Original article

Fiber laser enucleation of the prostate (ThuFLEP): learning curve and early surgical experience in a training program

Enucleación de próstata con láser de fibra de tulio: curva de aprendizaje y experiencia inicial en un programa de entrenamiento

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Abstract

Objective: to describe the initial experience and evaluate the learning curve of Thulium Fiber Laser Enucleation of the Prostate (ThuFLEP) in a training program.
Methods: an ambispective study included consecutive patients with benign prostatic enlargement who underwent ThuFLEP between March 2024 and January 2025. Collected variables included demographics, operative times, enucleation and morcellation efficiency, perioperative complications, and functional outcomes at 3 months. Learning progression was assessed using linear regression of enucleation efficiency and operative time across consecutive cases, and by stratifying patients into quartiles according to case order.
Results: thirty-eight patients were included. Mean prostate volume was 74.5 ± 19.6 g, and mean operative time was 83.6 ± 40.3 minutes. Mean enucleation efficiency was 0.75 ± 0.30 g/min. Total operative time decreased by approximately 3 minutes per case ($p < 0.01$). Most complications were low grade (Clavien-Dindo grade I–II). Significant improvement at 3 months was observed in PSA, IPSS, QoL, and PVR (all $p < 0.0001$). Operative proficiency reached around case 10-20.
Limitations of this study: small sample size, ambispective design, and lack of a comparative group.
Originality: this is the first Mexican study describing early experience and the learning curve of ThuFLEP in a training program.
Conclusions: ThuFLEP shows a reproducible learning curve in a supervised training environment. Its safety profile, hemostatic properties, and predictable tissue interaction support its use as a technique for surgical education.

Key words: ThuFLEP, Learning Curve, Prostate Laser Enucleation

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Citation: García-Saucedo J., Zapata-González J. A., Robles-Torres J. I., González-Garza R., Maldonado-Calderón J. L., Gutiérrez-González A. *Fiber laser enucleation of the prostate (ThuFLEP): learning curve and early surgical experience in a training program. Rev Mex Urol. 2026;86(1):*1-13.

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Received: December 19, 2025
Accepted: January 29, 2026

Resumen

Objetivo: describir la experiencia inicial y evaluar la curva de aprendizaje de Enucleación Prostática con Láser de Fibra de Tulio (ThuFLEP) en un programa de entrenamiento.

Métodos: estudio ambispectivo que incluyó pacientes consecutivos con agrandamiento prostático benigno sometidos a ThuFLEP entre marzo 2024 y enero 2025. Se recolectaron variables demográficas, tiempos operatorios, eficiencia de enucleación y morcelación, complicaciones perioperatorias y resultados funcionales a los 3 meses. La progresión de la curva de aprendizaje se evaluó mediante regresión lineal de la eficiencia de enucleación y del tiempo quirúrgico a lo largo de los casos consecutivos, así como mediante la estratificación por cuartiles según el orden de los procedimientos.

Resultados: se incluyeron 38 pacientes. El volumen prostático medio fue de 74.5 gr ± 19.6 gr. y tiempo operatorio promedio fue de 83.6 ± 40.3 min. La eficiencia promedio de enucleación fue de 0.75 ± 0.30 gr/min. El tiempo quirúrgico total disminuyó aproximadamente 3 minutos por caso ($p < 0.01$). La mayoría de las complicaciones fueron de bajo grado (Clavien-Dindo I-II). Se observó una mejoría significativa postquirúrgica a los 3 meses en APE, IPSS, QoL y VRP. La mejoría en desempeño quirúrgico se alcanza entre los 10-20 casos consecutivos.

Limitantes del estudio: tamaño de muestra pequeño, diseño ambispectivo y ausencia de grupo comparativo.

Originalidad: este es el primer estudio mexicano que describe la experiencia inicial y curva de aprendizaje de ThuFLEP en un programa de entrenamiento.

Conclusión: ThuFLEP presenta una curva de aprendizaje reproducible en un entorno de entrenamiento supervisado. Su perfil de seguridad, propiedades hemostáticas e interacción tisular predecible respaldan su utilidad como técnica para la formación quirúrgica.

