

Tunica Vaginalis Flap as a Second Layer for Tubularized Incised Plate Urethroplasty

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Purpose: To investigate the success rate of Snodgrass method in combination with tunica vaginalis flap as the second layer for hypospadias repair.

Materials and Methods: In a prospective study, 33 patients with penile hypospadias who were treated using a Tubularized Incised Plate Urethroplasty (Snodgrass method) and vascularized tunica vaginalis flap as a second layer, were evaluated. Wound infections, meatal stenosis, and urethrocutaneous fistula were considered as treatment complications. Success rates of surgery were recorded. Failure was defined as need for re-operation.

Results: The mean age of the patients was 9.93 ± 4.4 years (range, 1.5 to 18 years). The mean follow-up was 8.79 ± 5.43 months (range, 6 months to 5 years). Four patients were lost to follow-up and excluded from the study. The location of hypospadias was distal penile in 17 patients (59%) and mid-penile in 12 (41%). Of studied patients, 3, 2, and, 1 developed fistula, wound infection, and meatal stenosis, respectively. Two subjects with meatal stenosis and one with wound infection were managed conservatively.

Conclusion: Snodgrass technique in combination with tunica vaginalis flap as a second layer is a reasonable procedure for hypospadias repair because of good cosmetic appearance and acceptable complication rates. Currently, fistula formation remains the most common complication of this technique, which often needs surgical repair.

Keywords: urethra, urethral stricture, hypospadias, surgical flaps, graft survival, reconstructive surgical procedure

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INTRODUCTION

Hypospadias, with prevalence of 1 per 300 live births, is a congenital malformation⁽¹⁾ caused by incomplete fusion of urethral folds, in which the meatal orifice opens on the inferior surface of the penis.⁽²⁾

Tubularized incised plate method was first described by Snodgrass in 1994⁽³⁾ and has rapidly become a procedure for various types of hypospadias. The principal advantage of this technique is the excellent cosmetic appearance with the minimum scarring in the urethra.⁽⁴⁾ In any reconstructive surgeries like hypospadias repair, vascularity of the repaired site is a major concern.⁽⁵⁾ Hence, to obtain

better outcome of hypospadias repair, some vascularized flaps like dartos fascia and tunica vaginalis flap were introduced. These vascularized flaps are placed on the neourethra as the second layer. It seems that use of a vascularized tunica vaginalis flap as a second layer combined with Snodgrass procedure results in better outcome. The aim of this study was to evaluate the efficacy of Snodgrass method in combination with vascularized tunica vaginalis flap.

MATERIALS AND METHODS

Patient Selection

This pilot case series study was

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performed on 33 patients with penile hypospadias without chordee, who referred to a single urologist from December 2003 to June 2008.

All the patients underwent Tubularized Incised Plate supported by tunica vaginalis flap. Five patients received pre-operative androgen therapy, which was administered as testosterone enanthate injection (2 mg/kg) for 2 to 5 weeks before the operation.

We followed up the patients every 3 months for the first year, every 6 months thereafter, and whenever a patient experienced a problem. We called the patients if they did not show up for the follow-up.

A need for repeat surgical intervention during the follow-up was considered as a failure. Wound infections, development of meatal stenosis, scrotal disorders, and urethrocutaneous fistula were regarded as surgical complications.

Surgical Technique

Under general anesthesia, after placing stay sutures, according to the traditional Snodgrass technique, one midline deep incision was carried out in the urethral plate from hypospadiac meatus to the glans penis. Then, by another 2 parallel incisions, tubularized urethroplasty was completed over a silicon urethral catheter (8-12 F according to the penile size and patient's age). Thereafter, the testis was delivered via a separate scrotal incision and a vascularized tunica vaginalis flap was harvested and transferred to the site of surgery through a subcutaneous tunnel. Care was taken to make a wide tunnel to avoid compression of flap pedicle. Scrotal dissection was done gently with paying attention to complete hemostasis. Ventral side of the urethra was covered by serosal layer of tunica vaginalis flap. The penile skin was then sutured with 5-0 or 6-0 vicryl sutures. Urethral catheter was removed 5 to 7 days after the surgery (Figure).

Statistical Analysis

Data were analyzed using SPSS software (Statistical package for the Social Science, Version 13.0, SPSS Inc, Chicago, Illinois, USA) and Chi-square test. *P* values less than .05 were

considered statistically significant. We assessed the relationship between age and complication rate by dividing patients into two age groups; ≤ 6 years old and > 6 years of age.

