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Endoscopic Vaporization of the Prostate: A Mini-Invasive Option for the Treatment of Prostatism

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Abstract

Objective: To evaluate the results of endoscopic vaporization of the prostate (EVOP) in a Urology center in Douala, Cameroon. **Methods:** This retrospective study, conducted from January 2020 to December 2025, included 52 patients with symptomatic prostatism who, after failure of medical treatment, underwent EVOP using a bipolar generator. Data were collected from patients' clinical records and analyzed using Epi Info version 7.2.7.0. P values below 0.05 were considered statistically significant. **Results:** The mean age of our participants was 70.27 years ± 7.95 years, and 50% of them were above 70 years old. In 57.69% of cases, the presenting complaints were obstructive symptoms, while a combination of obstructive and irritative symptoms accounted for 17.3%. The median prostate volume was 55 [44.5 - 64] ml, while the median surgery duration was 68.5 [55 - 78.5] minutes, and the maximum catheterization duration was 3 days. Postoperative complications, mainly acute urinary retention, were observed in 4 (7.69%) patients. Patients with postoperative complications were older than those without. The prostate volume and surgery duration were significantly higher among those with postoperative complications. **Conclusion:** Endoscopic bipolar prostate vaporization is a viable minimally invasive alternative for the management of prostatism in elderly patients with moderately enlarged prostate glands. It is associated with short hospitalization, brief catheterization, few postoperative complications, and rapid societal reintegration; however, it is not very suitable for voluminous prostate glands.

Keywords

Endoscopic Vaporization of the Prostate, Prostatism, Douala

1. Introduction

Prostatism is a prevalent urological disorder in aging men. It is characterized by nonmalignant proliferation of the prostatic stroma and epithelium, leading to enlargement of the prostate gland and lower urinary tract symptoms (LUTS), a phenomenon commonly referred to as prostatism [1] [2]. The clinical manifestations of this condition, which include urinary frequency, hesitancy, weak stream, nocturia, and incomplete bladder emptying, result from mechanical obstruction and dynamic smooth muscle tone increments in the prostatic urethra [3]. The global burden of prostatism continues to rise with increasing life expectancy, making it a major public health concern, especially in sub-Saharan Africa, where diagnostic and therapeutic resources remain limited [4]. Up until the early 1990s, the only accepted treatment for prostatism was prostatectomy [5]. Although this technique provides excellent relief for large adenomas, open procedures are associated with prolonged hospitalization, higher intraoperative blood loss, and increased risk of postoperative complications such as infection and incontinence [6]. Over recent decades, the demand for minimally invasive techniques has fostered the development of a range of endoscopic interventions. Among them, transurethral resection of the prostate (TURP) has become the gold standard for medium-sized glands, offering reduced morbidity and quicker recovery compared to open surgery [7] [8]. Nevertheless, conventional TURP, especially monopolar TURP, has some shortcomings, including the risk of bleeding, transurethral resection (TUR) syndrome, and limited applicability in patients with massive prostate glands [9]. Advances in urological endoscopy and energy-based systems have progressively transformed surgical treatment options for prostatism. Techniques such as holmium laser enucleation of the prostate (HoLEP) and photoselective vaporization of the prostate have emerged as alternatives with enhanced safety profiles and quicker patient recovery [10] [11]. Endoscopic vaporization of the prostate (EVOP), an evolution of these techniques, employs high-frequency electrical or laser energy to ablate prostatic tissue via vaporization, ensuring hemostasis and minimal thermal injury to surrounding structures [12]. This technique has gained increasing adoption in low-resource settings worldwide as it combines efficiency, minimal intraoperative bleeding, short postoperative hospitalization, and quick patient recovery; however, its efficacy is limited in managing patients with markedly voluminous prostate glands, indicating that patient selection is critical to ensuring optimal outcomes [13]. Nevertheless, to the best of our knowledge, EVOP has not yet been investigated in the Cameroonian population; therefore, this study aimed to evaluate the results of EVOP in a Urology center in Douala, Cameroon.