Palabras clave: ThuFLEP, curva de aprendizaje, enucleación prostática con lásera

Introduction

Endoscopic enucleation of the prostate (EEP) is currently recognized as one of the most effective surgical treatments for lower urinary tract symptoms (LUTS) secondary to benign prostatic enlargement (BPE).[1] Initially adopted for large prostate glands due to its superior hemostasis control and efficient adenoma removal, EEP has progressively expanded its indications.

currently recommended by international guidelines for prostates of all sizes because of its durability and safety profile.[1]

Current international guidelines recommend endoscopic enucleations as a first-line surgical option for prostates of all sizes, owing to its durable functional outcomes, low retreatment rates, and favorable safety profile when compared with transurethral resection of the prostate (TURP) and open simple prostatectomy.[2]

Since the introduction of holmium laser enucleation of the prostate (HoLEP) in 1980, continuous technological advancements have driven the development of alternative energy sources aimed at improving surgical precision, efficiency, and safety.[3] Thulium-YAG lasers were introduced in 2010, followed by the emergence of Thulium Fiber Laser (TFL) systems in 2015.[4] Owing to its unique physical properties – including a wavelength of 1940 nm, low pulse energy, high frequency, and minimal tissue penetration – TFL provides excellent cutting and coagulation capabilities with reduced retropulsion and improved endoscopic visibility.[4]

The clinical applicability of TFL for prostate enucleation was first highlighted in 2018, when Enikeev *et al*. demonstrated that thulium fiber laser enucleation of the prostate (ThuFLEP) offered efficient adenoma dissection, superior hemostasis, and smooth tissue interaction when compared with established enucleation techniques. These characteristics are particularly advantageous in training environments, where clear visualization of the capsular plane and controlled tissue handling are essential for safe skill acquisition.[5]

Compared with holmium: YAG systems, TFL operates at lower pulse energy while maintaining higher repetition rates, resulting in more stable vaporization and coagulation. In addition, TFL platforms are diode-based, compact, and energy-efficient, requiring less cooling infrastructure.[4] These features have facilitated their increasing adoption across urologic centers worldwide, including academic institutions and training programs.[6–8]

Despite the growing use of ThuFLEP, the learning curve associated with this technique remains a critical consideration, particularly in real-world training settings.[7] Endoscopic enucleation is known to be technically demanding, and the process by which trainees achieve procedural proficiency has important implications for patient safety, operative efficiency, and functional outcomes. While several studies have explored learning curves for HoLEP and other enucleation modalities, data specifically addressing the learning curve of ThuFLEP within structured mentorship programs remain limited, especially in Latin American and Mexican training contexts.[6,9]

Therefore, the present study aims to describe the initial surgical experience and evaluate the learning curve of ThuFLEP performed by a urology fellow under structured supervision. By analyzing operative efficiency, perioperative safety, and short-term functional outcomes across consecutive cases.

Materials and methods

Study design and setting

An ambispective observational study was conducted including consecutive patients with BPE who underwent ThuFLEP between March 2024 and January 2025 at *Hospital Universitario "Dr. José Eleuterio González", Universidad Autónoma* *de Nuevo León, México*. The study was approved by the Institutional Ethics Committee, and all procedures were performed in accordance with the Declaration of Helsinki.

Patient selection

Eligible patients were men aged ≥18 years with a clinical diagnosis of BPE and moderate to severe LUTS. Indications for surgery included failure of medical therapy, and/or the presence of an indwelling urethral catheter due to acute urinary retention. All patients were required to have a minimum postoperative follow-up of 3 months. Exclusion criteria included a history of prior urethral surgery and a confirmed or suspected diagnosis of prostate cancer.

Surgical technique

All procedures were performed by a urology fellow within a structured training program, under the direct supervision of an experienced mentor. Anticoagulant and antiplatelet medications were managed according to current guidelines and individual drug recommendations. Standard perioperative antibiotic prophylaxis was administered in all cases.

ThuFLEP was performed using a 26-Fr continuous-flow laser resectoscope (Karl Storz, Tuttlingen, Germany) and a TFL system (Fiberdust®, Quanta Systems, Italy), with a 550 µm laser fiber. Enucleation was carried out using the en-bloc technique with early apical release, followed by stepwise adenoma dissection along the anatomic capsular plane. Laser settings were 30 W (1.0 J × 30 Hz) for enucleation and 60 W (1.2 J × 50 Hz) for hemostasis.

