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Predictive Factors and Long Term Outcomes of Urethroplasty In Male Anterior Urethral Stricture: Single Center Study

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Predictive Factors and Long Term Outcomes of Urethroplasty In Male Anterior Urethral Stricture: Single Center Study

Erkek Hastalardaki Ön Üretral Darlıklarda Uygulanan Üretroplastinin Başarısını Etkileyen Faktörlerin ve Uzun Dönem Sonuçların Değerlendirilmesi: Tek Merkezli Çalışma

ABSTRACT

Objective

The present study aimed to evaluate predictive factors affecting success rates and long term outcomes of urethroplasty due to male anterior urethral stricture.

Material and Methods

Thirty-five patients who underwent anastomotic (EAT) urethroplasty and eighteen patients who underwent buccal mucosa graft (BMG) urethroplasty were evaluated retrospectively. Age, endoscopic interventions before urethroplasty, stricture length, follow-up time and re-stricture time were compared between groups. Univariate and Cox's multivariate analyses were calculated to determine predictive factors of success. Kaplan Meier analysis was plotted to identify the stricture free survival.

Results

Both EAT and BMG techniques have similar success rate (65.7% and 72.2%, p:0.634) and mean re-stricture time (4.18 and 3.4 months, p: 0.556) respectively. The stricture length was shown to be the prominent predictive factor for success (HR 1.6; 95% CI 0.453–12.797; $p < 0.001$).

Conclusions

Both urethroplasty techniques had similar success rates. The length of stricture is the most reliable factor affecting success of surgery.

Key Words

Urethral stricture, Anterior urethra, Urethroplasty

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ÖZ

Amaç

Çalışma, erkek anterior üretral darlıklarda uygulanan üretroplastinin başarı oranını saptamayı ve başarıyı etkileyen faktörleri tespit etmeyi amaçlamaktadır.

Gereç ve Yöntemler

Primer anostomoz (PA) ve bukkal mukoza grefti (BMG) teknikleri ile üretroplasti yapılan 35 ve 18 hastanın verileri geriye yönelik incelendi. Yaş, üretroplasti öncesi cerrahi girişimler, takip süresi ve rekürrens süresi ile gruplar değerlendirildi. Tek yönlü ve çok yönlü Cox's analizleri ile başarıyı etkileyen faktörler araştırıldı. Rekürrenssiz sağ kalım süresi Kaplan Meier analizi ile tespit edildi.

Bulgular

Her iki cerrahi tekniğin de (PA ve BMG) benzer başarı oranları (%65.7 ve %72.2, p:0.634) ve ortalama rekürrens sürelerine (4.18 ve 3.4 ay, p: 0.556) sahip olduğu tespit edildi. Darlık uzunluğunun başarıyı etkileyen en belirgin faktör olduğu görüldü (HR 1.6; 95% CI 0.453–12.797; p < 0.001).

Sonuç

Çalışmamız, PA ve BMG tekniklerinin benzer başarı oranlarına sahip olduğunu ve üretroplasti başarısını etkileyen en belirgin faktörün darlık uzunluğu olduğunu ortaya koymaktadır.

Anahtar Kelimeler

Üretral darlık, Ön üretra, Üretroplasti

INTRODUCTION

Currently, anterior urethral stricture is a common urological condition in males, caused by various factors such as pelvic fracture, trauma, previous endoscopic procedures, and urinary tract infections, which impacts quality of life due to high recurrence rates and morbidity (1). Novel treatment algorithms in urology practice widely consist of minimally invasive options such as internal urethrotomy (DVIU), self-dilatation techniques, and balloon dilation. However, high recurrence and low success rates of these procedures have caused a shift to open urethroplasty among urologists. Current studies and guidelines recommend urethroplasty as a gold standard approach, with 58-90% success rates, after one failed endoscopic procedure, particularly in patients with high risk for recurrence (2).

Open urethroplasty is mainly performed via excision anastomotic technique (EAT) or augmentation with several sorts of grafts mainly buccal mucosa (BMG). However, several techniques and grafts have been described in the literature (3). Even in experienced hands and high-volume centers, relatively high re-stricture rates have been reported after urethroplasty (4). Therefore, factors predicting the success rate of these techniques are crucial for urologists to prevent re-operations and increase the quality of life of patients.

In the present study, we aimed to investigate the predictive factors for success rates and demonstrate the long-term outcomes of these urethroplasty techniques in male anterior urethral stricture.

