
SHORT COMMUNICATION

Could transperineal interstitial laser ablation of the prostate be the right option for highly-comorbid patients with lower urinary tract symptoms due to benign prostatic obstruction? A preliminary single-center experience focusing on functional and safety outcomes

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ABSTRACT

In this paper, we aimed to highlight functional and safety outcomes of highly-comorbid patients undergoing transperineal laser ablation (TPLA) of prostate at a referral academic center. Patients undergoing TPLA from April 2021 and February 2023 with moderate to severe lower urinary tract symptoms (LUTS), prostate volume ranging from 30 to 100 mL, and an American Society of Anesthesiologists (ASA) Score ≥ 3 were included. All patients were evaluated as unfit for standard surgery. Procedures were performed in an outpatient setting using local anesthesia. Failure after the procedure was defined as the shift to other ultra-minimally invasive surgical treatment or the need for long-term indwelling catheter replacement. Overall, 23 patients were enrolled with a median age of 76 years. Median ASA Score and Charlson Comorbidity Index were 3 and 5, respectively. Of these, 11 (48%) were under antiplatelets, 4 (17%) under new oral anticoagulants (NOACs) and 3 (13%) under warfarin. Six (26%) patients had an indwelling catheter preoperatively. Median prostate volume was 42 mL. Median follow-up was 12 months. No Clavien-Dindo Grade ≥ 2 complications were recorded. Four/six (66%) patients with an indwelling catheter before TPLA achieved spontaneous micturition. Treatment failure occurred in 2 (8.5%) patients. Of the remaining 21 patients, 12/21 (57%) patients reported an improvement in International Prostate Symptoms Score (IPSS) symptoms class (*i.e.*, severe to moderate, moderate to mild, etc.); all patients whose IPSS symptoms class remained stable (N=8 [38%]) had a significant improvement of the IPSS score as compared to the

preoperative period, while 1 (4.5%) patient reported worsening of LUTS. In conclusion, TPLA appears to be a safe and feasible ultra-minimally-invasive option for LUTS due to benign prostatic obstruction (BPO) in patients with significant comorbidities at high-risk for standard surgical options.

(Cite this article as: Polverino P, Lo Re M, Saladino M, Pecoraro A, Moscardi L, Rivetti A, *et al.* Could transperineal interstitial laser ablation of the prostate be the right option for highly-comorbid patients with lower urinary tract symptoms due to benign prostatic obstruction? A preliminary single-center experience focusing on functional and safety outcomes. *Minerva Urol Nephrol* 2024;76:646-9. DOI: 10.23736/S2724-6051.23.05479-4)

KEY WORDS: Prostatic hyperplasia; Lower urinary tract symptoms; Urology.

Despite the technological progress achieved in standard surgical techniques for benign prostatic obstruction (BPO), they are still not devoid of side effects and require general or spinal anesthesia as well as hospitalization. Recently, several ultra-minimally invasive surgical techniques were developed to ensure favorable functional results while minimizing morbidity and preserving ejaculation, often not requiring general or spinal anesthesia and/or hospitalization.¹⁻³

However, an expanded role of these new ultraminimally invasive techniques could be in the setting of highly-comorbid patients, potentially not eligible for more invasive surgical procedures.⁴⁻⁶ In this view, transperineal interstitial laser ablation (TPLA) of prostate adenoma has shown promising results in preliminary series in an outpatient setting and using local anesthesia.⁷ Therefore, we aimed to assess functional and perioperative outcomes of highly-comorbid patients undergoing TPLA in a referral academic center, focusing on the safety profile and functional outcomes in such a fragile patient cohort.

After Institutional review board approval, our prospectively maintained database was queried to identify highly-comorbid patients (defined as American Society of Anesthesiologists [ASA] Score patients ≥ 3) with moderate to severe lower urinary tract symptoms (LUTS) (International Prostate Symptoms Score [IPSS] ≥ 8) and prostate volume ranging from 30 to 100 mL, who underwent TPLA between April 2021 and February 2023.

After anesthesiologic evaluation, all patients were considered as unfit for standard surgery (*i.e.*, TURP, HoLEP, etc.) due to the potential increased risk of intraoperative or postoperative adverse events, especially intra/perioperative bleeding as well as medical complications.

The TPLA procedures were performed in an outpatient setting using local anesthesia with 20 mL lidocaine 2% and low-dose oral benzodiazepine administration according to patients' preference, using EchoLaser™ (Elasta SpA, Calenzano, Florence, Italy) multisource diode laser generator for the ablation, as previously reported.⁷ Data regarding functional outcomes evaluated by validated questionnaires (IPSS and QoL) and uroflowmetry parameters, as well as patient management (catheterization, medications, complications), were recorded pre- and postoperatively. Failure after the procedure was defined as the shift to other ultra-minimally invasive surgical treatment or the need for long-term indwelling catheter replacement for urinary retention. All relevant data obtained in this study were analyzed with SPSS version 24 (IBM Corp., Armonk, NY, USA).

Overall, 23 patients were included in the analytic cohort, with a median age of 76 years (IQR: 65-82). Median ASA Score was 3 and the median age-adjusted Charlson Comorbidity Index 5 (IQR: 3-6). Of these, 11 (48%) patients were under antiplatelet medications, 4 (17%) under new oral anticoagulants (NOACs) and 3 (13%) under warfarin at the time of surgery. Six (26%) patients had an indwelling catheter before the procedure. Median prostate volume was 42 mL (IQR: 39-70). Preoperative characteristics of patients and intraoperative features are further described in Table I.

