

Using Prepusial Subcutaneous Dartos Flap in Distal Hypospadias Operations

Distal Hipospadiyas Ameliyatlarında Prepusial Subkutan Dartos Flap Kullanımı

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Summary:

Objective: Congenital hypospadias, is the most common malformation of the penis, located at the ventral side. The most common complication of hypospadias following repair can be elaborated as ureterocutaneous fistula. In this study, it was aimed to reduce the rate of fistula in children operated with Mathieu or TIPU methods with the use of subcutaneous dartos flaps.

Material and Methods: Subcutaneous dartos flap which was prepared from the preputium have been utilized as a buffer layer between the skin and the neourethra. In this way, 17 children were operated with the TIPU and Mathieu methods using a subcutaneous flap in a prospective protocol. Additionally, a control group of 23 cases that had been previously operated in the clinic with TIPU and Mathieu methods without using subcutaneous flaps were included. Study group and the control group were compared in terms of fistula complications.

Results: The fistula rate was 26% in the control group, this rate was 50% in the TIPU method and 21% in the Mathieu method. It can be said that the high fistula rate in TIPU cases in the control group is due to the overlapping of the neourethra and skin suture lines. In the study group, only 1 case was reoperated due to fistula, and the rate was 5.8%.

Conclusion: In the study, a low re-operation rate by reducing the complications in line with the literature, with the use of Mathieu or TIPU techniques were achieved. The hypospadias operation should be performed as early as possible (between 6 and 18 months) in order to heal with fewer complications and leverage operation amnesia in psychological terms.

Key words: Fistula, hypospadias, Mathieu, re-operation, TIPU

Özet:

Amaç: Konjenital hipospadiyas, penisin ventral tarafında yer alan en sık görülen malformasyonudur. Hipospadiyasın onarım sonrası en sık görülen komplikasyonu üreterokutanöz fistül olarak detaylandırılabilir. Bu çalışmada cilt altı dartos flebi kullanılarak Mathieu veya TIPU yöntemleri ile ameliyat edilen çocuklarda fistül oranının azaltılması amaçlandı.

Gereç ve Yöntemler: Prepisyumdan hazırlanan subkutan dartos flebi, deri ile üretra arasında tampon tabaka olarak kullanılmıştır. Bu şekilde 17 çocuk prospektif protokolle cilt altı flep kullanılarak TIPU ve Mathieu yöntemleri ile ameliyat edildi. Ayrıca daha önce klinikte TIPU ve Mathieu yöntemleri ile cilt altı flep kullanılmadan opere edilmiş 23 olgulu kontrol grubu alındı. Çalışma grubu ile kontrol grubu fistül komplikasyonları açısından karşılaştırıldı.

Bulgular: Fistül oranı kontrol grubunda %26, bu oran TIPU yönteminde %50, Mathieu yönteminde %21 idi. Kontrol grubundaki TIPU olgularında fistül oranının yüksek olmasının neoretra ve cilt sütür hatlarının üst üste gelmesinden kaynaklandığı söylenebilir. Çalışma grubunda sadece 1 olgu fistül nedeniyle tekrar ameliyat edildi ve oran %5,8 idi.

Sonuç: Çalışmada Mathieu veya TIPU teknikleri kullanılarak literatüre uygun olarak komplikasyonlar azaltılarak düşük tekrar ameliyat oranı elde edilmiştir. Hipospadiyas ameliyatı, daha az komplikasyonla iyileşmek ve ameliyat amnezisini psikolojik açıdan kaldırmak için mümkün olduğunca erken (6-18 ay arası) yapılmalıdır.

Anahtar kelimeler: Fistül, hipospadiyas, Mathieu, reoperasyon, TIPU

Kabul Tarihi: 17.Ağustos.2022

Introduction

Congenital hypospadias of the urethra, is the most common malformation of the penis, located at the ventral side (1). The incidence of hypospadias anomaly is 0.8–8.2/1000 and its prevalence was reported as 1 in 250-300 births (2). According to the anatomical types, anterior (glanular, subcoronal), middle (distal penile, midshaft, proximal penile) and posterior (penoscrotal, scrotal, perineal) most common anterior type (50%) in hypospadias classified can be seen. Posterior hypospadias is also known as proximal hypospadias (1).

