقارنة بين نتائج استعمال غطاء السليخية المنفرد مقابل الغطاء المزدوج في تقنية سنودجراس لتجميل ألبال التحتي تم إجراء دراسة مقارنة للنتائج من حيث: المعدل الكلي للنجاح وللمضاعفات , النسبة المئوية لكل مضاعفة (ناسور الاحليل-جلدي, تضيق فتحة الاحليل, جيب الاحليل ونقر الحشفة أو تام) مع النتيجة التجميلية النهائية واستقامة انسياب الإدرار. الدراسة امتدت من شهر كانون الثاني 2013 وحتى شهر حزيران 2015. حيث شملت 43 طفل مصاب بتشو ألبال التحتي بمعدل عمر 29 شهر (من 12-66 شهر) وقد تم اختيارهم بشكل عشوائي. تم تقسيم المرضى إلى مجموعتين:

مجموعة 1 : شملت 21 مريض تم اختيارهم لإجراء تقنية سنودجراس بغطاء منفرد. مجموعة 2 : شملت 22 مريض تم اختيارهم لإجراء تقنية سنودجراس بغطاء مزدوج.

أجريت لهم عملية تجميل ألبال التحتي لجميع المرضى بتقنية سنودجراس في صالة عمليات مستشفى الديوانية التعليمي العام وتحت التخدير العام. أظهرت النتائج ارتفاع معدل النجاح والشكل التجميلي مع انخفاض معدل المضاعفات لمرضى المجموعة الثانية مقارنة بالمرضى في المجموعة الأولى وبدول فرق إحصائي واضح. إن استعمال الغطاء السليخي المزدوج في تقنية سنودجراس لتجميل الاحليل اظهر نتائج وظيفية وتجميلية أفضل مقارنة

باستعمال الغطاء الأحادي من حيث رفع معدل النجاح وتقليل المضاعفات وخصوصا ناسور الاصليل-جلدي الذي يعتبر من أكثر المضاعفات شيوعا بعد هذا النوع من التداخل الجراحي.

الكلمات المفتاحية: مبال تحتي, تقنية سنودجراس, غطاء السليخية, ناسور.

Introduction

Hypospadias is a developmental anomaly characterized by arrested penile development. It is characterized by proximal opening of the urethral meatus, dorsal hooding of the foreskin, and ventral penile curvature (chordee). Phallic development is dependent upon androgenic stimulation between the ninth and twelfth weeks of gestation. Androgen stimulation leads to elongation of the genital tubercle and fusion of the urethral folds. Lack of androgenic stimulation during this critical time period can lead to hypospadias and its associated findings. The incidence of hypospadias is 1 in 250-300 live births. Hypospadias is noted to also occur in 6-8% of affected individuals' fathers and 14% of male siblings. Severe hypospadias is associated with DSD (Disorders of sexual differentiation) and karyotype is warranted, especially if diagnosed with concomitant cryptorchidism. Hypospadias can cause difficulty with both sexual intercourse and urinating from a standing position [1].

Various factors were involved in the etiology of hypospadias such as vascular factors, enzymes and receptor deficiency, but the exact etiology is not known [2].

Hypospadias is classified according to the location of urethral meatus as the following: 65%-70% as anterior, 10-15% middle and in 20% as posterior [3].

The aim of hypospadias repair is to create a urethral meatus at appropriate position on the glans, to correct penile curvature and create a urethra that allows urination with a controlled stream. These goals must be accomplished with attention to cosmesis. Results of hypospadias surgery can be analyzed by both subjective and objective criteria. Objective criteria includes functional status as measured by uroflow. Subjective criteria are more difficult to define, but certainly include cosmesis,

sexual function, psychosocial adjustment and body image [4].

Modern techniques have evolved from the myriad of operations described by the pioneers of hypospadias surgery. An understanding of these techniques is germane to present-day practice [5].

Hypospadias surgery that began in the early 1800s originally focused on repair for proximal defects, by the end of the decade nearly all primary hypospadias could be repaired using MAGPI, only, or tubularized preputial flaps. Although it is commonly written that more than 200 repairs have been described, hypospadias urethroplasty can be summarized into three basic categories: tubularization of the urethral plate, supplementation or substitution of the urethral plate with skinflaps, or urethral plate substitution with grafts. Of these, today the most common primary surgery is urethral plate tubularization. This is also the most recently introduced concept, given that the urethral plate—tissues extending distally from the hypospadias meatus that normally form the urethra—was only recognized as a distinct structure in the late 1980s. Although tubularization of the broad or deeply grooved urethral plate had been reported sporadically, in 1994 the midline incision was described to tubularize the narrow or flat plate without the need for supplemental skin flaps (Snodgrass, 1994). The TIP repair subsequently gained widespread use for its perceived simplicity and improved cosmetic outcomes versus flap repairs. Its application to proximal hypospadias followed increased realization that the urethral plate is not fibrous scar but well-vascularized tissues that potentially can be preserved for urethroplasty [6].

