Modified Hinderer's Technique for Serious Proximal Hypospadias with Ventral Curvature: Outcomes and Our Experience

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Purpose: Hypospadias is a congenital anomaly that includes defi¬cient ventral structure of the penis. Proximal hypospadias cases make up 20% of all hypospadias cases. The choice of operative technique for hypospadias repair depends on the severity, and it is influenced by the surgeon's experience and perception of where priorities should lie. Several other factors interact to determine the type of repair, such as meatal site, presence of chordee, availability of the prepuce, and quality of the urethral plate and in addition surgeon's experience affects the type of repair.

Materials and Methods: The treatment records of 42 penoscrotal and perineal hypospadias cases that were treated in our clinic from 1998 to 2017 were reviewed retrospectively. Cases with penoscrotal and perineal meatus were included in the study at the beginning of the urethroplasty. All cases had surgical intervention via Hinderer's technique.

Results: Acceptable cosmetic results were obtained in 37 (85%) patients with an objective scoring system (HOSE) for evaluating the results of hypospadias surgery score. The mean score after surgery was 14.8. Fistula and wound breakdown occurred in 7 out of the 42 cases.

Conclusion: In conclusion, the modified Hinderer's technique is a safe and reliable technique for both proximal and perineal hypospadias. Low complication rates and application in a single surgical session increase the comfort of both the patient and the surgeon.

Keywords: hypospadias; Hinderer's technique, urethral surgery

INTRODUCTION

Hypospadias is a congenital anomaly that includes defi¬cient ventral structure of the penis. Its prevalence is 1 in 300 live births, and proximal hypospadias cases make up 20% of all hypospadias cases[(1)]. The choice of operative technique for hypospadias repair depends on the severity and it is influenced by the surgeon's experience and perception of where priorities should lie[(2)]. Several other factors interact to determine the type of repair, such as meatal site, presence of chordee, availability of the prepuce, and quality of the urethral plate in addition to surgeon's experience[(3)].

The prepuce is an important source of tissue that can be used in different ways in the repair of hypospadias for neo-urethral reconstruction, to either provide a barrier layer to cover the repair or to provide skin cover to the ventral shaft. Differently in our technique, flap was prepared from prepisium and not from mucosa.

The aim of the present article is to show that Hinderer's method for penoscrotal and perineal hypospadias could be preferred because it is conducted in a single session and has both better aesthetic outcomes and lower complication rates.

MATERIALS AND METHODS

The treatment records of 42 penoscrotal and perineal hypospadias cases that were treated in our clinic from 1998 to 2017 were reviewed retrospectively. Cases with penoscrotal, and perineal meatus operated by a surgeon were included in the study at the beginning of the urethroplasty. All patients had severe ventral curvature (defined as greater than 45 degrees on artificial erection). All cases had surgical intervention via Hinderer's technique. Exclusion criteria included either interventions with other techniques or the presence of either proximal penile or mid-shaft defects. Either systemic or topical testosterone was administered, per the surgeon's preference.

Subsequent to penile cleaning and cleaning of the region and in line with Hinderer's technique, the ventral skin of the penis was dissected and the chordee was corrected. During dissection a flap was prepared from meatus to dorsal prepisium for tubularization with protecting ventral plate. Meatus and urethra continues with proximal flap and this is the main difference from island flap. A preputial flap was formed for the new urethra. In the modification that we conducted, the skin used for the new urethra was formed not of the inner skin of the preputium but rather from the inverted outer skin. The

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Received January 2018 & Accepted October 2018

Table 1. The HOSE assessment form.

Variable	Score
1. Meatal Location	
Distal Glanüler	4
Proksimal Glanüler	3
Coronal	2
Penile Shaft	1
2. Meatal Shape	
Vertical Slit	2
Circular	1
3. Urinary Stream	
Single Stream	2
Spray	1
4. Erection (Chordee)	
Straight	4
Mild Angulation (<10)	3
Modarate Angulation (<45)	2
Severe Angulation (>10)	1
5. Fistula	
None	4
Single Distal	3
Single Proximal	2
Multipl or Complex	1

flap was tubularized with a catheter (**Figure 1**). The tubular penis was extended ventricularly and anostomised; it was accompanied by a glanular canal. After the urethra was supported with surrounding tissue, the penile skin was rewrapped around the penis.

Patients were administered parenteral ampicillin and oral ampicillin until the seventh postoperative day. During the operation, to form the tube and neourethra, 6/0 or 7/0 Polydioxanone suture materials were used and the skin was closed with the same suture material. For the urethral stent, a 10 Fr. silicon Foley tube was preferred. In all cases, an elastic pressure bandage was applied to the penis to prevent the development of hematoma and edema. The bandage was removed on either the third or fourth postoperative day. The mean catheterization period was 10 days. HOSE hypospadias score was used in evaluation. The study was approved by Selcuk University Ethical Committee (2018/33). Descriptive statistical analyses was performed in the study.