All patients were discharged on the same day of the procedure. Median follow-up time was 12 months. Median catheterization time was 7 days (IQR: 7-9). No Clavien-Dindo Grade ≥ 2 postoperative complications were recorded. Four out of 6 patients with an indwelling catheter before TPLA achieved spontaneous micturition at last follow-up.

TABLE I.— *Patients characteristics and intraoperative features.*

Patient characteristics	N.=23
Age (years), median (IQR)	77 (68-84)
BMI, median (IQR)	24.5 (22-27)
ASA score, median (IQR)	3 (3-3)
CCI, median (IQR)	5 (3-6)
Prostate volume (mL), median (IQR)	42 (39-70)
Patients with indwelling catheter, N. (%)	6 (26)
Patients under antiplatelet/ anticoagulant therapy, N. (%)	11 (48) antiplatelets 4 (17) NOACs 3 (13) Warfarin
Intraoperative features	
Number of fibers, median (IQR)	2 (2-2)
Energy erogated, median (IQR)	2800 (2400-3200)
Catheterization time (days), median (IQR)	7 (7-9)

IQR: interquartile ranges; BMI: Body Mass Index; ASA: American Society of Anesthesiologists; CCI: Charlson Comorbidity Index; BMI: Body Mass Index; NOACs: new oral anticoagulants.

Overall, 7/23 patients (30%) reintroduced medical therapy for BPO at last follow-up. Treatment failure occurred in 2 (8.5%) patients. Both patients had an indwelling catheter before the procedure, and after 2 catheter removal attempts, in accordance with the patient, an indwelling catheter was replaced. Of the remaining 21 patients, 12/21 (57%) patients reported an improvement in IPSS symptoms class (of which 8/12 from severe to moderate LUTS; 1/12 from severe to mild; 3/12 from moderate to mild; Supplementary Digital Material 1: Supplementary Table I).

All patients whose IPSS symptoms class remained stable (N.=8 [38%]) had a significant improvement of the IPSS score as compared to the preoperative period (data not shown). Only one patient reported worsening his symptomologic status according to IPSS.

Median pre- and postoperative QoL was 4 (IQR: 3-5) and 2 (IQR: 1-3), respectively. An accurate overview of preoperative clinical status in terms of comorbidities and baseline and last follow-up urinary status based on the IPSS questionnaire are highlighted patient-by-patient in Supplementary Table I.

Highly-comorbid patients are often excluded from conventional BPO surgery, given their potential frailty and subsequent higher risk of perioperative adverse events, medical complications, postoperative bleeding and longer hospitaliza-

tion. Notably, the median age-adjusted Charlson Comorbidity Index in our cohort was 5, meaning a 10-year estimated overall survival of 21%. This makes patient selection for ultra-minimally invasive treatment for BPO a clinical unmet need.

These patients are usually treated with medical therapy, that could be ineffective, poorly tolerated or contraindicated due to the potential side effects. Unfortunately, selected patients could even need to maintain a lifelong indwelling catheter, with a consequent increased risk of urinary tract infections and a non-negligible impact on their QoL.⁸ In the last decade, an increasing interest about minimally and ultra-minimally-invasive techniques for the treatment of BPO has been observed given their functional results and the advantages in terms of length of hospitalization, and complication rates.¹⁻³ Such techniques were mainly developed to provide new options to find a compromise between symptomatic relief and ejaculation preservation,^{9, 10} but a further field of application can certainly be represented by patients with obstructive symptoms in whom the trade-off between the risk complication of traditional surgery and the need for interventional treatment is more nuanced. In this scenario, TPLA has the potential to achieve all the results required in this well-selected cohort. In fact, it has been shown to be feasible in an outpatient setting, without the need for hospitalization, even without suspending any antiplatelet or anticoagulant therapies using local anesthesia.⁷ Although several series evaluating feasibility, safety, functional and sexual outcomes of this technique have been reported,^{3, 7, 11} to date, there is lack of evidence on the safety and feasibility of TPLA in a cohort of highly-comorbid patients.

Despite the preliminary nature of the study, the relatively small sample size and the lack of a control group, our experience provides evidence supporting TPLA as a reliable option for well-selected multimorbid patients with LUTS due to BPO who could be at higher risk of adverse events after standard surgery.

Larger prospective comparative studies are needed to confirm these results and to investigate the cost-effectiveness of TPLA vs. other ultra-minimally invasive options as well as vs. current gold standards.

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Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions

Paolo Polverino, Francesco Sessa, Riccardo Campi and Mattia Lo Re have given substantial contributions to study conception and design, Marco Saladino, Luisa Moscardi, Anna Rivetti, Giulio R. Resta, Marta Pezzoli and Andrea Romano to data acquisition, Alesio Pecoraro and Riccardo Campi to data analysis and interpretation, Paolo Polverino, Bhaskar K. Somani, Giampaolo Siena, Andrea Cocci and Mauro Gacci to manuscript writing, Sergio Serni, Andrea Minervini and Francesco Sessa to manuscript critical revision. All authors read and approved the final version of the manuscript.

History

Article first published online: December 13, 2023. - Manuscript accepted: November 6, 2023. - Manuscript revised: September 1, 2023. - Manuscript received: June 19, 2023.

Supplementary data

For supplementary materials, please see the HTML version of this article at www.minervamedica.it