Preservation of the urethral plate makes the surgical approach for hypospadias repair. The tubularized incised plate procedure has been used mostly for distal hypospadias repair due to its simplicity, low

complications rate and good cosmetic outcomes [7].

Complications of Snodgrass repair include urethrocutaneous fistulas, meatal stenosis, residual curvature, torsion, stricture, suture tracts, diverticulum, subcutaneous cysts, hairy urethra, retrusive meatus, splayed urinary stream, Balanitis xerotica obliterans, multiple failures, erectile dysfunction, ejaculatory dysfunction and cosmetic considerations[8].

Urethrocutaneous fistulas are the most common complication after hypospadias urethroplasty. Technical steps thought to reduce fistula risk include two-layer subepithelial closure of the neourethra and subsequent coverage with a barrier flap, usually dartos[6].

The addition of a dartos flap significantly reduced fistulas during TIP repair in comparison onto retrospectively obtained results from patients repaired without a dartos flap. Splitting the dorsal dartos flap to create a "double-layer" barrier was found to significantly reduce fistulas versus a single-layer dartos flap in TIP repair [9].

In the present era, with the good results of TIP, it is logical to use urethral preservation procedures. Many centers use TIP as the main technique of urethroplasty because it is simple procedure with one suture line in the urethra, less operative time, imparts good cosmesis and results in a uniform vertical meatus[10].

Materials and Methods

From January 2013 to June 2015; forty three children with median age of 29 months (range from 12 to 66 months) with a primary hypospadias were selected randomly in this study.

The patients were selected to have either distal or midshaft hypospadias, exclusion criteria included cases were previously operated or circumcised, patients with thin unhealthy urethral plate, presence of chordee and those with more proximal hypospadias.

Patients were divided randomly into 2 groups:

Group 1 includes 21 patients that were selected to be operated by a single layer TIP technique.

Group 2 includes 22 patients that were selected to be operated by a double layer TIP technique.

Following complete physical examination; routine investigations like complete blood count, screening for hepatitis and chest x-ray were done in all cases.

All patients underwent tubularized incised-plate (TIP) urethroplasty (Snodgrass technique) in the surgical theater of Al-Diwaniya teaching general hospital under general anesthesia.

Patients are positioned supine at surgery and surgical site preparation were done. A stay suture (2/0 rounded needle silk) was placed in the midline of the glans for the traction and a bloodless operative field was obtained by applying a tourniquet around the base of the penis.

A circumferential skin incision was made distal to the U-shaped incision around the hypospadias meatus and urethral plate and join it on either side. Then degloving of penis was done, followed by incising urethral plate along from hypospadias meatus to the tip of glans. The incised urethral plate was then tubularised with one layer subcuticular suture (6/0 polyglactin) over a 6–8-F stent without tension, the tubularisation was extended to the midglans only to make a wide meatal opening to avoid late meatal stenosis. The glanular incisions were dissected deeply and laterally to prevent tension after closure.

Next step is creation of dartos flap with good vascularity and length:

For those patients in group 1; the flap usually developed from the ventrolateral dartos proximal to the urethral plate that sutured to the side of tubularisation as only one layer covering of neourethra.

For group 2 patients; a second dartos flap was separated from preputial skin and rotated anteriorly on the opposing side of first layer to make a double-dartos flaps covering over the neourethra.

Finally; releasing the tourniquet, complete hemostasis, closure of the glans wings and remaining skin defects using 5/0 or 4/0

polyglactin sutures and a dressing is applied. Prophylactic intravenous antibiotic (ceftriaxon or amikacin) started 30 minutes before induction of anesthesia and continued for 3-4 days postoperatively.

Hospital stay was range from 3 to 5 days (median 4 day, mean 3.8 ± 0.6 day) and all the patients were discharged to the home with stent and prescribed oral antibiotics (amoxicillin or cefixime) and analgesic (acetaminophen or ibuprofen). They were advised to revisit after 10 days for catheter removal and assessment.

Follow-up period was range from 4 to 12 months with a mean of 5 months.

In our study, we compare our experience results for the two groups in term of: The overall success and complications rates, percentage of each complication (urethrocutaneous) fistula, meatal stenosis, urethral diverticulum and glandular or complete neourethra dehiscence) with final cosmetic appearance and straightening of urinary stream.