RESULTS

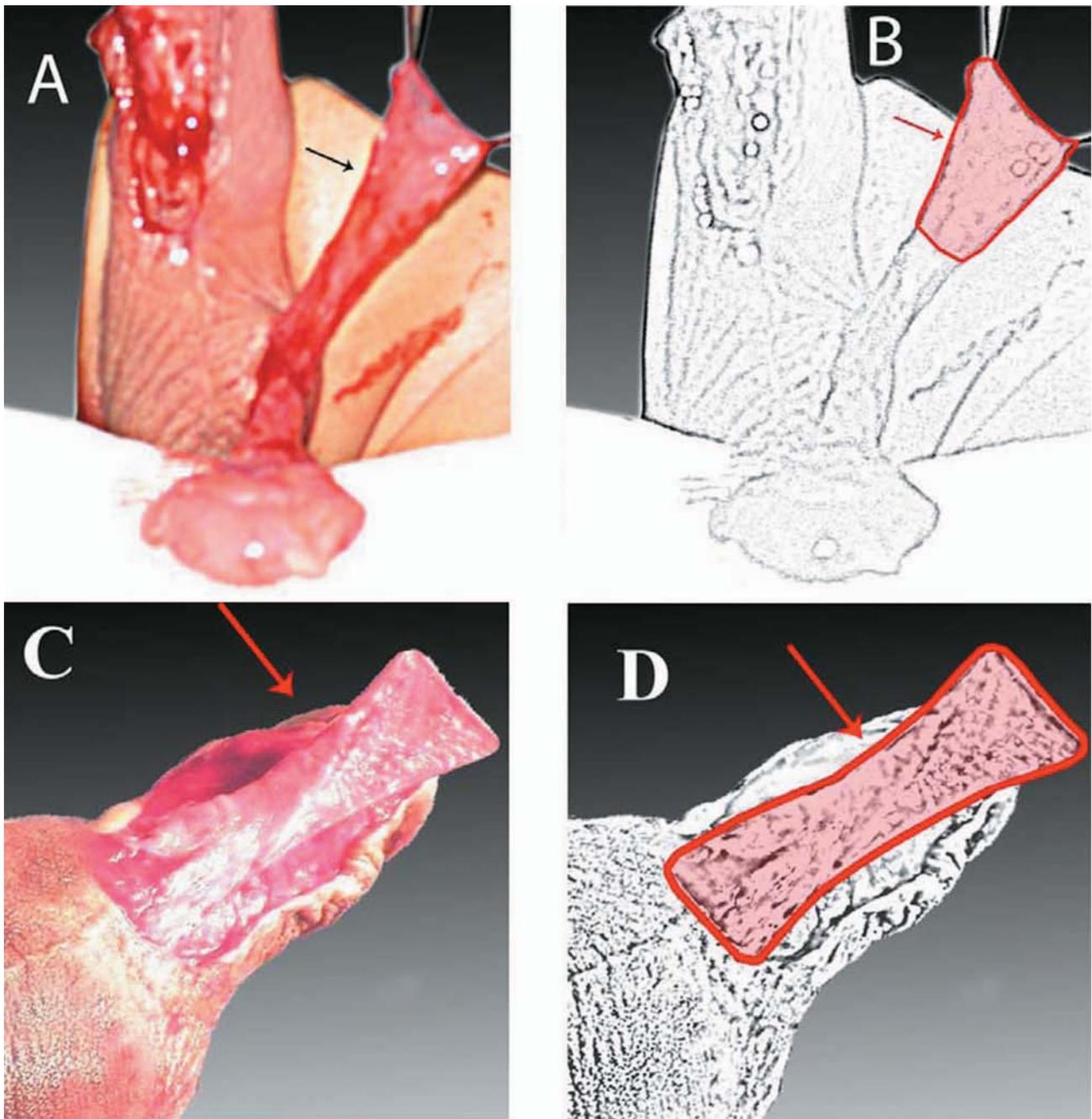
The mean age of the patients was 9.93 ± 4.4 years (range, 1.5 to 18 years). The mean follow-up was 8.79 ± 5.43 months (range, 6 months to 5 years). Four patients were lost to follow-up and excluded from the study. Location of hypospadias was distal penile in 17 patients (59%) and mid-penile in 12 (41%). Eight patients (27.5%) had a history of circumcision. The following complications occurred in 10 patients (34.48%): fistula formation in 3 (10.34%), wound infections in 4 (13.79%), and meatal stenosis in 3 (10.34%). There were no cases of hematoma and scrotal complications. In 6 patients (21.69%), the surgery failed because of fistula formation in 3 (10.34%), wound infection in 2 (6.89%), and meatal stenosis in 1 (3.44%). Two subjects with meatal stenosis and 2 patients with wound infections were treated conservatively, and hence, were not considered as failures, but were included in complication rates.