2. Methods

This was a retrospective study carried out from 2020 to 2025 at Saint Cyr Endoscopic Urology Center in Douala. We consulted the clinical records of patients with symptomatic prostate pathologies who underwent EVOP using the bipolar Olympus generator. We included all patients who underwent EVOP at our center

from January 2020 to December 2025 and excluded those with incomplete clinical records. After excluding those with incomplete medical records, a total of 52 patients were ultimately included in this study. The data we obtained from the participants' clinical records included patients' age, clinical presentation, history of hypertension, anticoagulant use, digital rectal examination (DRE) results, prostate volume as per the transrectal ultrasound (TRUS), total prostate-specific antigen titer (PSAT), preoperative and postoperative hemoglobin levels, transfusion during or after surgery, prostate biopsy results, Gleason score upon pathological analysis of prostate biopsy specimens, the International Society of Urological Pathology (ISUP) score, results of the thoraco-abdomino-pelvic computed tomography (TAP CT) scan, the presence and kind of metastases, the preoperative and postoperative International Prostate Symptom Score (IPSS) for each patient, the preoperative and postoperative quality of life (QoL) scores, patients' preoperative Qmax, postoperative Qmax, indication for the surgery, surgery duration (minutes), duration of postoperative hospitalization (days), postoperative duration of the indwelling urinary catheter (days), and postoperative complications. The digital rectal examination findings were unremarkable if there was no suspicion of prostate cancer and positive if prostate cancer was suspected upon palpation of the prostate. The IPSS score was assessed using a standardized questionnaire (IPSS questionnaire) that contains seven questions on the obstructive and irritative symptoms of prostatism, with each question scored from 0 to 5, with 0 indicating the complete absence of the symptom and 5 indicating the constant presence of the symptom. This questionnaire also contains a question on the patient's quality of life, which is scored from 0 to 6, with 0 indicating the best possible quality of life and 6 indicating the worst possible quality of life. With this questionnaire, the total score ranges from 0 to 35, with 0 - 7 being mildly symptomatic, 8 - 19 moderately symptomatic, and 20 - 35 being severely symptomatic. Surgery is usually indicated for severely symptomatic patients. Uroflowmetry was also performed in all patients before and after surgery to evaluate the Qmax, except for those whose prostate glands were voluminous enough to cause acute urinary retention (for which they had indwelling Foley's catheters), which prohibited the assessment of Qmax. A Qmax of >15 ml/s is considered normal, while a Qmax of <10 ml/s is considered abnormal [14].

In this study, patients were included consecutively. Biopsy with histopathology was performed for every patient undergoing EVOP before the procedure to determine malignancy. This is because this procedure, unlike resection, does not leave samples to be analyzed. Before surgery, all the patients consulted an anesthetist and did certain preoperative laboratory tests, including a complete blood count, blood urea, serum creatinine, prothrombin time, kaolin-cephalin coagulation time, and urinalysis. This was to ensure that the patients had satisfactory blood cell counts, hemoglobin levels, kidney function indexes, and sterile urine before the surgery, since a urinary tract infection of any kind is a contraindication to this minimally invasive procedure. All patients undergoing EVOP were given appoint-

ments one month after the procedure to assess their hemoglobin levels, IPSS, QoL, Qmax, and postoperative complications. Indications for EVOP included failure of medical treatment, which was defined as the persistence or recurrence of signs and symptoms of prostatism after adequately administering medications such as alpha blockers. Another indication was the patient's choice, defined as the informed decision of the patient to go for EVOP without first trying other therapeutic procedures such as TURP.