Morcellation was performed using a 26-Fr nephrocystoscope sheath with a Hawk® oscillating morcellator. At the end of the procedure, meticulous hemostasis was confirmed, and a three-way catheter was placed with continuous bladder irrigation.

Data collection and analysis

Collected variables included demographic characteristics, comorbidities, preoperative clinical parameters, operative data, and postoperative outcomes. Operative variables comprised total operative time, enucleation time, morcellation time, enucleated tissue weight, and calculated enucleation and morcellation efficiency (expressed as grams per minute).

Postoperative complications were recorded and classified according to the Clavien-Dindo grade. Functional outcomes were assessed preoperatively and at 3 months postoperatively, including prostate-specific antigen (PSA), International Prostate Symptom Score (IPSS), quality of life (QoL) score, and postvoid residual urine volume (PVR).

Learning curve assessment

To evaluate the learning curve, cases were analyzed sequentially according to surgical order. Enucleation efficiency, morcellation efficiency and operative time were assessed across consecutive cases using ANOVA of repeated measures and Friedman Test. In addition, patients were stratified into quartiles based on case order (Q1-Q4) to explore trends in operative performance and functional outcomes throughout the learning process. A Post Hoc analysis was used to determine the case at which a significant difference was observed.

Statistical analysis

Statistical analyses were performed using SPSS version 23.0 (IBM Corp., Armonk NY, USA). Continuous variables are reported as mean ± standard deviation, and categorical variables as absolute values and percentages. Paired comparisons between preoperative and postoperative functional outcomes were performed using T test or ManWhitney U test. Linear regression analysis was used to evaluate the association between case number and enucleation efficiency. A p value <0.05 was considered statistically significant.

Results

Patient characteristics and baseline data

A total of 38 patients were included in the analysis. Baseline demographic and clinical characteristics are summarized in Table 1.

Table 1. Demographic characteristics.

Patiens (38)	Mean ± SD / n (%)
Age (years)	70.5 ± 7.8
Comorbidities	
Hypertension, n (%)	15 (37.5 %)
Diabetes mellitus, n (%)	9 (22.5 %)
Medical history	
Prior endoscopic prostate surgery, n (%)	1 (2.5 %)
Alpha blocker therapy, n (%)	34 (85 %)
5-alpha-reductase inhibitor therapy, n (%)	15 (37.5 %)
Dual therapy, n (%)	13 (32.5 %)
Previous Urethral catheter user, n (%)	13 (32.5 %)
Patients on anticoagulation, n (%)	5 (12.5 %)
Baseline data	
Prostate volume (g), mean ± SD	74.5 ± 19.6
IPSS, mean ± SD	22.87 (± 6.3)
PSA, mean ± SD	3.7 (± 3.3)
PVR (mL), mean ± SD	127.8 (±53.3)
QoL, mean ± SD	5.2 (± 0.9)
Operative data	
Total operative time (min), mean ± SD	83.6 (± 40.3)
Enucleation tme (min), mean ± SD	72.0 (± 37.8)
Morcelation time (min), mean ± SD	9.9 (± 8.5)
Enucleated volume (g), mean ± SD	59.16 (± 19.1)

Abbreviations: SD = Standard deviation; g = grams; IPSS = International Prostate Symptoms Score; PSA = Prostate-specific antigen; PVR = post-void residual volume; QoL = Quality of life

The mean age was 70.5 ± 7.8 years. Hypertension was the most frequent comorbidity, present in 15 patients (37.5 %) followed by diabetes mellitus in 9 patients (22.5 %).

Most patients were receiving alpha-blocker therapy preoperatively (34 patients, 85 %), while 15 patients (37.5 %) were on 5-alpha-reductase inhibitors. Dual medical therapy was documented in 13 patients (32.5 %). A history of prior endoscopic prostate surgery was uncommon (1 patient, 2.5 %). Thirteen patients (32.5 %) had a history of urethral catheterization due to urinary retention, and 5 patients (12.5 %) were receiving anticoagulation therapy at the time of surgery.