The main purpose in hypospadias surgery is functional, forming new urethra, correcting penile curvature. The aim is to create a functional and aesthetic penis necessary for sexual intercourse. Hypospadias surgery should be performed as early as possible in childhood so that the child will overcome psychological trauma and loss of self-confidence thought to be preventable. Severe hypospadias known as mid-penile or proximal localizations or accompanied by severe penile curvature cases (3).

Hypospadias can be diagnosed via physical examination of the newborn. Typically, this abnormal preputial anatomy pulls attention for further evaluation. If penile raphe is away from the midline and the glans penis ventrally bending (cordy) is determined size of meatus pinhole can be seen as shaped but mostly not occluded. Penis ventral curvature of the shaft can be recorded during erection. The main problem in patients with hypospadias is inability to urinate while standing and the inability to direct the urine forward. Sexual dysfunction and infertility are the most important problems in adults (4).

Dorsal-located preputium (dorsal hood), altered morphology of the glans penis and features including the chordee can be determined in the prenatal period via fetal ultrasonography. Urinary output from ventrally displaced meatus confirms the diagnosis (4).

Radiological evaluation is not necessary in all hypospadias cases however considering the possible defect in embryogenesis detection of anomalies of other organ systems such as rectal or radial problems that might suggest ultrasonographic evaluation of the urinary system (5).

Hypospadias surgery has been reported to show a negative correlation with age and psychosexual development. In the study of Jones et al., compared the genital appearance of children who were operated before and after 5 years of age and concluded that satisfaction rates were better in patients <5 years of age (6).

The most common complications of hypospadias following repair can be elaborated as ureterocutaneous fistula, meatal stenosis, urethral stricture, urethral diverticula, dilation of the glans, and unwanted reoperation cosmetic results. The rate of complications varies between 6% and 68% depending on the degree of hypospadias, follow-up time, and surgery techniques utilized. Postoperative complications usually occurs in the first few months. However, in the late term different complications such as urethral fistula or especially the ongoing curvature of the penis after puberty may have been reported (4,5).

Treatment of complications of hypospadias excluding severe urethral or meatal stenosis requiring urgency is performed after a recovery period, which usually lasts 4-6 months (4).

Despite techniques that continue to evolve, hypospadias repair in pediatric urology remains one of the most challenging areas in reconstructive surgery. A single and universal technique has not yet been defined in primary hypospadias or re-operation techniques. Each case should be evaluated according to the degree of hypospadias and an individualized surgical approach should be performed according to postoperative complications (2,3,4,5).

In this study it was aimed to reduce the rate of fistula in children operated with Mathieu or TIPU methods with the use of subcutaneous dartos flaps.

Material and Methods

In this study, 17 children who were operated with the suspicion of distal hypospadias were enrolled and 23 children were included in the control group. The participants were operated with the Mathieu and TIPU methods, with subcutaneous dartos flap. The active study group had been investigated prospectively and additionally a control group was added to the research and analyzed retrospectively. Ethics committee

approval was obtained for the study and informed consent form was obtained from all patients. The study was conducted according to the Helsinki Declaration clinical research principles.

Study Group

Cases with distal hypospadias were operated with Mathieu or TIPU methods, and subcutaneous dartos flap used cases were included in the study group. Cases with midpenile or proximal hypospadias, who were operated with other urethroplasty methods, and who did not use subcutaneous flaps were excluded from the study. Three patients had been operated before, but since the preputium was left intact, a subcutaneous flap could be used in the new operation and these cases were included in the study. A circumcised patient has been included in the study group, since the neourethra was covered by using a subcutaneous dartos flap from the penile skin. Twelve of the 17 cases in the study group were operated with the TIPU method and 5 with the Mathieu method.

Control Group

Patients with distal hypospadias who underwent urethroplasty with Mathieu and TIPU methods without using a subcutaneous flap were selected as the control group. Cases who underwent other urethroplasty methods and did not attend regular controls were excluded from the study. There were 23 cases in the control group, of which 19 were operated with Mathieu and 4 with the TIPU method.

