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Original Research Article

Comparative study between snodgrass urethroplasty and modified snodgrass urethroplasty for distal penile hypospadias in terms of post-operative urethrocutaneous fistula formation

Abu Bakar Akan*, Susankar Kumar Mondal, M. Rezaul Karim Mojmdar, M. Shakhawat Islam, Noor Mahammad, Umme Habiba Dilshad Munmun

Department of Pediatric Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

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***Correspondence:**
Dr. Abu Bakar Akan,
E-mail: abubakarakan9@gmail.com

ABSTRACT

Background: Hypospadias is a congenital defect involving the male urethra characterized by the absence of urethral meatus at its normal position. This anomaly is usually associated with the ventrally deficient but dorsally hooded skin. In some cases, the penis is ventrally curved. Surgery is the option for this defect. So many procedures have been developed but none is free from the development of urethrocutaneous fistula. Now-a-days, the popular Snodgrass procedure is widely practiced but still fistula occurs. Many factors are thought to be responsible for it. The most important one is defective ventral penile skin which is deficient of vascular and collagen tissues. To minimize these deficient factors, a dorsal vascular preputial flap is transferred ventrally (modified) to reduce fistula formation further. A comparative study was disigned to determine the role of dorsal vascular flap.
Methods: The prospective observational study was conducted in the department of pediatric surgery, Bangabandhu Sheikh Mujib medical university, Dhaka, Bangladesh since February 2017 to May 2021.
Results: A total of 40 patients with distal penile hypospadias were included in this study. They were divided into Group A and group B, 20 for each. Snodgrass procedure was for Group A and the modified Snodgrass procedure was done for group B. The outcome of both the groups was determined in terms of fistula formation. Seven patients in group-A and one patient in group B developed fistula. The results were analyzed and were found statistically significant.
Conclusions: Modified Snodgrass urethroplasty has a better outcome.

Keywords: Hypospadias, Snodgrass procedure, Modified Snodgrass procedure, Urethrocutaneous fistula

INTRODUCTION

Hypospadias is defined as an arrest of the normal urethral development where the external urethral meatus is located at the ventral surfece of the penis along the shaft, even in the perineum. It occurs in 1 in 350 live births.[1] In 1996, Duckett classified hypospadias according to meatal location as an Anterior group (49%) comprising the distal penile, sub-coronal, coronal, and glandular variety. In the middle group (21%) in which, meatus is present at the under surface of the mid-shaft of the penis. The posterior group (30%) comprises the posterior penile, penoscrotal, scrotal, and perineal variety.[2] Surgical reconstruction is the only way to correct this congenital defect.[3] But the complications are much higher after hypospadias surgery than in any other reconstructive procedure.[4] Among the complications, the most notorious and frustrating one is the urethrocutaneous fistula.[5] To overcome this

frustrating post-operative complication, more than 350 procedures have been developed by the hypospadiologist but none become the ideal one to avoid this notorious complication like urethrocutaneous fistula.[6] Among the recently developed procedures, the Snodgrass technique become a popular procedure especially for mid and distal penile hypospadias as it has a low complication rate (7-26%).[7] Now the question is why fistula occurs even in the best hands with the most popular method in the hypospadias world? Histological analysis of the ventral skin of the hypospadiac penis, distal to the meatal opening shows that collagen and vascular tissues are insufficient here significantly.[8] Those locally deficient healing factors may be responsible for the causation of frustrating urethrocutaneous fistula after hypospadias surgery as both the factors are essential for wound healing.[9] To augment ventrally in terms of collagen and vascular tissues, a local vascular flap termed the dorsal vascular preputial flap is created and transferred ventrally to fix it over the neourethra created by the Snodgrass technique.[10] It produces a complete and symmetrical covering of the whole length of the urethra. So, the present study was designed to compare the two groups of distal penile hypospadias in terms of the rate of post-operative urethrocutaneous fistula formation by Snodgrass technique alone (group A) and modified Snodgrass technique (group B).

METHODS

The prospective observational study was conducted in the department of pediatric surgery, Bangabandhu Sheikh Mujib medical university, Dhaka, Bangladesh since February 2017 to May 2021, ramdom sampling technique was used for the study. Irrespective of age, all patients with distal penile hypospadias were admitted to BSMMU hospital from the outpatient department of pediatric surgery of Bangabandhu Sheikh Mujib Medical University (BSMMU). After admission, patients were selected on the basis of inclusion and exclusion criteria. Only the patients with a history of previous penile surgery were not included in this study. Then after selection, patients were numbered and uneven numbers of patients were included in group A and even-numbered were included in group B (Figure 1).

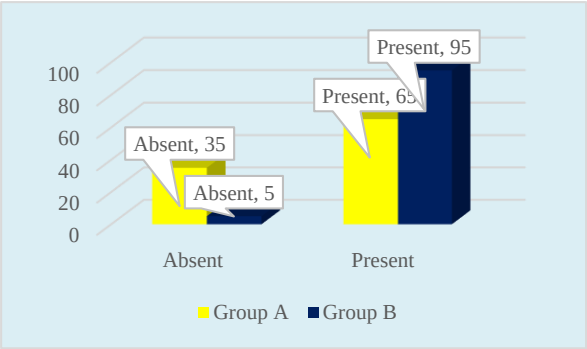

Figure 1: Distribution of urethrocutaneous fistula in two groups.

Figure 2: Distal penile hypospadias.

Figure 3: 8 fr stent is introduced into the bladder.