Baseline functional parameters showed a mean prostate volume of 74.5 ± 19.6 g. The mean preoperative International Prostate Symptom Score (IPSS) was 22.7 ± 6.3, indicating severe LUTS. Mean prostate-specific antigen (PSA) level was 3.7 ± 3.3 ng/dL. The mean postvoid residual volume value (PVR) was 127.8 ±53.3, and baseline Quality of life (QoL) score was 5.2 ± 0.9.

Operative outcomes

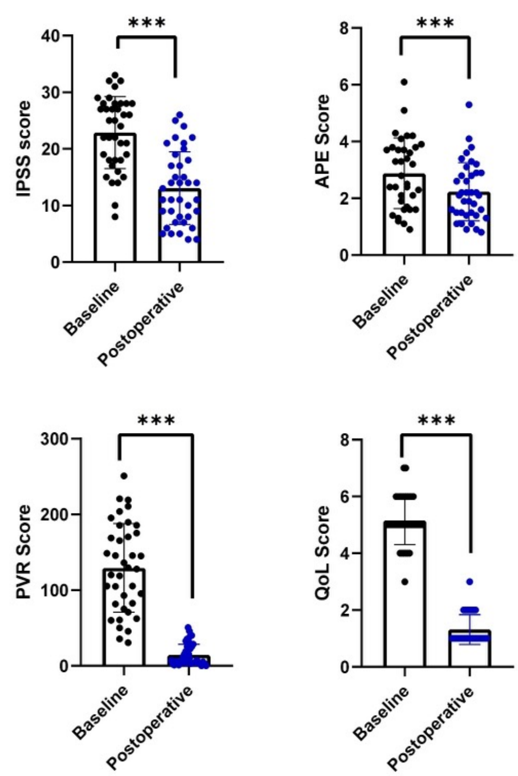
Operative data is detailed in Table 1. The mean total operative time was 83.6 ± 40.3 minutes. Mean enucleation time 72.0 ± 37.8 minutes, while mean morcellation time was 9.9 ± 8.5 minutes. The mean enucleated prostate volume was 59.16 ± 19.1 g.

Mean enucleation efficiency was 0.75 ± 0.30 g/min. No cases of deferred morcellation, bladder injury, or ureteral orifice injury were observed.

Functional outcomes

Paired comparisons between baseline and postoperative values demonstrated significant functional improvement at 3 months in IPSS, PSA and PVR (p<0.01, showed in **Figure 1**).

Figure 1. Comparison of baseline and postoperative outcomes



Paired analyses were performed to compare baseline and postoperative measurements. IPSS, PSA, and PVR were analyzed using the paired Student's t test, while QoL was analyzed using the Wilcoxon matched-pairs signed-rank test due to its ordinal distribution.

Abbreviations: Q = quartile; PSA = Prostatic-specific antigen; IPSS = International Prostatic Symptoms Score; PVR = post-void residual volume; QoL = quality of life; *** = significant postoperative improvement (P<0.0001)

Learning curve analysis

Learning curve assessment demonstrated progressive technical improvement over consecutive cases. Postoperative PSA and QoL did not show any significant difference across Q1-Q4 patients (p=0.257 and p=971, respectively). Postoperative IPSS and PVR reported significant decreased between groups (p=0.016 and p=0.0127, respectively). A Post Hoc analysis determined that IPSS show a significant reduction after 20 cases, and PVR decreased significantly after 30 cases (**Table 2**).

