The effect of experience of surgeon on surgical outcomes of tubularized incised-plate urethroplasty in distal hypospadias repair

Distal hipospadias onarımında tübülarize insize-plate üretroplasti uygulamasında cerrah deneyiminin cerrahi sonuca olan etkisinin değerlendirilmesi

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Abstract

Objective: Tubularized incised-plate urethroplasty (TIPU) is one of the techniques to repair distal hypospadias. We investigated the effect of the experience of the surgeon on overall success in terms of cosmetic and functional outcomes in TIPU.

Materials and methods: Records of 123 patients were retrospectively evaluated. Each session was performed based on surgeon status related with experience on TIPU by two surgeons. Surgeons was divided into three groups: chief (C.G.) with specific experience in hypospadias surgery (1); urologist with at least five years experience performing TIPU (2); and urology residents with at least three years experience as first surgeon or first assistant (3). Eight groups were created according to the operation team, in which the first number the first surgeon (FS) and the second number the first assistant surgeon (FAS); group I: 1-3, group II: 1-2, group III: 3-2, group IV: 3-1, group V: 2-2, group VI: 2-1, group VII: 3-3, and group VIII: 2-3.

Results: Mean patient age was 7.3 (range 1-23) years. The number of patients in each group was as follows: 41 (group I), 14 (group II), 11 (group III), 1 (group IV), 8 (group V), 0 (group VI), 8 (group VII), and 40 (group VIII). The effect of experience of FS and/or FAS on surgical success or complication rates was not significant (p>0.05).

Conclusion: Although hypospadias repair is a technical procedure requiring subspecialty surgical experience, success and complication rates in TIPU are not affected by the experience of the surgeon and assistant surgeon.

Key words: Experience of surgeon; hypospadias; tubularized incised-plate urethroplasty.

Özet

Amaç: Tübülarize insize-plate üretroplasti (TİPU) distal hipospadias onarımında kullanılan yöntemlerden biridir. TİPU'da kozmetik ve fonksiyonel sonuç açısından toplamdaki başarı üzerine cerrahın deneyiminin etkisini araştırdık.

Gereç ve yöntem: Toplam 123 hastanın kayıtları retrospektif olarak değerlendirilmiştir. Her bir seans cerrahın TİPU üzerine deneyimine göre iki cerrah tarafından gerçekleştirilmiştir. Cerrahlar üç gruba ayrılmıştır; hipospadias cerrahisi üzerine özel deneyimi olan şef (C.G.) (1), TİPU üzerine en az beş yıl deneyimi olan ürolog (2), birinci cerrah ya da birinci asistan olarak en az üç yıl deneyimi olan üroloji asistanı (3). Operasyon ekibine göre ilk sayı birinci cerrahı (FS), ikinci sayı ise birinci asistan cerrahı (FAS) gösterir şekilde, sekiz grup oluşturulmuştur; grup I: 1-3, grup II: 1-2, grup III: 3-2, grup IV: 3-1, grup V: 2-2, grup VI: 2-1, grup VII: 3-3, ve grup VIII: 2-3.

Bulgular: Hastaların ortalama yaşı 7.3 (dağılım 1-23) idi. Gruplardaki hasta sayıları, 41 (grup I), 14 (grup II), 11 (grup III), 1 (grup IV), 8 (grup V), 0 (grup VI), 8 (grup VII), ve 40 (grup VIII) hastadır. FS ve/veya FAS'ın deneyiminin cerrahi başarı veya komplikasyon oranları üzerine etkisi anlamlı değildi (p>0.05).

Sonuç: Her ne kadar hipospadias onarımı, üzerinde özel olarak çalışılmayı gerektiren teknik bir cerrahi işlemse de, TİPU'daki başarı ve komplikasyon hızlarının, cerrahın ve asistan cerrahın deneyimlerinden etkilenmediği bulunmuştur.

Anahtar sözcükler: Cerrah deneyimi; hipospadias; tübülarize insize-plate üretroplasti.

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Tubularized incised-plate urethroplasty (TIPU) is a technique for hypospadias repair that has been increasing in popularity. The simplicity of the operative technique, low complication rate, short learning period, and reliable formation of a normal-appearing glandular meatus are advantages of this technique.[1] Following TIPU surgery, the most common problems are fistula (8%), meatal stenosis with fistula (3%), and meatal stenosis (7%); although higher rates of meatal stenosis with/without fistula formation, neo-urethral stricture, and dehiscence have been described as complications during the learning curve.[2]

Criteria for success in hypospadias surgery are determined in terms of functional and cosmetic results and no requirement for reoperation.[3] The satisfaction of surgeons and patients have increased with better cosmetic and functional results[4] with development of optical magnification, use of finer suture material, active glandular hemostasis,[5] artificial erection,[6] and testosterone stimulation.[7] The experience of the surgeon may play a significant role in clinical outcome. In regard to learning curve of surgeon, more favorable results after TIPU procedures were reported for patients operated by surgeons with experience, compared to patients operated by surgeons with less experience who had a higher complication rate (35%).[2] While the literature surrounding learning curves in surgery are abundant for other technically challenging procedures, such as laparoscopic surgery,[8] there are few reports regarding the learning curve involved in hypospadias surgery.