There were not any statistically significant differences in the terms of age ($P = .49$), meatus location on the penis ($P = 1.000$) (mid or distal penile), history of circumcision ($P = 1.000$), and history of androgen therapy ($P = 1.000$) between two patients with and without complications.

DISCUSSION

Several different surgical methods have been proposed to achieve normal appearing penis with low complications rates in the treatment of hypospadias. Some of these techniques use the penile skin while some other methods use extra penile tissues, including the buccal mucosa,⁽⁶⁾ the skin graft,⁽⁷⁾ and the tunica vaginalis as a flap or graft.⁽⁸⁾

Snodgrass procedure or Incised Plate Urethroplasty is a method with high success rate;⁽³⁾ however, urethrocutaneous fistula is a common complication following this technique.⁽⁹⁾ To decrease the rate of this complication, a



A, B: A vascularized tunica vaginalis flap (arrow) is harvested through a scrotal incision. **C, D:** Tunica vaginalis flap (arrow) covers the neourethra.

vascularized tissue is applied as a second layer between the neourethra and the skin coverage.⁽⁵⁾ Dorsal flap is a tissue that has been used for the neourethra coverage to improve the outcome; however, this technique sometimes results in penile torsion or chordee.⁽³⁾

An alternative technique is the use of tissues such as dartos fascia of ventral side of the penis.

Furness and Hutcheson reported a success rate of 98% for this method and of 109 patients, only 2 developed fistulas.⁽¹⁰⁾ A study in Turkey demonstrated better cosmetic results using mucosal collars. In that study, fistula and meatal stenosis rates were 8.3% and 14%, respectively.⁽¹¹⁾

It should be noted that fascia is not always available to be used as a second layer. In our

series, 28% of the subjects were circumcised, which made preparation of dorsal based dartos flap difficult.

Tunica vaginalis is another tissue that can be used as a second layer in hypospadias repair. Advantages of this flap are its availability and excellent vascularity. Furthermore, because this tissue is far from the penis, it is not affected by the penis disorders. Besides, acceptable outcomes have been achieved from the use of tunica vaginalis flap for repair of urethrocutaneous fistula.

In another study, the success rate with tunica vaginalis flap was 100% without a significant complication.⁽⁸⁾ In a study by Snow and colleagues, most of the post tunica vaginalis flap complications were related to scrotal hematoma and abscess, while the rate of 5% was reported for urethrocutaneous fistula.⁽¹²⁾ Therefore, Snow and associates has recommended tunica vaginalis flap as a second layer for primary hypospadias repair. In our study, the rate of fistula was higher compared to their study. This could be due to the use of microscope by Snow and colleagues. By performing complete hemostasis, anatomical dissection, and well dressing of the scrotal region, we did not encounter scrotal complications.

In an Indian study, Snodgrass method alongside dartos fascia was used in 20 patients and tunica vaginalis flap in 29 patients as a second layer for hypospadias repair.⁽¹³⁾ After urethral catheter removal, 20% and 10% urinary leakage was observed in dartos fascia and tunica vaginalis groups, respectively. The rate of urinary leakage was similar to urinary fistula rate in our study. Interestingly, in the above-mentioned study, placement of a urethral catheter (urethral re-catheterization) for another 7 to 10 days resulted in urinary leakage improvement as well as prevention of permanent fistula formation. In contrast, those subjects in whom a dartos fascia has been used as the second layer, urethral re-catheterization could not prevent permanent fistula formation. Since we did not use urethral re-catheterization, we could not comment on this subject.

CONCLUSION

Our results showed that Snodgrass technique

in combination with tunica vaginalis flap, as the second layer, is a reasonable method for hypospadias repair, resulting in good cosmetic appearance and acceptable complication rates. However, further refinement of this technique could lower the complication rate. Careful dissection of the scrotum and attention to hemostasis can reduce scrotal complications as well. Currently, fistula formation remains the most common complication of this technique, which often necessitates re-operation.

CONFLICT OF INTEREST

None declared.

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