Patients in both groups; were questioned in terms of intrauterine infection and drug exposure. None of the patients had a positive anamnesis in this respect. It was learned that the first degree relatives of 2 patients had hypospadias.

Bleeding time, coagulation time, hemogram and complete urinalysis were routinely performed before the operation. Perioperative prophylactic, parenteral, single-dose antibiotics were administered. In some cases, oral antibiotics were continued until the urethral catheter was removed.

No patient underwent suprapubic diversion. The dressing was opened on the 3rd postoperative day. The catheter was removed on an average of 6 days (4-8 days) and micturition was performed on the children. The patients were hospitalized

until the catheter was removed and followed up for early complications. Ibuprofen syrup 20 mg/kg was used for pain palliation, dorsal penile nerve block was not applied. Infected cases were treated with 20 mg/kg cefadroxil.

The patients were examined for fistula, stenosis, and cosmetic appearance at 1, 3, and 6 months, and family satisfaction was questioned. According to the age of the child, 8-10 F diameter stenosis was accepted as the limit. Meatus localization was taken as a basis for cosmetic appearance. Meatus was evaluated as good if it was at the tip of the glans, moderate if it was at the ventral side of the glans, and bad if it was coronal or subcoronal. In addition, the presence of scar tissue on the skin was evaluated as an intermediate cosmetic result. Re-operation was planned for patients who developed fistula. Meatal strictures were dilated with bougie under local anesthesia.

Results

The mean age of the study population was 6.7 years (18 months-13 years) while it was 6.7 years (3-12 years) in the control group. The mean follow-up period of study group was 6.6 months (ranging between 3-18 months) and it was 17.3 months (ranging between 10-24 months) in the control group (Table 1).

The average operation time was one and a half hours. The patients were hospitalized until the catheter was removed, and the mean hospitalization time was 6 days (4-8 days) in the study group and 8 days (6-12 days) in the control group.

While 3 cases in the study group had been operated once before, in the control group; 7 patients had been operated once and 1 patient had been operated three times. One case in the study group and 2 cases in the control group were circumcised before the operation.

The number of patients with distal hypospadias operated using subcutaneous dartos flap in the study group was 17, and 23 in the control group. Meatus localization and structure were determined in preoperative examinations. Corona was localized in two cases, subcoronal in 12 cases, and distal penile in 3 cases in the study group. There were 2 coronal, 13 subcoronal, and 8 distal penile meatus in the control group.

The presence of accompanying anomalies was investigated in the examination of the patients. While retention testis has been observed in 1 patient in the study group (5.8%), inguinal hernia was accompanied in 1 patient in the control group (4.3%). When the two groups were evaluated in combined analysis, the rates of inguinal hernia and retention testis accompanying distal hypospadias were 2.5%.

The presence of chordee was investigated preoperatively and peroperatively. Chordee was observed in 3 cases each in the study and control groups (17% and 13%, respectively), and all of them were in the form of skin chordee. No

additional chordee was found in any of the cases when examined with artificial erection after skin dissection in the operation.

The patients were followed up for early complications during the hospitalization period. Edema, one of the early postoperative complications, was observed in 3 (17%) patients in the study group, 6 patients (26%) in the control group, infection in 4 (23%) patients in the study group, and 3 (13%) in the control group. Skin necrosis was seen in 3 cases in the study group and in 4 cases in the control group, and the rate was 17% in both groups (Table 1).

Table 1. Baseline Demographics of the Patient Groups

Operation Method		MATHIEU Technique		TIPU Technique		TOTAL
Variables		Primary	Secondary	Primary	Secondary	
Study Group	Number of Cases	4	1	10	2	17
	Age (years)	8.2	10	5.0	10.5	6.7
	Follow-up (months)					6.6
Control Group	Number of Cases	13	6	2	2	23
	Age (years)	8.0	8.3	9.5	4.5	6.7
	Follow-up (months)					17.3

