Mid-term evaluation of the safety of plasma vaporization of the prostate

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Abstract

Introduction and objectives: The bipolar plasma vaporization of the prostate (BPVP) in saline is a very promising technique in BPH endoscopic treatment. The aim of this study was to evaluate in a retrospective manner the complications of prostate BPVP during a follow-up period of at least 12 months.

Material and methods: A number of 356 patients who underwent plasma-button vaporization of the prostate between January 2010 and January 2013 were retrospectively evaluated. Inclusion criteria were represented by prostate volume between 30 and 80 mL, Qmax under 10 mL/s and IPSS over 19. The perioperative features as well as the immediate and late complications were evaluated. 34 patients were lost during the follow-up period.

Results: The mean operation time, catheterization period and hospital stay were 32.5 min, 24.5 hours and 47.8 hours, respectively. The main intraoperative complications were constituted by prostatic capsule perforation (1.9%) and significant intraoperative bleeding which imposed blood transfusion (0.3%). The immediate postoperative complications were represented by conservatively managed clot retention (0.6%) and important hematuria which imposed re-intervention for hemostasis (0.3%). The re-catheterization rate was 2.5%. Late complications during follow-up included irritative symptoms (10.9%), bladder neck sclerosis (0.9%), urethral stricture (7.1%) and urinary incontinence (1.2%).

Conclusions: The continuous bipolar plasma vaporization of prostate was characterized by good surgical efficacy, substantially reduced morbidity, fast postoperative recovery, satisfactory follow-up parameters and a superior safety profile emphasizing remote complications.

Keywords: plasma vaporization, prostate, BPH
Clinical studies

Introduction
The bipolar plasma vaporization of the prostate (BPVP) in saline is a very promising and relatively recent emerging technique in BPH endoscopic treatment. A large quantity of published data is currently in the course of gathering while demonstrating at least similar (if not superior) results by comparison to the monopolar transurethral resection of the prostate (TURP).

However, the safety profile of any newly introduced surgical technique represents a very important feature. Although BPVP seems to constitute a safe treatment modality, the medium and long term data are still needed in order to confirm the feasibility of this type of approach.

The aim of this study was to evaluate in a retrospective manner the complications of prostate BPVP during a follow-up period of at least 12 months.

Material and Methods
A number of 356 patients who underwent plasma-button vaporization of the prostate between January 2010 and January 2013 were retrospectively evaluated.

The bipolar vaporization ablation process started with the median lobe and continued with the lateral lobes. At the end of the procedure, the tissue was removed at the 12 o’clock position as well as in the proximity of the sphincter and around the verumontanum.

Hemostasis, with the coagulation of the remaining bleeding sources was completed at the end of the intervention, resulting in a neat surface of the vaporization area.

The inclusion criteria for this study group were represented by prostate volume between 30 and 80 mL, maximum urinary flow rate (Qmax) under 10 mL/s and International Prostate Symptom Score (IPSS) over 19.

The first 190 were treated using the UES-40 first generation energy source, while the rest of the 166 patients were treated using the new ESG-400 bipolar generator. The differences were represented by the fact that the latter model allowed a continuous vaporization phenomenon to be achieved, while the first one required periodic interruptions of the respective process in order to avoid overheating the system. The ESG-400 energy source functions at substantially lower power settings (200W for vaporization and 120W for coagulation) by comparison to the older generator (280W and 160W, respectively).

The patients' records were reviewed for determining the perioperative features as well as the immediate and late complications for 322 cases, the other 34 patients being lost during the follow-up period.

Results
The BPVP procedure was successfully performed in all cases. The mean operation time, catheterization period and hospital stay were 32.5 min, 24.5 hours and 47.8 hours, respectively. The main intraoperative complications were constituted by prostatic capsule perforation (1.9% - 6 cases) and significant intraoperative bleeding which imposed blood transfusion (0.3% - 1 case). The mortality rate in the studied series was 0%.

The immediate postoperative complications were represented by conservatively managed clot retention (2 cases - 0.6%) and important hemorrhage which imposed re-intervention for hemostasis (1 case - 0.3%). The re-catheterization rate was 2.5% (8 cases).

Late complications during follow-up included irritative symptoms, bladder neck sclerosis, urethral stricture and urinary incontinence. Early irritative symptoms (dysuria, urgency, frequency) were reported in 35 cases (10.9%). Bladder neck sclerosis was found in 3 patients (0.9%) while urethral stricture occurred in 23 cases (7.1%). The locations of the urethral strictures were bulbar and prebulbar. On the other hand, persistent urinary incontinence was identified in 4 cases (1.2%).

Discussion
The gold standard surgical procedure for medium and large adenomas is still represented by the monopolar TURP. The development of alternative techniques is justified by the attempt to get at least similar efficiency while substantially reducing the perioperative morbidity. Under these circumstances, all of these therapeutic modalities must first display reliable short and medium term such outcomes before gaining acknowledgement as reliable parts of the BPH treatment armamentarium.

Although the risk of transurethral resection syndrome has significantly decreased during the last decades to less than 1.1%, it is still a reality, with potentially severe consequences (1.2). The risk factors associated with TUR syndrome occurrence are prolonged operation time (correlated with large prostates or inexperienced operators) and conditions of excessive bleeding, especially when venous sinuses are opened.

While performing the bipolar vaporization in saline, the risk of TUR syndrome is practically absent, thus allowing the intervention to be prolonged, at least theoretically, for as long as necessary. Additionally, in the continuous mode, the local endoscopic circumstances get to exclusively dictate the length of the ongoing ablation stages.

The re-catheterization rate in the current study was...
2.5% by comparison to 4–22% recorded in monopolar TURP series (3,4).

The significantly reduced postoperative hematuria rate by comparison to TURP (0.9% vs 2.9–13.3%) (1,5,6,7) offered additional confirmation of the improved coagulation properties of the “button” electrode. Moreover, using the ‘button’ for both vaporization and hemostasis creates the premises for a comfortable, thus offering the operator the possibility to quickly switch between the two working modes whenever it becomes necessary. This feature further improves the safety of the procedure by optimizing both visibility and hemostasis.

The median probability of postoperative stress urinary incontinence following TURP is around 2.2% by comparison to 1.2% in the present series (1,2,8-13).

Irritative symptoms constitute an issue of debate when evaluating bipolar electrosurgical techniques. The rate of early such symptoms in this trial was 10.9%, otherwise similar with those recorded after monopolar TURP (4.3–20%) (4,14).

Secondary to conventional resection, the EAU Guidelines present a bladder neck sclerosis and urethral stricture rates of 4.7% and 3.8% respectively. In this series, the bladder neck sclerosis rate (0.9%) was significantly reduced by comparison to monopolar TURP, therefore confirming the previously reports advocating this technique as a successful approach for this pathology as well (15,16).

As far as the urethral stricture rate was concerned, a relatively different situation is present. The rate of this late complication following bipolar vaporization was somewhat increased (7.1%) by comparison to the monopolar TURP reports. However, according to more extensive studies, no statistically significant differences were determined between the two types of procedure (17).

The perioperative mortality rate (defined as mortality during the first 30 days after the intervention) according to the EAU Guidelines is 0.1% (6). No cases of deaths were present in this group.

Conclusions

The continuous bipolar plasma vaporization of prostate seems to represent a valuable minimally invasive alternative in BPH endoscopic treatment. This technique was characterized by good surgical efficacy, substantially reduced morbidity, fast postoperative recovery, satisfactory follow-up parameters and a superior safety profile emphasizing remote complications.

References