The importance of the experience of the first surgeon (FS) and first assistant surgeon (FAS) on surgical outcomes of TIPU was unclear. Therefore, we investigated the effect of surgeon experience, attended as FS and/or FAS, on overall success in terms of cosmetic and functional satisfaction in distal hypospadias repaired with TIPU regardless of the learning curve.

Materials and methods

A total of 123 patients with distal hypospadias were evaluated retrospectively from 2001 to 2007. For each patient, informed consent was signed and the surgical procedure was performed. We determined our groups depending on the meatal location, which are coronal, subcoronal, distal penile, or mid-penile.

TIPU was performed on all patients under general anesthesia. Each session was performed by two surgeons, one as FS and the other as FAS. Each session was classified based on surgeon status related to experience in TIPU. Each session was performed with optical magnification used by FS and FAS. The surgical loupes (Heine®, Optotechnik Medical Diagnostic Equipments, Herrsching, Germany) had the same magnification rate (high resolution, x2.5). Urethral catheter was placed as a diversion method and removed on 7th day. During surgery, the neo-urethra was modified using 6/0 polydioxanone filament.

Our clinic is one of the most popular referral centers for hypospadias surgery in Turkey. In our center, TIPU or the other types of hypospadias repair are generally performed by members of the urology department rather than members of the plastic surgery or pediatric surgery departments. In this study, we described the surgical experience for TIPU as performing and/or assisting the TIPU sessions during residency for residents, urologists, and chief of department. We excluded the learning curve period for each surgeon to determine the effect of surgeon experiences on surgical outcomes. Urology resident is defined as a surgical resident continuing education in a urology training program in Turkey. The residents and urologists included in the study attended the operations in random fashion. Surgeons were divided into three groups: chief of department (C.G.) with more than twenty years experience in hypospadias surgery (represented by number 1), urologist with at least five years of experience for performing TIPU at our clinic (2); and urology residents with at least three years of experience as FS and FAS (3). Using these definitions, eight groups were created in which the first number indicated the FS and the second number indicated the FAS; group I: 1-3 (33%), group II: 1-2 (6%), group III: 3-2 (0%), group IV: 3-1 (6%), group V: 2-2 (1%), group VI: 2-1 (9%), group VII: 3-3 (11), and group VIII: 2-3 (34%). The number of patients in each group was as follows: 41 (group I), 14 (group II), 11 (group III), 1 (group IV), 8 (group V), 0 (group VI), 8 (group VII), and 40 (group VIII). Surgical procedures for group VII were performed with the guidance of the chief or a urologist.

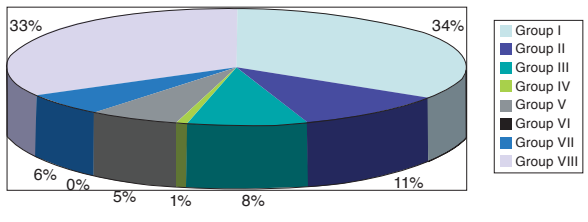

Figure 1 The percent of each study group for the total number of operations during study period.

The patient parameters for age, number of previous operations, fistula, and meatal stenosis were defined. For each session, the names of FS and FAS were recorded, and the success criteria were compared among groups. The success criteria were full satisfaction in cosmetic and functional results during the one-year follow-up period. Surgeon experience could not be defined in terms of "cases per month" for each surgeon because of non-homogenous and inadequate patient number for various months.

Statistical analysis was performed excluding groups IV and VI because of the inadequate patient numbers. Statistical analysis was done by one-way analysis of variance and non-parametric Kruskal-Wallis test using Statistical Package for Social Sciences for Windows program (SPSS, Chicago, USA). $p<0.05$ was considered to indicate statistical significance.

Results

TIPU was performed on 123 patients with a mean age of 7.3 (range 1-23) years. Although the same technique of TIPU that was applied to prepubertal patients was performed in postpubertal patients, the group with two postpubertal patients was not analysed as a separate group. Seventy-nine (64%) patients were primary cases; the remaining patients (36%) had undergone at least one hypospadias repair previously (in various urology centers). The presence of chordee and location of the meatus are shown in Table 1. Coronal meatus (59.3%) was the most common location in all groups. The overall complication rate, including fistula, meatal stenosis, urethral diverticula, and failure of neo-urethra was 28%.

In our department, five certified urologists and four residents were included as FS and/or FAS in addition to the chief. The distribution of FS was 45.5% (56) for chief, 38.2% (47) for urologist, and 16.3% (20) for residents, while residents usually attended as FAS (73%). The distribution of the eight groups with respect to total number of operations is shown in Fig. 1. Age, previous surgery number, presence of chordee, and fistula rates of patients were similar among groups ($p>0.05$). In all cases of primary, secondary, or tertiary hypospadias, the complexity of the cases was homogenous; therefore, surgical outcomes per surgeon was excluded from the statistical analysis. The success and complication rates were not significantly different between the groups ($p>0.05$). The success rates were 67% in group I, 37% in group II, 36% in group III, 65% in group V, 66% in group VII, and 45% in group VIII. The experience of FAS did not affect the success and complication rates ($p>0.05$). There were no differences in success and complication rates according to the localization of meatus among the groups ($p>0.05$).