RESULTS

The mean patient age at the time of surgical intervention using the modified Hinderer's technique was 20 months (range: 9 to 91months). Preoperative testosterone was administered in 10 patients.

The mean follow-up was at 36 months (range;5 to 80 months). Three patients had early complications, such as bleeding, hematoma, and wound infection. All patients voided spontaneously after catheter removal. Fistula and wound breakdown occurred in 7 out of the 42 cases (fistula 4:9.5%; breakdown or dehiscence 3:7.1%). A proximal fistula developed in one patient; the remaining were distal fistulas. All fistulas were repaired with a single intervention.

No urethral strictures or meatal stenosis emerged after the operation. In three cases, minimal residual curvatures developed due to injuries that occurred during early catheter removal. The patients with recurrent ventral curvatures subsequent to wound breakdown were treated by degloving the skin and the surrounding tissue flaps.

Acceptable cosmetic results were obtained in 37 (85%) patients with an objective scoring system for evaluating the results of hypospadias surgery (HOSE) score[4] (**Table 1**). The mean HOSE score after surgery was 14.8 (range:13–16) (**Figure 2**).

DISCUSSION

Hypospadias is a congenital abnormality occurring in 1 in 300 live births, with proximal hypospadias being identified in 20% of cases[1]. There are various interventional techniques available for the treatment of hipospadias. Despite the presence of multiple techniques and decades of research, the repair of either proximal or distal hypospadias remains one the most challenging complications in pediatric urology. Outcomes are variable and difficult to interpret due to important inconsistencies in pre-operative patient characteristics, operative techniques, follow-up duration, and the surgeon's outcome realization[5,6]. Moreover, few reports consider the patient's quality of life and realization of the repair [7]. In addition, there are differences in the repair of proximal and distal hypospadias. Surgical interventions on the urethral plate are especially important. With recognition of the urethral plate as an anatomical object, pediatric urologists were able to present new techniques for repair based on either plate tubularization or augmentation: tubularized incised plate (TIP) urethroplasty[8] or dorsal inlay graft (DIG)[9]. Both techniques were initially used for distal hypospadias repair without chordee, but their application was prolonged due to proximal hypospadias[10]. Therefore, when transaction of the

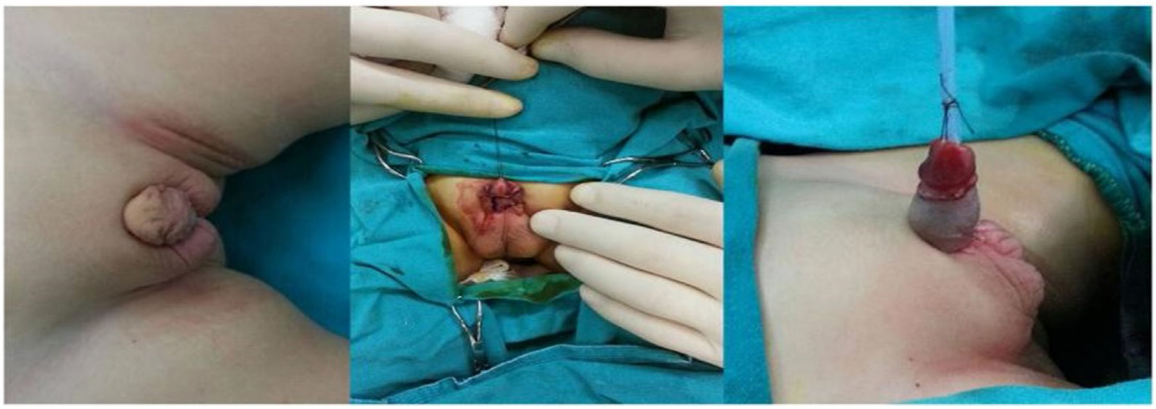

Figure 1. Flapping and tubularization in technic, The urethral plate was preserved and the ventral curvature was corrected.