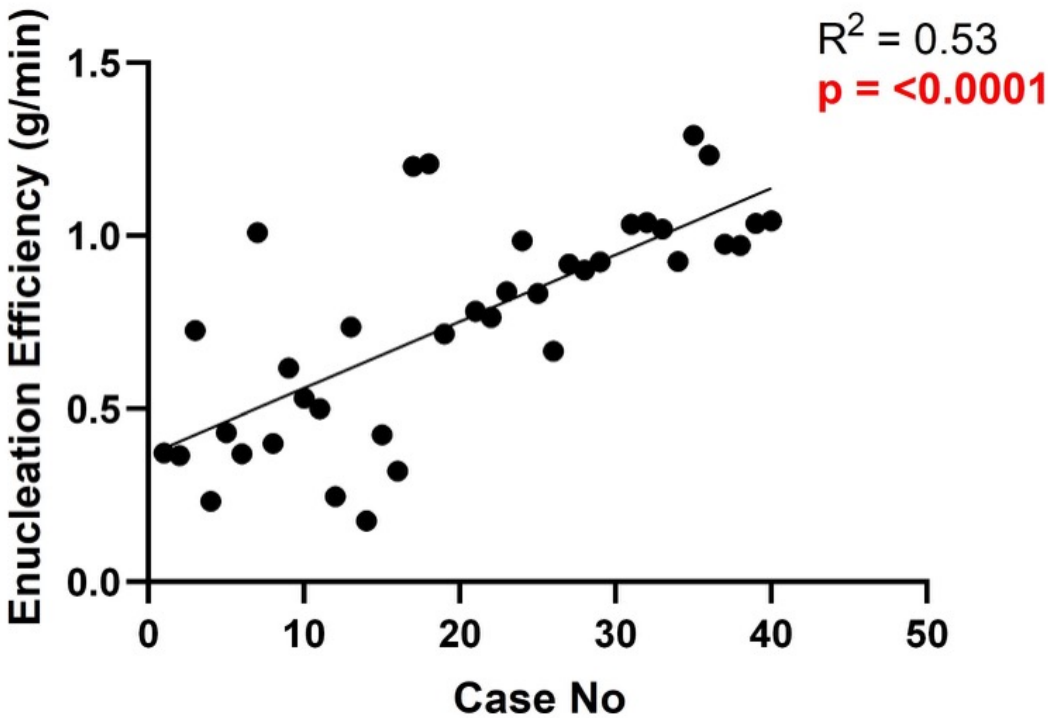
Table 2. Comparative analysis divided by consecutive cases

Variable (mean ± SD/*median (IQR))	Q1 (1-10)	Q2 (11-20)	Q3 (21-30)	Q4 (31-40)	p value
PSA Baseline	6.13 ± 5.06	3.26 ± 2.87	2.95 ± 1.04	2.20 ± 1.15	
PSA Postoperative	3.13 ± 1.13	2.42 ± 2.43	2.03 ± 0.64	2.00 ± 0.99	0.257
p value	0.06	**0.002**	**0.0009**	0.07	
IPSS Baseline	25.50 ± 4.40	25.50 ± 5.91	18.90 ± 7.62	21.25 ± 4.95	
IPSS Postoperative	15.20 ± 4.26	15.50 ± 7.82	10.30 ± 6.58	10.88 ± 5.35	**0.016**[a]
p value	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	
PVR Baseline	127.80 ± 44.92	137.30 ± 63.52	133.50 ± 72.62	116.4 ± 56.67	
PVR Postoperative	12.80 ± 14.35	17.29 ± 16.50	15.25 ± 14.96	11.98 ± 12.38	**0.0127**[b]
p value	<0.0001	<0.0001	0.0003	0.0024	
***QoL Baseline**	5 (4-6)	5 (4-6)	5 (3-6)	5 (4-6)	
***QoL Postoperative**	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)	0.971[+]
p value	**0.002**	**0.002**	**0.002**	**0.007**	
Enucleation Efficiency (g/min)	0.489 ± 0.254	0.604 ± 0.408	0.854 ± 0.102	1.063 ± 0.128	**<0.001**[c]
Morcelation Efficiency (g/min)	3.015 ± 0.504	6.878 ± 6.429	5.865 ± 2.154	7.935 ± 3.688	**0.047**[d]
Surgical Time (min)	161.38 ± 30.02	108.88 ± 37.07	71.24 ± 15.53	65.25 ± 9.36	**<0.001**[e]

Abbreviations: SD = standard deviation; IQR = interquartile range; Q= quartile; PSA = Prostate-specific Antigen; IPSS = International Prostate Symptoms Score; QoL = Quality of life; PVR = post-void residual volume. T-test was used comparing baseline vs postoperative variables. *ManWhitney-U test was used. ANOVA of repeated measures was applied to determine difference between consecutive groups. [+] Friedman test was used. Post Hoc analysis determines that significant difference (p<0.05) was obtained after [a,c]20 procedures, [b]30 procedures, and [d,e]10 procedures.