EVOP was performed with the help of the bipolar Olympus Generator. During surgery, the patient was placed in the lithotomy position, after which the thighs, external genital organs, and pelvic regions were cleaned with betadine solution. Thereafter, a bipolar Olympus resectoscope system featuring a 26 French (Fr) was used to perform the procedure. First, cystoscopy was employed to observe the two ureteral orifices, after which the bipolar Olympus resectoscope was introduced with the vaporization loop, which was placed in the resectoscope beforehand, and then the vaporization procedure was initiated. After the procedure, hemostasis is performed in the prostatic fossa using the bipolar electrodes of the resectoscope during the vaporization procedure. After the procedure, a three-way 22-Fr indwelling silicone Foley catheter is placed in the bladder, which is irrigated using normal saline. All the interventions were carried out by the same urologist. Patients with unsatisfactory surgical outcomes using EVOP, mainly due to postoperative acute urinary retention caused by their voluminous prostate glands, underwent a second procedure, which was the classic endoscopic resection of the prostate gland, performed 4 - 6 weeks after the EVOP procedure. Postoperative histopathology was not performed for patients who underwent only EVOP.

Data collected included age, clinical presentation, history of hypertension, anticoagulant use, DRE findings, prostate volume on TRUS, prostate-specific antigen (PSA) titers, preoperative hemoglobin levels, transfusion, prostate biopsy results, Gleason score, ISUP score, TAP CT, metastases, preoperative IPSS score, preoperative quality of life, preoperative Qmax, indication for EVOP, surgery duration, duration of postoperative hospitalization (days), postoperative hemoglobin level, duration of indwelling catheter stay, occurrence of postoperative complications, postoperative IPSS score, postoperative quality of life, and postoperative Qmax. For patients aged at least 75 years, there were no data for metastases, TAP CT, ISUP, Gleason score, prostate biopsy, or PSAT. The main outcome variable was the surgical outcome, a dichotomous variable with modalities being successful or unsuccessful surgery. In this study, a successful surgery was one not followed by postoperative complications, while an unsuccessful one was one in which there was a postoperative complication. For patients with unsuccessful procedures, there were no data on postoperative quality of life, postoperative Qmax, and postoperative IPSS.

The data collected from the patients' clinical records were entered into Microsoft Excel 2016 and then exported to Epi Info 7 for statistical analysis. This study was

approved by the institutional review board of the Faculty of Medicine and Pharmaceutical Sciences (FMPS) of the University of Douala and by the ethical committee of Saint Cyr Endoscopic Urology Center in Douala, Cameroon. The requirement for patients' informed consent was waived due to the retrospective nature of the study. Continuous variables were presented as mean values and standard deviations for normally distributed data and as median values with interquartile ranges for data with skewed distributions. The independent samples t-test was used to compare normally distributed continuous variables, while the Mann-Whitney U test was used to compare continuous variables with skewed data distributions. The chi-square test and Fisher's exact test were used to compare categorical variables. Values of $P < 0.05$ were considered statistically significant.

3. Results

We included 52 men aged 55 - 82 years in this study. The mean age of our participants was 70.27 years ± 7.95 years, and 50% of them were above 70 years old. Thirty patients (57.69%) presented with obstructive symptoms only, 9 (17.31%) presented with both obstructive and irritative symptoms, 6 (11.54%) presented with acute urinary retention, 6 (11.54%) presented with gross hematuria, and 1 (1.92%) presented with urinary tract infection (UTI). Thirty-eight (73.08%) patients had no history of anticoagulant use, and 24 (46.15%) of them had a history of hypertension. Digital rectal examination was positive in 43 (82.69%) patients. All prostate biopsies performed were positive. The IPSS scores of our participants ranged from 14 to 35, with a mean value of 25 ± 5.41. The age distribution and clinical presentations of the study population are presented in Table 1.

Table 1. Age distribution and presentations of the study participants.