Then the patients were prepared for surgery. All the patients of group A underwent Snodgrass urethroplasty under general anesthesia. According to that procedure, an 8 fr stent is introduced into the bladder through abnormally located urethral meatus (Figure 3). and the urethral plate is incised at midline longitudinally from the floor of the meatal orifice to the tip of the glans. Then a 'U' shaped incision is made encircling the meatus and extends distally along the edges of the urethral plate up to the glans as if it can accommodate the size of 8 fr feeding tube easily. Then the penis is degloved up to the root to correct any chordee or rotational deformity (Figure 4).

Figure 4: Total degloving of the penis.

Then both the edges of the urethral plate are approximated ventrally over the feeding tube by continuous suturing with 6/0 vicryl. This neourethra is

covered by a second layer from the surrounding tissue by 6/0 vicryl. The glans wings are approximately by 5/0 vicryl. Then the dorsal hooded skin is incised at the midline longitudinally up to the corona and extra skin is discarded circumferentially. Finally, stitches are given around the corona like that of circumcision.

Figure 5: Dorsal preputial skin before making the vascular flap.

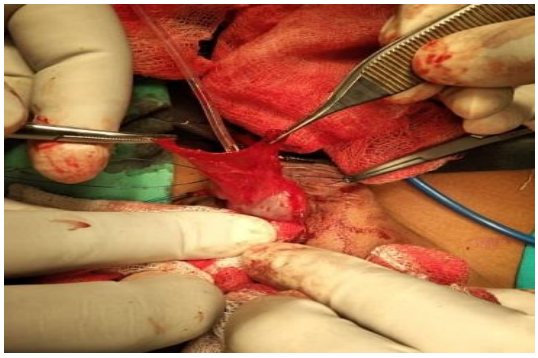

Figure 6: Dorsal preputial vascular flap.

Figure 7: Making a central hole before transferring the flap ventrally.

Then the skin is closed ventrally over the second layer of the neourethra. The urethral stent is fixed with glans by prolene. In group B, before skin closure, a 3rd layer of the dorsal vascular preputial flap (Figure 6) is created from dorsal preputial skin (Figure 5), which is then transferred ventrally by making a central hole (Figure 7) as if the flap can cover not only the second layer of neourethra but also the whole length from the root of the penis up to the glans with the aim to strengthen the locally deficient healing factors. This placing is anchored by stitches. Finally, the skin is closed as the fourth layer as described the skin closure in group-A. The urethral stent is kept in situ in both groups for urinary drainage (Figure 8) and is removed on the 10th post-operative day.

Figure 8: Completion of modified snodgrass urethroplasty.

After stent removal, urinary flow is observed directly to see any fistula formation. Then the patient is discharged with the advice of the urethral calibration to be started on the 15th day of operation and to come for follow-up after two weeks of calibration starting to see any fistula formation as fistula may appear within four weeks of operation. All the data were recorded systematically in a data sheet. Collected information is compiled, analyzed, and edited using the software SPSS (version 24.0) (IBM) Chicago, Illinois. Ethical approval was obtained from the ethical review committee of BSMMU, Dhaka, Bangladesh.

RESULTS

During the four years and three months period from February 2017 to May 2021, under the department of pediatric surgery of Bangabandhu Sheikh Mujib medical university, a total of 40 patients with distal penile hypospadias underwent urethroplasty. Half of the patients underwent the Snodgrass procedure (group A) and half of the patients underwent the Modified Snodgrass procedure (group B) (Table 1). The mean±SD of age in group A was 3.77±1.47 and in group B, it was 3.74±1.50. The p value is 0.958 which is statistically non-significant. Data are expressed as frequency percentages. Fisher's exact test is used to analyze the data, p value is found to be 0.040, which is statistically significant.

Table 1: Comparison of the mean age between two groups (n=40).

Parameter	Group A (N=20) Mean±SD	Group B (N=20) Mean±SD	P value
Age (years)	3.77±1.47	3.74±1.50	0.958

DISCUSSION

One of the most common congenital birth defects is hypospadias. Despite obvious surgical advances in hypospadias repair, no single technique has been proved to be fistula-free.[11] The present study was designed to evaluate the role of the dorsal vascular preputial flap over the neourethra, created by the Snodgrass procedure. 40 patients were included in this study. After pre-operative evaluation, the Snodgrass procedure was done in group A which is considered the control group, and the Modified Snodgrass procedure was done in group B which is considered an experimental group. In this study, 7 patients in group A developed a urethrocutaneous fistula (35%), and only 1 patient developed a fistula (5%) in group B. It means the rate of fistula formation is higher when the Snodgrass procedure was done alone in comparison with the modified Snodgrass procedure (35% vs. 5%). In one study, it was found that fistula formation was 37.5% when urethroplasty was done by the Snodgrass technique alone without additional dorsal vascular preputial flap.[10] This result almost matched our findings (37.5% vs. 35%). In the study conducted by Snodgrass himself, the rate of fistula formation was 7-26%.[12] In another study, fistula formation was 44%.[13] But in our study, the fistula rate is much lower (5%) than in any other studies stated above. So, the present study demonstrated that Snodgrass urethroplasty, when modified with the addition of dorsal vascular preputial flap, has a much better outcome in terms of frustrating urethrocutaneous fistula formation. When compared with the result of the Snodgrass technique alone (35% vs. 5%), the result is statistically significant (p=0.040). The study was conducted in a single hospital with small sample size. So, the results may not represent the whole community.

CONCLUSION

Post-operative urethrocutaneous fistula formation is a common complication of hypospadias surgery. This study demonstrated that the rate of fistula formation is much lower when the Snodgrass procedure is modified by ventrally transferring the dorsal vascular preputial flap and fixing it throughout the whole length of the urethra from the root of the penis up to the glans as 3rd layer before closing the ventral skin.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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