Success was consider as those patients with complete healing without development of any complication or needing second corrective operation. The statistical analysis was performed using SPSS software and the data were compared using chi-square test, with differences considered significant at $P < 0.05$.

Results

All the forty three patients were underwent TIP urethroplasty (Snodgrass technique); Group 1 included 21 patients where their repair was covered with single-dartos flaps and the other 22 patients in group 2 underwent a double-dartos flap to cover the neourethra.

The median age for patients was 29 months (range from 12 to 66 months) and the period of study was 30 months (2.5 years) extending from January 2013 to June 2015.

The mean follow-up period after surgery was 5 months (range from 4 to 12 months).

The mean operative time in TIP repair for group 1 was 35.9 ± 12.4 (40–90) minutes and for group 2 was 42.0 ± 15.1 (45–100)

minutes. The difference in the operative time between the two groups was statistically insignificant ($P=0.2$). the variation in operative time was due to additional time that being used for adding a second layer but several other intra-operative factors may be responsible for this variation among them was the level of hypospadias meatus.

In group 1: 7 patients (33%) develop urethrocutaneous fistula, glandular dehiscence occur in one patient (5%) while 2 patients (9%) develop complete neourethra dehiscence and no any patient develop meatal stenosis or urethral diverticulum. The overall complications rate in this group was 47% (10 patients).

In group 2: 4 patients (18%) develop urethrocutaneous fistula, glandular dehiscence occur in one patient (4%), complete neourethra dehiscence also occur in one patient (4%). another 1 patient develop meatal stenosis (4%) and no case complicated by urethral diverticulum. The overall complications rate in this group was 31% (7 patients).

The overall success rate for patients in group 1 was 53% and for those in group 2 was 69%, The difference in success and complication rates between the groups was not statistically significant ($P = 0.5$).

Urethrocutaneous fistula was the most common complication in both group and the difference in fistula formation and other mentioned complications is statistically insignificant ($P > 0.05$).

Cosmetic appearance (by inspection) has been consider either satisfactory (86% vs 96%), or accepted (9% vs 4%) and unsatisfactory (5% vs 0 %) while the urinary stream (evaluated by examination during voiding for older patients or by the parents description for younger patients) was straight in (95% vs 100%) or slightly diverted stream (5% vs 0%) for patients in group 1 and 2 respectively with no statistically significant difference for these results ($P > 0.05$).

The whole results of our study are summarized in tables 1 and 2 and figure 1.

Table 1: Summary of complications

Complications	Group 1 n=21	Group 2 n=22
Urethrocutaneous fistula	7 (33%)	4 (18%)
Meatal stenosis	0 (0%)	1 (4%)
Glandular dehiscence	1 (5%)	1 (4%)
Complete dehiscence	2 (9%)	1 (4%)
Urethral diverticulum	0	0
Overall complication rate	10 (47%)	7 (31%)

Table 2: Cosmetic appearance and straightening of urinary stream

		Group 1	Group 2
Cosmetic appearance	Satisfactory	18 (86%)	21 (96%)
	Accepted	2 (9%)	1 (4%)
	Unsatisfactory	1 (5%)	0 (0%)
Urinary stream	Straight	20 (95%)	22 (100%)
	Diverted	1 (5%)	0 (0%)