Variable	Frequency (n)	Percentage (%)
Age (Years, n = 52)		
≤60	9	17.31
61 - 70	16	30.77
71 - 75	10	19.23
>75	17	32.69
Clinical Presentation and Medical History		
Obstructive Symptoms Only	30	57.69
Obstructive and Irritative Symptoms	9	17.31
Acute Urinary Retention	6	11.54
Gross Hematuria	6	11.54
Urinary Tract Infection	1	1.92
Positive Digital Rectal Examination	43	82.69
Hypertension	24	46.15

Continued

Anticoagulant-Naïve	38	73.08
Positive Digital Rectal Examination	43	82.69
IPSS Range (n = 52)		
20 and Below	15	28.85
21 - 25	16	30.77
26 - 30	13	25
31 and Above	8	15.38

On TRUS, prostate volumes ranged from 29 ml to 80 ml, with a median value of 55 [44.5 - 64] ml. PSA titers ranged from 49 ng/mL to 464 ng/mL, with a median value of 100 [87 - 220] ng/mL. TAP CT was positive for all 29 participants who took the test. The Gleason score was 7 for 14 (48.27%) participants, 8 for 6 (20.69%) participants, 9 for 7 (24.14%) participants, and 10 for 2 (6.90%) participants. There were 14 (48.28%) patients with ganglionic metastases only, 11 (37.93%) patients with ganglionic and bone metastases, and 4 (13.79%) patients with only bone metastases. The paraclinical findings of the study participants are presented in Table 2.

Table 2. Paraclinical findings of our study participants.

Variable	Frequency	Percentage
Prostate Volume on TRUS (ml, n = 52)		
35 and Below	2	3.85
36 - 45	16	30.77
46 - 55	9	17.31
56 - 65	14	26.92
66 - 75	10	19.23
>75	1	1.92
PSA Titers (n = 29)		
60 and Below	2	6.90
61 - 160	17	58.62
161 - 260	5	17.24
261 - 360	4	13.79
>360	1	3.45
Gleason Score (n = 29)		
7 (3 + 4)	11	37.93
7 (4 + 3)	3	10.34
8 (3 + 5)	2	6.90

Continued

8 (4 + 4)	4	13.79
9 (4 + 5)	3	10.34
9 (5 + 4)	4	13.79
10 (5 + 5)	2	6.90
Metastases (n = 29)		
Ganglionic Only	14	48.28
Ganglionic and Bone	11	37.93
Bone Only	4	13.79

Regarding the preoperative details of the participants, the preoperative Hb level ranged from 7.8 g/dL to 14.5 g/dL, with a mean value of 12.08 g/dL ± 1.63 g/dL. Nineteen (36.54%) out of 52 participants had preoperative hemoglobin levels below 12 g/dL. The preoperative quality of life scores ranged from 3 to 6. The preoperative Qmax ranged from 4 to 14, with a median value of 10 [8]-[12], and 54.35% of participants had values of 9 - 12. The indication for surgery was prostate adenocarcinoma in 26 (50.0%) cases, the patient's choice in 6 (11.54%) cases, failure of medical treatment in 14 (26.92%) cases, and acute urinary retention in 6 (11.54%) cases. The surgery duration ranged from 40 minutes to 120 minutes, with a median value of 68.5 [55 - 78.5] minutes. The preoperative and intraoperative details are found in Table 3.

Table 3. Preoperative and intraoperative details.

Variable	Frequency	Percentage
Hb Level (g/dL, n = 52)		
<12	19	36.54
≥12	33	63.46
QoL (n = 52)		
3	4	7.69
4	8	15.38
5	23	44.23
6	17	32.69
Qmax (n = 46)		
≤8	13	28.26
9 - 12	25	54.35
>12	8	17.39
Indication for Surgery (n = 52)		
Prostatic Adenocarcinoma	26	50.00
Patient's Choice	6	11.54

Continued

Failure of Medical Treatment	14	26.92
Acute Urinary Retention	6	11.54
Surgery Duration (Minutes; n = 52)		
≤60	22	42.31
61 - 80	22	42.31
81 - 100	7	13.46
>100	1	1.92

Regarding postoperative parameters, 4 (7.69%) out of 52 participants required blood transfusions after surgery. Most participants (45, 86.54%) were hospitalized for one day after surgery. The postoperative hemoglobin level ranged from 9.9 g/dL to 14 g/dL, with a mean value of 12.16 g/dL ± 1.25 g/dL. The duration of the indwelling urinary catheter ranged from 2 days to 3 days. The postoperative IPSS ranged from 3 to 15, with a median value of 7.5 [5]-[10]. The postoperative QoL score was 0 in 22 (45.83%) patients and 1 in 26 (54.17%) patients. There were no postoperative complications in 48 (92.31%) of patients. The postoperative details are found in Table 4.