MATERIAL and METHOD

Data of patients who underwent urethroplasty due to anterior urethral stricture between 2016 and 2020 were collected in the database of our institution. Patients with a hypospadias history, posterior urethral stricture, pelvic radiotherapy, age <18, less than 2 years of follow-up period, and missing data were excluded. In total, fifty-eight patients were enrolled in the present study. Data including age, stricture etiology and length, operation technique, follow-up time and clinical evaluation, previous failed procedures, re-stricture time, and management were recorded. Before urethroplasty, all patients were evaluated with physical examination, medical history, and urological tests including uroflowmetry, retrograde urethrography (RGU), serum creatinine, and urine culture. After this assessment, surgery technique, either EAT or BMG described in previous studies, was planned and discussed with the patients (5, 6). After surgery, the urethral catheter was removed in 2-4 weeks without an additional test such as RGU or uroflowmetry. Patients were asked to attend clinical controls bimonthly in the first year. Additional endoscopic procedures and bothering complaints related to decreased stream of urine were considered as recurrence.
In statistical analysis, continuous and categorical data are presented as mean ± SD (standard deviation) or median (min-max), and number of cases and percentages,

respectively. Differences between groups were checked with the Mann-Whitney U and Independent T-test. A Kaplan-Meier survival curve was plotted to identify the recurrence-free survival. Multiple Cox proportional hazards regression analysis was performed to specify the independent predictors that affected recurrence-free survival. In data analysis, SPSS 22® program was used and p <0.05 was accepted as significant.

RESULTS

Demographic characteristics and data comparing preoperative and postoperative variables of both techniques are summarized in Table I. Accordingly, a statistically significant difference was detected solely in the length of stricture and follow-up period between the 2 groups (<0.001 and <0.001, respectively). In addition, EAT and BMG groups were shown to have similar success rates (65.7% vs 72.2%, p:0.634) and prior numbers of DVIU (p:0.82) and prior procedures (0.524).

Although, only the length of stricture was determined as a predictor affected success of urethroplasty in univariate regression analysis (HR 1.6; 95% CI 0.453–12.797; p < 0.001), in Cox's multivariate analysis both length of stricture and postoperative urethral catheter removal time were the strongest determinants of urethroplasty success (HR 2.97; 95% CI 1.163–7.318; p: 0.002 and HR 0.791; 95% CI 0.626–0.999; p: 0.049, respectively).

Kaplan-Meier analysis revealed that the recurrence-free survival was 66.42 ± 7.62 and 30.15 ± 4.1 months for EAT and BMG, respectively. The log-rank test revealed no difference between the anastomotic (EAT) and BMG groups regarding recurrence (p:0.746) (Figure 1).

In the follow-up period, twelve patients in the EAT group (n:35) had recurrence after primary surgery. Ten of those were treated via DVIU, whereas 2 underwent redo-urethroplasty. Besides, 5 patients of the BMG group (n:18) had a recurrence and 4 underwent DVIU but 1 had redo-urethroplasty. Additionally, two patients with oral numbness in the BMG group after urethroplasty were referred to the ear-nose-throat (ENT) clinic and did not undergo any additional procedures intervention. Furthermore, patients were questioned for erectile functions and continence during clinical visits, none of those specified a particular complaint.

