Original Article

Relationship between development of urethral stricture after transurethral resection of prostate and glycemic control

Şükrü Kumsar, Hasan Salih Sağlam, Osman Köse, Salih Budak, Oztuğ Adsan

Department of Urology, Sakarya University Training and Research Hospital, Sakarya, Turkey

Abstract

Objectives: The purpose of this study is to investigate the association of glycemic control prior to TUR-P and postoperative urethral stricture development.

Materials and Methods: Of the 168 patients with a diagnosis of urethral stricture, who underwent internal urethrotomy in our hospital were retrospectively analyzed for this study.

98 patients who underwent monopolar TUR-P in our hospital previously and were developed urethral stricture were divided into two groups as diabetic and nondiabetic. Based on their HbA1c concentrations, diabetics were allocated to two groups with good (HbA1c ≤ 6.5%) or poor (HbA1c > 6,5%) glycemic control. Time to internal urethrotomy and the other operative parameters were compared among groups.

Results: Time to internal urethrotomy after TUR-P was significantly shorter in diabetic patients with poor glycemic control than Group 1 and Group 2 ($P = 0,02$, $P = 0,012$) but no significant difference was found between Group 1 and Group 2 ($P = 0,368$). There was no significant difference in the mean diagnosed and resected prostate wight among groups There was no significant difference in the mean resection time and the mean time to urethral catheter removal among groups.

Conclusions: Especially in poor glycemic control patients, urethral stricture development was seen in the early period after TUR-P. For this reason, in the elective TUR-P scheduled poor glycemic controlled patients the operation should be done after glycemic control.

Key Words: Glycemic control, transurethral resection of prostate, urethral stricture

Address for correspondence:
Dr. Şükrü Kumsar, Sakarya EAH, Uroloji Kliniği, Sakarya, Turkey. E-mail: drkumsar@yahoo.com
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INTRODUCTION

The term "urethral stricture" refers to obstruction of the urethral lumen that causes slowing or cessation of urinary flow.[1]

Strictures stem predominantly from infectious disease (sexually transmitted diseases, tuberculosis); today, most of the strictures are post-traumatic or iatrogenic and the main iatrogenic cause is transurethral surgery.[2,3] The true incidence of male urethral stricture disease is unknown; however, development of urethral stricture after transurethral resection of the prostate (TUR-P) is stated as 2-10% in the literature.[4]

Factors, which are responsible for development of urethral strictures after TUR-P, include large prostate volume, prolonged operation time, size and material of catheter, urinary tract infection, usage of thick shaft and high energy, and energy leakage from shaft.[4,5] Endoscopy and imaging modalities are used for diagnosis of strictures. The most common technique for management of urethral strictures is visual internal urethrotomy (VIU), because of being an easy and minimally invasive technique.[6]

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Diabetes is a chronic metabolic disorder characterized by inappropriate hyperglycemia due to lack of or resistance to insulin.[7]

Plasma glycosylated hemoglobin A (HbA1c) is an established indicator of blood glucose control during previous 3 to 4 months[8] and was previously useful as a preoperative predictor of surgical outcomes in cardiac, vascular and colorectal patients.[9-11]

The purpose of the study is to investigate the effect of glycemic control before TUR-P on the development of postoperative urethral stricture. In order to achieve this purpose, we investigated the HbA1c levels prior to TUR-P with the time to internal urethrotomy after TUR-P and the other operative parameters retrospectively.

MATERIALS AND METHODS

A total of 168 patients, who underwent visual internal urethrotomy for urethral stricture, were evaluated retrospectively. Patients were identified from the practice computer database. Data of 150 patients were used for the study. Etiologies of urethral stricture, date of internal urethrotomy, date of TUR-P, diabetic conditions, preoperative HbA1c values, operating time of TUR-P, time of catheter removal, prostate weight measured through transvesical ultrasonography and resected prostate weight were noted. Men, who underwent previous urethra-related surgery before TUR-P, non TUR-P etiologies for urethral stricture and prostatic adenocarcinoma pathologies were excluded. Ninety eight patients with anterior urethral stricture shorter than 2 cm, who underwent visual internal urethrotomy in our hospital, were divided into two groups according to their diabetic conditions, and based on their HbA1c concentrations, diabetic patients were divided into two groups, as good (HbA1c ≤ 6.5%) and poor (HbA1c > 6.5%) glycemic control as previously described.[12] Group 1 was non-diabetic group ($n = 40$), group 2 was diabetic and good glycemic controlled group ($n = 24$) and group 3 was diabetic and poor glycemic controlled group ($n = 34$). Time to internal urethrotomies after TUR-P and operative parameters were statistically compared among groups.

SPSS software (The Statistical Package for the Social Sciences, Version 15.0, SPSS Inc., Chicago, Illinois, USA) was used to analyze the data. While normally distributed variables were described using means with standard deviations, non-normally distributed variables were described using medians with interquartile ranges.

Student *t* test was used to compare two groups and non-normally distributed data were analyzed using Mann-Whitney *U* test. $P < 0.05$ were considered as statistically significant.

RESULTS

The strictures developed after TUR-P in 98 (65.3%) of 150 patients. The mean age of 98 TUR-P patients was 68.47 ± 7.8. The mean age of non-diabetic group (Group 1) ($n = 40$) was 65.95 ± 8.06, mean age of diabetic and good glycemic controlled group (Group 2) ($n = 24$) was 71.58 ± 9.84 and mean age of diabetic and poor glycemic controlled group (Group 3) ($n = 34$) mean age was 69.23 ± 6.86. There was no significant difference between groups in terms of the mean age of patients [Table 1].