Table 4. Postoperative details.

Variable	Frequency	Percentage
Transfusion (n = 52)		
No	48	92.31
Yes	4	7.69
Duration of Hospitalization (Days, n = 52)		
1	45	86.54
3	7	13.46
Postoperative Hemoglobin Level (g/dL, n = 52)		
<12	16	30.77
≥12	36	69.23
Duration of Indwelling Catheter (Days, n = 52)		
2	1	1.92
3	51	98.08
Postoperative IPSS (n = 48)		
≤5	13	27.08
6 - 10	27	56.25
>10	8	16.67
Postoperative Quality of Life Score (n = 48)		
0	22	45.83
1	26	54.17

Continued

Postoperative Qmax (n = 48)		
≤18	12	25
19 - 22	20	41.67
23 - 26	6	12.50
>26	10	20.83
Postoperative Complications (n = 52)		
No	48	92.31
Yes	4	7.69

Certain parameters were between patients in whom EVOP was successful and those who experienced ARR as a postoperative complication. They were age, prostate volume, and surgery duration. The mean age of those who successfully underwent surgery was 70.17 years ± 8.12 years, which was lower than the 71.5 years ± 6.25 years for those with postoperative complications. However, the difference was not statistically significant (P = 0.75). The mean prostate volume of those who successfully underwent surgery was significantly smaller than that of those who experienced postoperative complications (52.92 ± 11.30 vs. 75.75 ± 2.99, P < 0.001). The mean surgery duration was lower for successful surgery than for surgery with postoperative complications (64.81 ± 14.21 vs. 95.75 ± 17.29, P < 0.001).

4. Discussion

We conducted this retrospective study to evaluate the results of endoscopic prostate vaporization in a Urology center in Douala, Cameroon. The mean age of our 52 participants was 70.27 years ± 7.95 years, which aligns closely with studies on minimally invasive prostate treatments for prostatism, where patients typically present in the seventh or eighth decades of their lives. This reflects the age-related progression of prostatism [15]. In randomized trials pitting TURP against photoselective vaporization of the prostate, the mean age ranges from 65.7 years to 76.1 years across groups, highlighting a shared demographic profile. The mean age of our participants positions EVOP as directly relevant to the typical prostatism surgical candidate, especially in resource-constrained settings like Cameroon, where elderly men often endure advanced LUTS before intervention [16] [17]. The median prostate volume was 55 [44.5 - 64] ml, a figure that encapsulates the moderate glandular enlargement typical of patients selected for EVOP. This volume aligns with established benchmarks from laser-based anti-prostatism interventions, where studies report medians ranging from 45 to 65 ml for techniques akin to EVOP, including photoselective vaporization and thulium laser vaporization [16] [18] [20]. By contrast, the TURP series often encompasses larger glands (median volumes of 60 - 80 ml). Thus, our findings underscore the versatility of EVOP across mid-range volumes without necessitating enucleation for smaller prostates [19]