Figure 1. Separation of the dartos flap from the penile conjunctiva and the skin



Postoperative bleeding has only been observed in TIPU operated cases in both groups. The number of cases with bleeding was 3 (17%) and 2 (8%) in the study and control groups, respectively. Meatal adhesion was observed in one case in the study group, and meatus stenosis did not develop in further follow-up after dilation with a stylet. Fistula developed in 3 patients in the study group, all of whom were treated with the Mathieu method. While the fistula closed

spontaneously in 2 patients, the fistula persisted in 1 patient with severe infection and tissue erosion in the early postoperative period (5.8%). Fistula developed in 8 patients in the control group, and while 2 fistulas closed spontaneously, surgical re-treatment was required for 6 (26%) fistulas. When evaluated according to the operation method, fistula developed in 2 of the 4 cases (50%) in the control group, in which the TIPU

Figure 2. Dividing the separated dartos flap into two to be ventrally



method was applied, and in 4 of the 19 cases (21%) in which the Mathieu method was applied. While no fistula developed in the study group with the TIPU method, fistula developed in 1 case (20%) who underwent Mathieu method.

Urethral meatus stenosis developed in two cases in the study group and in 1 case in the control group, with a rate of 11.7% and 4.3%, respectively. Postoperative meatus location was coronal in 1 patient in the study group and granular in all other cases (94%). In the control group, 17 granular (74%), 5 coronal (22%) and a subcoronal (4%) meatus formed.

In terms of cosmetic appearance, 13 and 7 cases were evaluated as good (76% and 30%), 3 and 12 cases as moderate (17% and 52%), and 1 and 4 cases as bad (4% and 17%) when the study and control groups were compared respectively.

Discussion

In recent years, rapid progress has been observed in hypospadias surgery. Fully clarification of the preputial blood supply and the use of a preputial flap increased the success of urethroplasty, as well as updated the use of subcutaneous dartos flap. The development of suture materials, the use of optical equipment such as microscopes or loops, as well as the development of new operation methods and new variations can be counted as factors that increase success (7). With these developments, the age of operation in hypospadias surgery has gradually decreased and it has been reduced to less than 3.5 years old. Leaving the operation after the age of 3 may cause castration phobia in the child. For this reason, performing the operation in the 3-18 month period will cause operation amnesia and will not affect the psychological development of the child. In addition, the complication rate is less in early operations (8). Duckett recommends surgery at 3-9 months, Selman at 6-8 months, Schultz at 6-18 months, and Smith at 3.5 years (9, 10).

Although chordee is seen in distal hypospadias, almost all of them are in the form of skin cordis. In artificial erection after skin dissection, the penis is sufficiently straightened and true fibrous cord is rarely seen. If there is still ventral curvature after skin dissection, dorsal plication can be applied to protect the urethral base (11). In this study, chordee was detected in a total of 6

cases (15%) in both groups, all of which were skin cords, and no additional intervention was required to straighten the penis.

The rate of undescended testis accompanying distal hypospadias has been reported as 5% and inguinal hernia rate as 9%, and upper urinary system anomalies are less common. In the presented study undescended testis and inguinal hernia were accompanied in 1 case each group (2.5%). The complication rate in distal hypospadias surgery has decreased significantly, and it was seen that the complication rate can be reduced to 1-5% in previous literature (12).

When the subcutaneous dartos flap is separated from the preputium, the nutrition of the preputial skin may be impaired. When the preputium is used to close the ventral defect with the Byar method, if the vascularity is impaired, necrosis may occur on the skin. Skin necrosis heals with minimal scarring and does not cause cosmetic problems. However, necrotic tissue may predispose to infection. For this reason, vascularity should be preserved while the flaps are being prepared, and the flap length should not be more than twice its width. Tissues suspected to be ischemic should be resected (13). The fact that the rate of skin necrosis was the same in both groups (study and control) (17%), suggested that this complication was related to technical problems, not subcutaneous flap separation from the prepuce. However, we still believe that using half of the preputium while preparing the subcutaneous flap will reduce the rate of skin necrosis.

Bleeding is generally seen as an intraoperative problem and can be prevented with dilute epinephrine injection or a tourniquet. When the tourniquet is applied, the duration should not exceed 30 minutes. Postoperative bleeding is rare. Tourniquet application was preferred for bleeding control in the patients. Postoperative bleeding occurred in 5 cases (12.5%) in which only TIPU was applied.