Enucleation and morcellation efficiency reported significant increase among groups Q1 – Q4 ($p<0.001$ and $p=0.047$, respectively). Surgical time also reported a significant reduction among groups ($p<0.001$). In the Post Hoc analysis, significant improvement in enucleation efficiency was obtain after 20 cases, morcellation efficiency improvement after 10 cases and surgical time reduction after 10 cases **Table 2**. A linear regression showed a constant improvement among consecutive patients ($p < 0.0001$, showed in **Figure 2**).

Figure 2. Learning curve analysis of enucleation efficiency acr consecutive cases



Linear regression analysis showing the association between case number and enucleation efficiency, calculated as enucleated prostate volume (g) divided by enucleation time (min). A significant positive correlation was observed, indicating progressive improvement in surgical efficiency with increasing case number ($R^2 = 0.53$, $P < 0.0001$). Each dot represents an individual case.

Complications

Perioperative complications are summarized in **Table 3**.

Table 3. complications divided by groups of consecutive cases

	All (38)	Q1 (1-10)	Q2 (11-20)	Q3 (21-30)	Q4 (31-38)
Complications					
Clotting, n (%)	3 (7,89 %)	1 (10 %)	1 (10 %)	1 (10 %)	0 (0 %)
UUI, n (%)	9 (23,6 %)	3 (30 %)	3 (30 %)	1 (10 %)	2 (25 %)
<30 days	7 (18,4 %)	2 (20 %)	2 (20 %)	1 (10 %)	2 (25 %)
>30 days	2 (5,28 %)	1 (10 %)	1 (10 %)	0 (0 %)	0 (0 %)
UTI, n (%)	2 (5,28 %)	0 (0 %)	2 (20 %)	0 (0 %)	0 (0 %)
Urethral stricture, n (%)	2 (5,28 %)	2 (20 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bladder and ureteral meatus injury, n (%)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Delayed morcelation, n (%)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Capsule perforation, n (%)	4 (10 %)	3 (30 %)	1 (10 %)	0 (0 %)	0 (0 %)
Clavien-Dindo classification, n (%)	20 (52,6 %)	9	7	2	2
I	16 (80 %)	7	5	2	2
II	2 (10 %)	2	0	0	0
III	1 (5 %)	0	1	0	0
IV	1 (5 %)	0	1	0	0

Abbreviations: PSA = Prostate-specific Antigen; IPSS = International Prostate Symptoms Score; QoL = Quality of life; PVR = post-void residual volume; UUI = Urge urinary incontinence; UTI = Urinary tract infection

The overall complication rate was 52.6 %, with most events classified as low-grade complications (Clavien-Dindo I-II). Transient urgency urinary incontinence was the most common complication occurring in 23.6 % of patients.

Capsular perforation was observed predominantly during the initial learning phase, occurring in 30 % of patients in Q1 and decreasing progressively across subsequent quartiles, with no cases observed in Q3 or Q4. No major intraoperative complications or early reinterventions were recorded.

Discussion

This study demonstrates that ThuFLEP presents a reproducible and favorable learning curve when implemented within a structured training program. Our results provide a comprehensive assessment of technical progression, safety, and short-term functional outcomes during early surgical experience.

A progressive improvement in enucleation efficiency and a concomitant reduction in operative time was observed across consecutive cases, confirming a clear learning curve effect.[6,9] Linear regression analysis revealed a strong positive association between case number and enucleation efficiency, with operative proficiency achieved around case 10-20.

The physical properties of Thulium Fiber Laser technology may play a significant role in facilitating this learning process. Compared with holmium: YAG systems, TFL operates at lower pulse energy and higher frequencies, resulting in reduced retropulsion, smoother tissue interaction, and improved endoscopic visibility. These characteristics are particularly advantageous in training environments, where clear identification of the capsular plane and stable nemostasis are essential for safe anatomical enucleation. Prior comparative studies have suggested that these features may contribute to a shorter and more intuitive curve for ThuFLEP compared with other enucleation modalities.[5,7]

Importantly, clinically meaningful functional improvements were observed early in the learning process. Significant postoperative reductions in IPSS, PVR, and QoL were evident across all quartiles, including the earliest cases, as demonstrated by the quartile-based analysis of baseline and postoperative outcomes. These findings suggest that, under appropriate supervision, ThuFLEP can deliver consistent patient-centered benefits even during the initial phase or surgical training. This observation has important implications for academic programs, as it supports the feasibility of introducing ThuFLEP without compromising short-term functional outcomes.