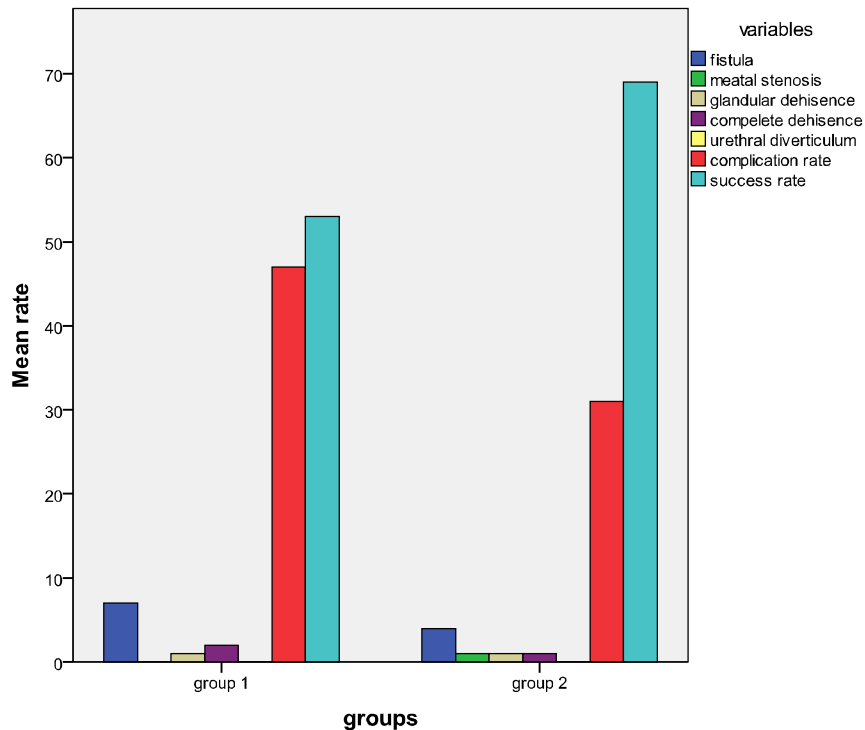


Figure 1: Comparison of the results between both groups

Discussion

The overall complications rate in group 1 was 47% and that for group 2 was 31% while the overall success rate for patients in group 1 was 53% and for those in group 2 was 69% which indicate a better results with double-dartos flap Snodgrass technique. complication rate of our study is approximate to complication rates from Tonvichien(33%) and Barrack(30%) studies[11,12]

There sults of our study indicate that urethrocutaneous fistula is the most common complication following TIP urethroplasty (Snodgrass technique) and the incidence of this complication was decreased by making a double-dartos flap covering of neourethra (18% in group 2 versus 33% in group 1) although the statistical difference was not significant ($P = 0.1$), this result can be explained by our belief that a double layers covering of neourethra act as a mechanical barrier that prevent urine leak from tubularisation in addition to improve local vascularity state that decrease ischemia and enhanced healing process.

Snodgrass mentioned that the most common problem following TIP was fistulas. In his first series of TIP repairs as he used a single layer dartos barrier flap and observed a 33% incidence of fistulas[13].

In a study reported by Snodgrass and Yucel [14], fistula rate was decline from 33 to 11% with two-layer dartos flap repair.

Several factors can contribute to fistula formation including: age of patient, level of hypospadias defect, experience of surgeon ,technique type, minimal tissue handling, water tight coverage, and prepuce reconstruction. [10]

The incidence of meatal stenosis in our study was low (0% in group 1 and 4% in group 2) this is because the wings of glans are deeply dissected laterally to avoid tension after closure and the tubularisation is carried out to the midglans only to make a wide meatal opening, the only one patient in group 2 (n=1, 4%) who develop meatal stenosis is thought to be due to ischemia resulting from glans closure under tension as it was difficult case. this result is

comparable to other studies which show a meatal stenosis rate of 0-7% of patients after repair.[13,15]

Dehiscence rate was also lower in group 2 where it occur in 2 patients (9%); 1 patient as complete dehiscence and other 1 patient as only glandular dehiscence, while it occur in 3 patients (14%) in group 1 (2 complete and 1 glandular dehiscence) which can related to improved vascularity by double-dartos flap covering resulting in a better healing. Bertozzi et al [16] had find lower incidence of repair breakdown following hypospadias repair with double layer covering of neourethra.

The final cosmetic appearance was good for all patients and most of our patients have a straight urinary flow during their follow-up although these results are a better for patients in group 2 but without statistical difference ($P = 0.5$). Din I U results with Snodgrass repair in his study were yield satisfactory cosmetic appearance and the results of KM O'Connor and EA Kiely study reported that the urinary stream was straight in 94% of their patients, and 97% have a satisfactory or good cosmetic appearance[17,18]

It is important to mention that the surgeon experience , multi-surgeon practice , more number of cases and more extended period of follow-up may results in less complications in other studies.

Ideal frequency and duration of follow-up after surgery are ill defined. The preferred postoperative examinations after distal to midshaft hypospadias repair is at 6 weeks and 6 months. Although it is often stated that periodic assessment should continue to puberty, it is unlikely many patients operated on while infants will have adult follow-up.[6]

Conclusion

The neourethral covering in TIP hypospadias repair(Snodgrass technique) with double-dartos flap yield a better cosmetic and functional results in comparison to single dartos flap cover in terms of increasing success rate and minimizing complications specially in decreasing the rate of urethrocutaneous

fistula formation which is the most common complication following this type of surgery despite no statistical significant difference between the two methods in our present study.

Snodgrass technique result in more natural cosmetic appearance of the glans and meatus and a more straight flow of urine but this is not differ in which method of covering being used.

However, careful attention to surgical details and adding second dartos flap to the procedure can help to achieve optimal results without consuming significant time.

We recommend that a double-dartos flap covering for neourethra being as a crucial step in TIP hypospadias repair (Snodgrass technique) but a further prospective, controlled trials with larger sample size and prolonged follow-up period are required for more assessment.

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