Infection is a factor that compromises the surgical procedure and increases the complication rate. Although effective treatment is performed after the infection develops, prevention of infection should be the first goal as it will increase the complication rate. Before the operation, a good skin cleaning should be done under general anesthesia. Necrotic tissue should

not be left in the operation area and as little cautery should be used as possible. Although prophylactic antibiotics are not found to be very effective, they are generally applied. In fact, there are some people who suggest that antibiotics be given during the hospital stay or until the urethral catheter is removed (14). Prophylactic antibiotics were used in the study. Total infection rate was 18%, of which 23% were in the study group. Maximum effort should be made to prevent infection.

The most common late complication in the treatment of hypospadias is fistula (2,15). However, in recent studies, it was seen that the rate of fistula has decreased considerably; in the publications of hypospadias repair using the Mathieu method, a fistula rate of 0-5.4% was reported (16). In the series in which the TIPU technique was applied, the rate of fistula was reported to be 0-11%. Very few fistulas developed in preputial island flap and tube urethroplasties, free graft urethroplasties and GAP methods using subcutaneous dartos flaps (4-7%) (17-19).

In this study, it was primarily aimed to reduce the rate of fistula. It could be said that high fistula rate in TIPU cases in the control group is due to the overlapping of the neourethra and skin suture lines. In the study group, only 1 case was reoperated due to fistula, and the rate was 5.8%.

When the operation methods were evaluated separately, fistula did not develop in any of the 12 cases operated with the TIPU method in the study group, and the rate was consistent with the literature. In the Mathieu method, the fistula rate of 1/5 did not allow a healthy evaluation due to the small number of cases. However, when evaluated in general, the fistula rate of 5.8% in the whole group can be considered as a very good result.

Meatal stenosis usually develops due to flap ischemia. However, meatal stenosis may also occur when the suture line forming the neourethra is extended towards the tip of the glans in the TIPU method. Meatal stenosis and separation of the glans sutures are rarely seen when the glans wings are fully released and a thick glans layer is formed on the neourethra. In addition, subcutaneous flaps provide an additional blood supply to the neourethra,

reducing the risk of meatal stenosis. In recent studies, the rate of meatal stenosis in Mathieu and TIPU methods has been reported to be 0-5% (20, 21).

Postoperative meatus placement is also better when the glans wings are thoroughly dissected and a thick glans tissue is formed on the neourethra. However, in the Mathieu method, as a result of the operation technique, the meatus may form horizontally or ventral to the glans, and this may impair the cosmetic appearance. However, in the TIPU technique, the meatus is located vertically at the glans end and the cosmetic appearance is very similar to its normal anatomy (22). In addition, when a vertical mattress suture is used while closing the skin, bad scar tissue is formed and impairs the cosmetic appearance (23). In the study, while cosmetic results were very good in all cases, those who applied the Mathieu method had worse cosmetic results.

Covering neourethra by creating a subcutaneous dartos flap from the preputium reduces the rate of fistula in all surgical techniques. When the subcutaneous flap is not used, the rate of fistula can be very high in the TIPU method because the suture lines overlap. The subcutaneous flap prepared using half of the preputium is sufficient to cover the neourethra in distal hypospadias operations. When the subcutaneous flap is prepared in this way, the risk of skin necrosis, tissue trauma and operation time are reduced.

Conclusion

Regarding the developments in recent years, reoperation rates have been improved in distal hypospadias surgery. In this study; low reoperation rate by reducing the complications in line with the literature, with the use of Mathieu or TIPU techniques were achieved. Hypospadias operation should be performed as early as possible (between 6 and 18 months) in order to heal with fewer complications and leverage operation amnesia in psychological terms.

Funding

There is no specific funding related to this research.

Editorial Support

The editorial support of this article has been conducted by QA Executive Consultancy, Ozan Batigun MD, MBA in 2021.
www.QAexecutiveconsultancy.com

Competing interests

The authors declare that they have no competing interests.

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