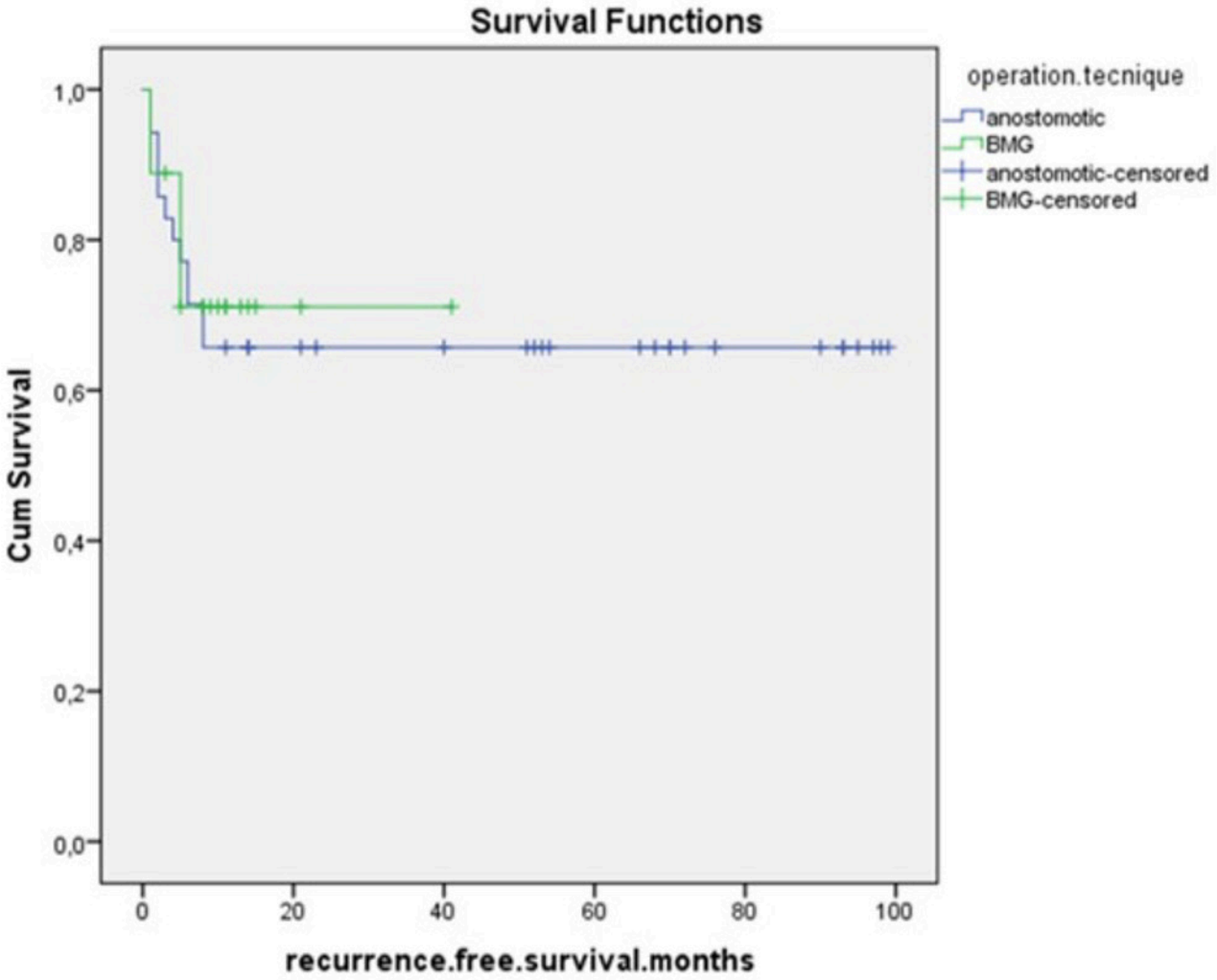
Table I. Descriptive and comparative data of both groups

	EAT (n:35)	BMG (n:18)	p value
Age (years), (mean ±SD)	38.9 (±17.6)	68 (±9.2)	0.117
Length of stricture, cm (mean)	2.09 (±1.02)	4.4 (±1.01)	<0.001
Etiology			0.58
Catheterization	18	8	
Endoscopic surgery	4	4	
Trauma, pelvic injury	13	6	
Number of preoperative DVIU (median)	1 (0-11)	2 (0-30)	0.82
Prior procedures			0.524
None	11	5	
DVIU	20	9	
Urethroplasty	1	3	
Dilation	2	0	
Stent	1	1	
Postoperative urethral catheter removal (day)	18.4 (±3.5)	16.8 (±3.8)	0.233
Postoperative re-stricture, (recurrence rates)			0.634
No	23 (65.7%)	13 (72.2%)	
Yes	12 (34.3%)	5 (27.8%)	
Re-stricture time (month)	4.18 (±2.6)	3.4 (±2.1)	0.556
Redo-surgery after recurrence	12	5	
DVIU	10	4	
Redo-urethroplasty	2	1	
Follow-up period after urethroplasty (month)	49.7 (±31.1)	37 (±7.7)	<0.001

Abbreviations: Direct vision internal urethrotomy (DVIU), Centimeter (cm), Excision anostomotic urethroplasty (EAT), Augmentation with buccal mucosa graft (BMG)

DISCUSSION

Urethral stricture has become a disturbing and frequent pathology affecting the quality of life in males due to an increase in endoscopic urological procedures, urethral catheterization, and pelvic injuries. Currently, the most popular and feasible treatment modality is DVIU. However, there are several disadvantages of DVIU regarding recurrence rates and long strictures. In the literature, several studies have demonstrated that patient age, length of stricture, repeated and excessive DVIU procedures deteriorating the blood supply to the urethra and causing severe fibrosis may affect the outcomes of urethroplasty negatively (7, 8). Thus, in the present study, we aimed to investigate predictive factors that affect the success of urethroplasty and long-term outcomes through our single institution data.



