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Comparison of plasmakinetic transurethral resection of the prostate with monopolar transurethral resection of the prostate in terms of urethral stricture rates in patients with comorbidities

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Purpose: To compare urethral stricture rates in comorbid patients undergoing plasmakinetic transurethral resection of the prostate (PK-TURP) and monopolar transurethral resection of the prostate (M-TURP) for benign prostatic hyperplasia.

Methods: The data of 317 patients with comorbidities undergoing either PK-TURP or M-TURP from September 2008 to December 2012 were retrospectively evaluated. Preoperative and postoperative 12-month International Prostate Symptom Score, maximal flow rate, postoperative International Index of Erectile Function scores, and urethral stricture rates were evaluated.

Results: A total of 154 patients underwent M-TURP and 163 patients underwent PK-TURP. Urethral stricture rates were 6/154 in the M-TURP treatment arm and 17/163 in the PK-TURP treatment arm ($P=0.000$). In the presence of hypertension and/or coronary artery disease and/or diabetes mellitus, the risk of urethral stricture complication was significantly higher in the PK-TURP group than in the M-TURP group ($P=0.000$).

Conclusions: The risk of urethral stricture increases with PK-TURP in elderly patients with a large prostate and concomitant hypertension and/or coronary artery disease and/or diabetes mellitus. Therefore, PK-TURP should be performed cautiously in this group of benign prostatic hyperplasia patients.

Keywords: Prostatic hyperplasia, Comorbidity, Transurethral resection of prostate, Urethral stricture

INTRODUCTION

For many years, monopolar transurethral resection of the prostate (M-TURP) has been the standard method for treating lower urinary tract symptoms (LUTS) resulting from benign prostatic hyperplasia (BPH) with immediate success in relieving the obstruction and with improvement of symptoms and voiding variables in the long run [1]. The reasons for the worldwide acceptance of this method include not only its good results, but also the low incidence of complications [2]. Nevertheless, M-TURP still requires hospitalization and can be complicated by intraoperative bleeding, clot retention, and transurethral resection (TUR) syndrome [3]. M-TURP is limited to prostate glands weighing less than 100 g and is associated with significant complications and morbidity if a larger prostate is resected. Therefore, a demand for technological alternatives that can decrease the risks of M-TURP, such as hemorrhage or electrolyte disturbances and TUR syndrome, remains [3,4].

In this context, plasmakinetic or bipolar technology has

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recently gained worldwide attention, with the aim of minimizing the morbidity of the standard M-TURP procedure while maintaining efficacy and durability [5]. Unlike M-TURP, bipolar technologies allow the electric current to complete the circuit without passing through the patient. This allows saline solution to be used instead of glycine for irrigation during resection. Thus, it reduces the risk of hyponatremia during TURP [5]. A concern for the occurrence of urethral stricture that could be a specific pitfall of plasmakinetic transurethral resection of the prostate (PK-TURP) was raised in recent years as the increasing number of patients with this complication became clinically relevant and alarming, even though the urethral stricture rate in the PK-TURP group compared with the M-TURP group was not statistically significant [6]. This issue was also noticed in our previous study [7]. However, although urethral stricture rates were higher in the PK-TURP group, statistical significance was not reached, probably because of the limited number of patients. Therefore, in the present study, a larger sample of patients undergoing either M-TURP or PK-TURP with similar technical equipment and clinical conditions was included in our series with the aim of obtaining sufficient data to evaluate the significance of the urethral stricture rate in the PK-TURP arm.

MATERIALS AND METHODS

1. Study design

The data of 317 patients with comorbidities who underwent either PK-TURP or M-TURP in two institutions (Taksim Teaching Hospital and Maltepe University Hospital, Istanbul, Turkey) from September 2008 to December 2012 were retrospectively evaluated. Formal study approval by the Institutional Review Board of Maltepe University (MAL.UN.KAEK/MEG.27. 2011/22) was obtained. Data for preoperative International Prostate Symptom Score (IPSS), maximal flow rate (Qmax), residual urine volume, International Index of Erectile Function (IIEF), and comorbidities such as hypertension (HT), coronary artery disease (CAD), diabetes mellitus (DM), and chronic obstructive pulmonary disease (COPD) were reviewed. Sodium levels before the procedure and at 2 hours and hemoglobin levels before and at 24 hours were recorded postoperatively. Treatment efficacy was evaluated at 12 months postoperatively by comparing Qmax, IPSS, IIEF scores, and urethral stricture rates. Inclusion criteria were age >50 years, good performance status, acute urinary retention if catheter removal failed after therapy with alpha-blockers or chronic urinary retention unresponsive to medical treatment, IPSS ≥ 8, and Qmax ≤ 15 mL/sec. Exclusion criteria were prostate volume < 30 cm^3, documented or suspected prostate cancer, neurogenic bladder, bladder stone or diverticula, urethral stricture, and maximal bladder capacity >500 mL. None of the patients had a history of urethral catheterization. Patients with low maximum and average flow rates at the postoperative follow-up underwent cystoscopy so that urethral stricture could be diagnosed and treated by internal urethrotomy.

2. Equipment

The electroresection and coagulation for M-TURP were performed with a standard tungsten wire loop by use of a high-frequency current having a maximum cutting power of 200 W and coagulating power of 80 W. In the M-TURP application, a 26-F resectoscope, a 30° wide-angled optic, a wire loop electrode (Storz, Tuttlingen, Germany), and 1.5% glycine solution were used. The Gyrus Plasmakinetic System for PK-TURP consists of a generator and a cutting loop that does not differ in shape from a monopolar loop but has an active and return electrode on the same axis, separated by a ceramic insulator. A chip in the loop automatically adjusts the power setting of the generator for the best cutting and coagulating parameters. In the PK-TURP application, a 26-F resectoscope, a 30° wide-angled optic, and saline solution were used. All operations were performed by using a similar technique under spinal or general anesthesia. A 22-F three-way urinary catheter was left in place after the operation for 3 days, and saline irrigation was continued until the effluent fluid was completely clear.

3. Statistical analysis

Statistical analyses were performed by using SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA). The results were analyzed by using descriptive statistics with the nonparametric Mann-Whitney *U*-test and chi-square test (or Fischer exact test), where appropriate, to compare continuous variables and categorical data, respectively. For the multivariate analysis, the possible factors that were identified in the univariate analysis were analyzed to determine independent predictors of urethral stricture. Hosmer-Lemeshow goodness-of-fit statistics were used to assess model fit. Differences were considered statistically significant at a *P*-value of less than 0.05.

RESULTS

One hundred fifty-four patients underwent M-TURP and 163 patients PK-TURP. Comorbidities in both treatment arms were similar (Table 1). The mean ages of the M-TURP and PK-TURP groups were 64.4 ± 8.3 and 69.0 ± 8.0 years, respectively ($P=0.00$). Prostate volumes were 42.6 ± 12.6 mL in the PK-

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