Table 1. The meatal locations in chordee positive and negative patients [n (%)]

	Coronal	Subcoronal	Distal penile	Mid-penile	Total
Chordee (+)	21 (50%)	9 (21%)	5 (12%)	8 (17%)	43 (100%)
Chordee (–)	52 (63%)	19 (23%)	7 (8%)	2 (3%)	80 (100%)
Total	73	28	12	10	123

Discussion

TIPU is a simple procedure and has a low complication rate, especially in patients with coronal and subcoronal meatus. In most published studies, complication rates varied from 0% to 40% after Snodgrass described TIPU.[9] Similarly, Eliçevik et al.[2] reported a complication rate of 23% in primary cases and 30% in secondary cases. We found an overall complication rate as 28%, which was consistent with the literature. Recently, the Snodgrass technique has been popularized and used throughout the world. In our opinion, the reason for the popularity of this technique is not only its high success rate, but also its short learning curve and its ease of applicability by surgeons.

All technically challenging procedures, e.g., laparoscopic surgery and transplantation surgery, have learning curves; gaining experience and performing specific procedures has become the target of educational programs.[10] For hypospadias surgery, there are structured fellowship programs conducted by experienced pediatric urology centers. However, the training system and learning curve period of TIPU for distal hypospadias repair are still unclear for residents and urologists. How should TIPU training program be adapted in a routine training program of urology residents? How should a fellowship program be scheduled following the certification of urology? These two questions need to be identified and clarified by expert hypospadiologists. We stressed the importance of training regarding TIPU for distal hypospadias during the residency training program

as well. Horowitz et al.[10] showed that the fistula rate after hypospadias repair, during a 5-year period immediately after completion of a 2-year fellowship program in pediatric urology, decreased significantly; they named this 2-year period the learning curve in hypospadias repair. The opinion of the majority of pediatric urologists (86%) and urology residents (71%) is that a pediatric urology fellowship is required to perform hypospadias surgery. [11]

In contrast, residents who participate and assist in a high volume of hypospadias repairs during their training are less likely to consider fellowship training a prerequisite for performing the procedure and more likely to anticipate performing the surgery in practice.[11] In our clinic, residents frequently attend hypospadias repair surgery, to gain experience and learn tips and tricks. We excluded the learning curve period of the residents for TIPU, and supposed that all types of hypospadias repair may need a specific fellowship program. However, we did not find differences in success rates and complication rates for TIPU procedures performed and/or assisted by the chief (hypospadiologist), urologist, or urology residents. Thus, the value of the learning curve in TIPU is still controversial. Germiyanoglu et al.[3] showed the importance of initial procedure for distal hypospadias and effectiveness of TIPU.

The type of hypospadias is generally classified by location of the meatus. The location of the meatus, presence of penile curvature, chordee, and previous hypospadias repairs affect the complication rates of procedure. Snodgrass et al.[12] showed that complication rates increase significantly as the defect progresses from mid-penile to proximal hypospadias, revealing the need for separate evaluation of outcomes according to the severity of cases. The importance of TIPU for distal hypospadias has been shown in many articles.[12,13] In our study, the patients had complete distal hypospadias.

The greatest number of sessions were performed in group I and group VIII. There were no differences in age, number of previous procedures, or overall complication rates between these groups ($p>0.05$). This demonstrated that there is no excessive requirement of experience to repair distal hypospadias with TIPU technique.

The specific feature of TIPU repair is the midline incision of urethral plate. Following the structure of neo-urethra, the length of the neo-urethra affects the rate of success.[14] It has been reported that the relation between the level of hypospadias and complication rate was not statistically significant;[2] we found similar results. The reported decrease in complication rates in relation to the learning curve was from 35% to 15%.[2] When we excluded the learning curve period, we did not observe any difference in complication rates related to the experience of FS or FAS.

The study was limited by the inability to describe experience in surgery in terms of "cases per-month" during the study period. It was calculated that the mean case number increased in summer time, approximately 12 cases per month. Afterward, it decreased to 2 or 3 cases per month. However, the number of patients was inadequate to evaluate surgeon experience from 2001 to 2007; thus we chose not to include this parameter because of the undetermined data for comparison of success rates among the groups.

In conclusion, TIPU is a feasible technique, preferred especially for distal hypospadias, and can be easily learned and applied. This technique can be performed by a surgeon with experience in performing and/or supervising the procedure in a hypospadias specified clinic. The experience of FS and FAS did not affect the TIPU success and complication rates. Thus, in our opinion, TIPU procedure can be included into the standard urology resident training program. We need multicenter randomized trials from various expert clinics in pediatric urology, to determine the exact value of surgeon status in surgical outcome of TIPU.

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