According to the literature, both urethroplasty techniques, including EAT and BMG, have been shown to provide similar and quite satisfying outcomes with more than 80% success (9, 10). Besides, a single-center study reported that stricture-free survival rates from 1 to 10 years revealed worse outcomes, and the re-stricture rates increased in years (11). In our series, success rates of both EAT and BMG techniques (65.7% and 72.2%, p:0.634, respectively) and stricture-free survival rates (49.7 and 37 months) may appear to be lower in long-term follow-up compared to the literature (Figure 1). However, relatively low success rates may be related to our initial experience in urethroplasty, complicated cases referred to our clinic or the restricted success criteria.

Nowadays, DVIU is the most popular and well-established treatment modality in urethral stricture for scenarios including less than 1.5 cm stricture and primary cases. Besides, repeated and excessive DVIU procedures may influence blood supply to the urethra, cause excessive fibrosis, lead to more complicated stricture, and decrease success rates of open urethroplasty in the long term (7, 12). According to the literature, several studies have claimed that an increase in the number of DVIU was a predictive factor for the success of urethroplasty and no reliable cut-off value for DVIU number was able to be detected (13, 14). In contrast to the literature, there is no significant association between the success of urethroplasty and the number of prior DVIU in our series. This discrepancy may be related to low DVIU numbers in our study group since the strict algorithm of our clinic avoids repeated DVIU procedures. The length of stricture has proven to be the most crucial risk factor in predicting success in urethroplasty. In addition, it is the most prominent parameter in deciding surgery technique and determining the complexity of the surgery. Accordingly, strictures more than two cm necessitate graft urethroplasty, whereas less than two cm excision and anastomotic technique. As the stricture length increases, more extensive dissection in the urethra and larger tissue grafting are performed which lead to tissue ischemia and stricture recurrence (2,4). Similar to the literature, the present study revealed a strong correlation between the length of stricture and success of EAT and BMG urethroplasty.

According to the literature, there is no well-established recommendation regarding the urethral catheter removal time after urethroplasty. In the present study, there was no significant difference in catheter removal time between groups (18.4 and 16.8 days, respectively). However,

Cox's multivariate analysis revealed that this time was a predictive factor for success, which may be totally in coincidence.

The present study has several limitations. The low-numbered groups, retrospective design, lack of postoperative uroflowmetry data and different surgical techniques, and the initial experience of a single surgeon may influence the strength of analysis and affect the outcomes and success rates of urethroplasty.

CONCLUSION

The present study revealed that the most prominent and reliable risk factor for re-stricture after urethroplasty appears to be the length of stricture. In contrast to the literature, no statistically significant relationship was observed between prior DVIU numbers and the success of urethroplasty. No solid data supports a particular surgical technique over another. Clinicians must consider every treatment modality and technique, avoid unnecessary procedures, and enlighten the patients in decision-making.

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Ethics Committee Approval

This research complies with all the relevant national regulations, institutional policies and is in accordance the tenets of the Helsinki Declaration, and has been approved by the Akdeniz Medical Faculty Ethical Committee, Akdeniz University (approval number: 2024/493).

Informed Consent

All the participants' rights were protected and written informed consents were obtained after the procedures according to the Helsinki Declaration because of the retrospective design of the study.

Author Contributions

Concept - A.E.C., O.Ö.; Design - A.E.C., O.Ö.; Supervision - A.E.C., O.Ö.; Resources – O.Ö.; Materials – A.E.C.; Data Collection and/or Processing - A.E.C.; Analysis and/or Interpretation – A.E.C.; Literature Search - A.E.C., O.Ö.; Writing Manuscript – A.E.C.; Critical Review – Ö.K.

Conflict of Interest

The authors have no conflict of interest to declare.

Financial Disclosure

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