[20]. Prostate size profile is clinically relevant, especially when juxtaposed against TURP's established gold standard. The efficacy of EVOP in vaporizing 55-ml glands rivals TURP's tissue removal rates while sidestepping the latter's irrigation-related hyponatremia risks, a coveted advantage for outpatient settings in low-resource locales like our Cameroonian hospitals. Patients with moderate prostate enlargement, who are often comorbid elderly people, stand to gain a lot from the practicability of EVOP, fostering more rapid symptom relief and societal reintegration amid LUTS burdens [20] [21]. In our cohort, the mean preoperative hemoglobin level was 12.08 g/dL ± 1.63 g/dL, and 36.54% of patients had hemoglobin levels below 12 mg/dL. This patient profile mirrors the hematological challenges prevalent in cohorts of patients with prostatism from sub-Saharan Africa, where chronic LUTS often coexist with iron deficiency anemia, malaria sequelae, or other comorbidities driving preoperative anemia. The issue of anemia in this cohort underscores the real-world frailty of patients in resource-limited settings and highlights the hemostatic advantage of EVOP over TURP, as highlighted by the fact that only four of the 52 patients required a blood transfusion postoperatively. TURP, on the other hand, is associated with comparatively higher transfusion rates [19] [22]. Another remarkable finding was the fact that the maximum indwelling urinary catheter duration following EVOP was three days, a testament to the procedure's rapid epithelialization and minimal thermal injury to the prostatic fossa. This benchmark outshines traditional TURP, which is associated with mean catheterization intervals of 4.4 - 5.3 days, often due to resection-related bleeding and irrigation-induced edema [11] [13] [23]. Clinically, this compressed timeline bears transformative implications, especially for anemic or comorbid septuagenarians in resource-limited settings, where prolonged catheterization fosters UTIs and bed immobilization strains overburdened wards. By capping catheterization at three days, EVOP accelerates ambulation and discharge, slashing hospital-acquired morbidity while mirroring TURP's durable voiding gains. For prostate glands with medium enlargement, EVOP carves a unique niche as an ambulatory-friendly rival, ideal for high-volume public hospitals where TURP's 1 - 2-week patient retention may slow down patient turnover [13] [23]. The patients who successfully underwent EVOP with no postoperative complications were younger than those who experienced postoperative complications, although the difference was not statistically significant. This lack of statistical significance was probably due to our small sample, as we had only four cases of postoperative complications. Prostate volume was significantly smaller among those who did not experience postoperative complications, positioning EVOP as the ideal surgical technique for 40 - 80 ml prostates. This also signals that larger prostate glands exact steeper vaporization demands, making the technique less ideal for extremely voluminous glands [22]. The surgery duration also mirrored this trend, as procedures that ended up in postoperative complications took significantly longer than hitch-free ones, likely reflecting prolonged energy delivery and irrigation in cases of voluminous prostates. These findings dovetail with TURP analogs, where glands exceeding 70 - 80 ml in volume correlate with doubled complication odds [24]. Clinically, these metrics sharpen patient selection:

for patients with 40 - 60 ml prostates, EVOP is associated with short postoperative hospitalization, rapid societal reintegration, and few postoperative complications [25], which is ideal for low-resource settings like Cameroon.

5. Conclusion

EVOP is a suitable mini-invasive procedure for the management of prostatism, especially for patients whose prostate enlargement is moderate. Its advantages include short postoperative hospitalization, brief catheterization periods, few postoperative complications, and rapid societal integration, which are soothing for both patients and health facilities in a low-resource setting. Nevertheless, this study had some limitations that should be acknowledged. First, the small sample size reduces the power of the study and hinders the generalizability of our findings. Second, it was conducted at a single urology center in Douala, which means the study population may not be very representative of the Cameroonian population. Third, being a retrospective study, it was prone to recall bias, and there was no long-term follow-up of study participants to ascertain the absence of late postoperative complications. However, irrespective of these limitations, our study successfully identifies EVOP as a suitable mini-invasive surgical technique for elderly patients with prostatism due to moderately enlarged prostate glands.

Authors' Contributions

CK, DEE, and AK conceived the study and guided data collection; MT, BA, and HEMM wrote the first draft of the manuscript under the supervision of CK and DEE. AK, BA, DEE, and MT participated in data analysis and interpretation; CK, AK, and HEMM critically reviewed the manuscript for important intellectual content. All authors have read and approved the final manuscript.

Informed Consent

The need for written informed consent was waived due to the retrospective nature of the study.

Ethics Statement

Ethics approval for this study was granted by the institutional review board of Saint Cyr Endoscopy Urology Center. All data were collected anonymously, and no identifying information was entered in the study database.

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Availability of Data and Materials

The datasets during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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