The mean resection time during TUR-P and the mean time to urethral catheter removal were 44 ± 14.2 min and 2.4 ± 0.68 day in Group 1, 38 ± 11.4 min and 2.5 ± 0.79 day in Group 2 and 40 ± 18.4 min and 2.35 ± 0.6 day in Group 3. There was no significant difference between groups in terms of the mean resection time and the mean time to urethral catheter removal [Table 1].

Mean measured and resected prostate weight were 48.4 ± 18.8 and 17.4 ± 7.6 in group 1, 52.2 ± 21.1 and 19.2 ± 7.6 in group 2, and 50.5 ± 19.3 and 17.9 ± 6.9 in group 3. There was no significant difference between groups in terms of the mean measured and resected prostate weight [Table 1].

Median value of time to internal urethrotomy after TUR-P was found to be 12 months (2-60) in Group 1, 10 months (2-48) in Group 2 (HbA1c ≤ 6.5%), and 4 months (2-24) in Group 3 (HbA1c > 6.5%). Time to internal urethrotomy after TUR-P was significantly lower in diabetic patients with poor glycemic control compared

Table 1: Patient demographics and operative variables

	Group 1 (non diabetic; *n*=40)	*P* value*	Group 2 (HbA1c□6.5%; *n*=24)	*P* value#	Group 3 (HbA1c>6.5%; *n*=34)	*P* value¶
Age mean±SD (range)	65,95±8,06	0,077	71,58±9,84	0,830	69,23±6,86	0,067
Mean±SD resection time (mins)	44±14,2	0,331	38±11,4	0,695	40±18,4	0,091
Mean±SD time to urethral catheter removal (days)	2,4±0,68	0,990	2,5±0,79	0,886	2,35±0,6	0,956
Median (min-max) time to internal urethrotomy (months)	12 (2-60)	0,368	10 (2-48)	<0,05	4 (2-24)	<0,05
Mean±SD diagnosed prostate wt (gm)	48,4±18,8	0,432	52,2±21,1	0,860	50,5±19,3	0,844
Mean±SD resected prostate wt (gm)	17,4±7,6	0,092	19,2±7,6	0,079	17,9±6,9	0,246

*Group 1 versus group 2, #Group 2 versus group 3, ¶Group 1 versus group 3. SD: Standard deviation

to patients in Group 1 and Group 2 ($P = 0.02$, $P = 0.012$) but no significant difference was found between Group 1 and Group 2 ($P = 0.368$) [Table 1].

DISCUSSION

Transurethral resection of the prostate (TUR-P) has been the dominant and definitive treatment for lower urinary tract symptoms due to benign prostatic hyperplasia (LUTS-BPH), but some of the late complications such as urethral stricture, which is the main late complication, can be frustrating.

Urethral stricture is a major late complication of TUR (2.2-9.8%), as well as radical (8.4%)[13] and simple (1.9%) prostatectomy.[3,4,13,14]

The development of a urethral stricture is most likely secondary to instrumentation, technique, or postoperative catheterization. However, a higher stricture rate associated with larger resection sheaths was previously reported.[15,16]

It was suggested that routine urethral dilation made before insertion of the resection sheath may reduce this incidence. Other factors have also been suggested in the literature as contributing to an increased incidence of urethral strictures. These include a high cutting current and use of lubrication.[4] Decreasing the cutting current and increasing the lubrication are thought to help minimizing the stricture rate.

In our study, all operations were conducted using a 26F continuous resectoscope and the urethral dilatation was not performed as a routine procedure in these TUR-P patients.

In addition to these general recommendations, we demonstrated that preoperative glycemic control is important on the development of urethral stricture after TUR-P in this study.

However, while there are some studies showing that age of the patient is an important risk factor for the development of urethral stricture after TUR-P,[17] there was no correlation between age and the development of stenosis in our study.

Some studies reported that duration of resection during TUR-P and time to urethral catheter removal after TUR-P were effective on development of postoperative stricture;[18-20] however, the relationship between these factors and the development of urethral stricture was not detected in our study.

HbA1c is a highly reliable measure of long-term glycemic control often used to follow ongoing adjustments to medications in patients with diabetes mellitus.[21] More recently in the surgical data, HbA1c has been demonstrated to be a preoperative predictor of postoperative outcomes. For example, in cardiac surgery, an elevated preoperative HbA1c has been associated with increased acute kidney injury and mortality.[22] Also, in vascular surgery, elevated HbA1c levels are associated with wound infections and overall 30-day morbidity.[23] Finally, elevated preoperative HbA1c levels in colorectal patients are associated with more infectious complications, such as pneumonia and urinary tract infection.[24]

To our knowledge, there has been no other study in the literature which investigates the development of urethral stricture after TUR-P associated with glycemic control prior to TUR-P; however, this study had some limitations; it was a retrospective study and numbers of patient were limited, ultimately restricting the statistical power of this study. Therefore, additional prospective and randomized studies are needed to demonstrate this relationship.

Preoperative glycemic control before TUR-P in diabetic patients has an important role on development of urethral stricture which is the most important late complication of TUR-P. Especially in poor glycemic control patients, urethral stricture development was seen in the early period after TUR-P. For this reason, the operation should be done after glycemic control in the elective TUR-P scheduled poor glycemic controlled patients.

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