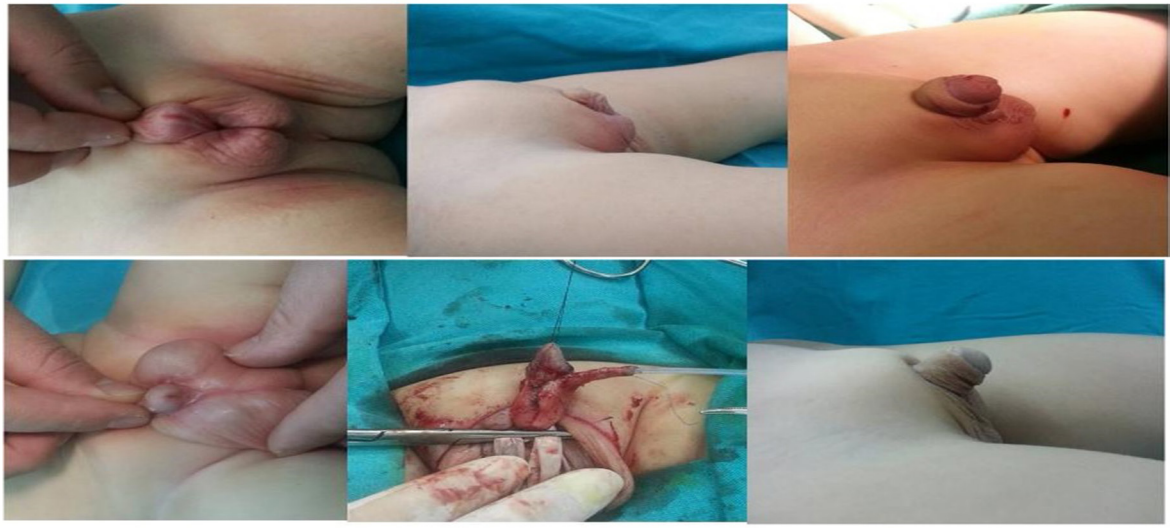

Figure 2. Patient's appearance before surgery and after 3 months.

urethral plate is required, repair can be realized with either tubularization of a pedicle flap or a free graft via either a single- or multi-stage procedure. Whereas some authors prefer a single-stage repair[11], others support a two-stage repair to achieve better functional and cosmetic results[2,12].

Rapid improvements have occurred in proximal hypospadias repair techniques, and materials used for hypospadias surgery have undergone serious modifications. Particularly, complete clarification of the preputium's bloodstream has increased the success rate of preputial flap techniques. In contemporary hypospadias repair, normal anatomy and the aesthetic appearance of the penis have become as important as functional outcomes. These outcomes can be achieved via single-session surgical interventions. In addition, adjustments in microsurgical procedures and improvements in anesthesia have also paved the way for the surgeon to perform hypospadias repair on patients of increasingly younger ages[13].

The main objectives of hypospadias surgery are improvement in both sexual and urinary functions as well as an acceptable appearance of the genitalia. Relevant literature shows that, although TIP urethroplasty achieves sufficient cosmetic improvement[14], it leads to more penile curvature and urethrocutaneous fistula[15]. Penile curvature requires either dorsal penile plication or much more aggressive treatment modalities. Likewise, for fistula repair, at least one surgical intervention session must be considered. This condition makes TIP urethroplasty an inadequate technique for both penoscrotal and perineal hypospadias. However, it remains an important technique for distal hypospadias[8,16,17].

Recently, use of the DIG urethroplasty technique, especially in proximal hypospadias, has increased. In this technique, after the curvature is fixed, the urethral bed is formed with the loose flap. In another session, as with TIP, urethroplasty is again applied. Hence, this technique includes two surgical interventions. Relevant studies have shown that the onlay flap method, when compared to TIP urethroplasty, has had cosmetically less acceptable outcomes[15]. When comparing fistula emergence and other complications, the results are comparable[15]. Notably, because it requires two surgical sessions, the patient acceptance rate is low[15].

Different studies have had different outcomes; however, the complication rates of both techniques are higher than those of the present technique.

Although the authors reported single-session anomaly correction using the DIG technique, in terms of fistula, wound formation, and ventral curvature, complications were alike. Fistula rates were reported as 25%, ventral curvatureas 15%, and total injury formation as 12% [15,16,17]. However, relevant literature research has shown that urethral stenosis cases are compared to other techniques more frequently[18,19,20].

This technique is advantageous because the plate is protected according to the island flap and the anastomosis line is more regular and shorter. In addition, urethral dilatation and stone formation are less common. Despite being a single session in the DIG procedure, the incidence of fistulae and ventral curvatures is higher. The reason that the Braca procedure is two sessions is less preferable than our procedure.

In the present study, fistula rates were determined as 9.5%, wound formation as 7.1%, and penile curvature as 7.1%. Cosmetically, per the HOSE scale, 14.8 is an acceptable appearance. Therefore, the modified Hinderer technique, when applied in a single session, emerges as the more advantageous technique in terms of patient satisfaction and acceptance.

CONCLUSIONS

In conclusion, the modified Hinderer technique is a safe and reliable technique for both penoscrotal and perineal hypospadias. Low complication rates and application in a single surgical session increase the comfort of both the patient and the surgeon.

CONFLICT OF INTEREST

The authors declare that they had no conflict of interest.

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