Similar observations have been reported in previous learning-curve studies of laser enucleation, where supervised trainees achieved comparable functional outcomes despite ongoing improvements in operative efficiency.[5,7,10]

In contrast, postoperative PSA reduction showed greater variability among quartiles, reaching statistical significance primarily in the intermediate groups. This heterogeneity likely reflects differences in baseline PSA levels, prostate size, and completeness of adenoma removal during early experience, rather than a limitation of the technique itself. Similar patterns have been reported in learning curve analysis of HoLEP and ThuFLEP, where PSA reduction stabilizes as surgical efficiency and anatomical dissection improve with experience.[5,7]

The observed improvement in enucleation efficiency over time is consistent with findings reported by Al Barajraji et al., who demonstrated progressive reductions in operative time and increased efficiency across consecutive ThuFLEP cases, with proficiency achieved after approximately 25 cases.[7] Likewise, Enikeev *et al*. reported that ThuFLEP exhibited a shorter learning curve compared with HoLEP and mechanical enucleation when performed under a mentoring model, largely attributable to improved visibility, smoother tissue interaction, and stable vaporization characteristics of TFL technology.[5] These findings support the notion that ThuFLEP facilitates faster acquisition of enucleation skills without compromising safety.

Beyond perioperative efficiency, endoscopic enucleation techniques have demonstrated superior long-term durability compared with resection-based procedures, with lower retreatment rates and sustained functional outcomes beyond 5 and 10 years of follow-up.[11] These characteristics further support the role of ThuFLEP as an ideal platform for surgical training, as the skills acquired translate into durable patient benefits.

The safety profile observed in this study further supports the suitability of ThuFLEP for training environments. Although the overall complication rate was 52.6 %, most events were low-grade Clavien–Dindo I–II, with transient urgency urinary incontinence being the most frequent finding. Notably, capsular perforations occurred predominantly in the first quartile and were absent in later cases, underscoring the impact of experience accumulation and mentorship on procedural safety.

Previous analyses of laser enucleation learning curves have consistently shown that early complications are generally mild and decline rapidly as experience increases, particularly in supervised settings. Our findings are concordant with these reports and reinforce the importance of structured mentorship in minimizing risk during the learning phase. No major intraoperative injuries, deferred morcellation, or early reinterventions were observed, underscoring the safety of ThuFLEP even during the initial learning phase.

Prostate size has been shown to influence operative time during the early learning phase of enucleation; however, once technical proficiency is achieved, enucleation efficiency becomes largely independent of gland volume. This finding highlights the importance of early exposure to a broad range of prostate sizes within structured training programs.[12]

The excellent hemostatic profile of TFL-based enucleation is particularly relevant in patients receiving anticoagulant or antiplatelet therapy, in whom laser enucleation has consistently demonstrated low transfusion rates and acceptable perioperative safety, even during early surgical experience.[13]

The structured mentorship model employed in our program—combining theoretical instruction, expert case observation, and supervised hands-on performance—played a decisive role in accelerating skill acquisition and reducing intraoperative variability. Mentorship has been identified as a crucial factor in achieving early procedural competence and minimizing the risk of complications during the learning phase.[14]

From an educational perspective, ThuFLEP offers several advantages for trainees, including enhanced endoscopic orientation, clearer identification of the capsular plane, and reduced visual obstruction due to bleeding. These factors contribute to improved confidence during early cases and may shorten the transition from supervised to independent practice.

Importantly, the reproducibility of the learning curve observed in this cohort suggests that favorable outcomes with ThuFLEP are not limited to high-volume expert centers. When performed within a structured mentorship framework, comparable safety, efficiency, and functional outcomes can be achieved in academic training environments, supporting broader dissemination of the technique

Conclusion

ThuFLEP is a safe, efficient, and highly suitable technique for training in endoscopic enucleation of the prostate. Under a structured mentorship, surgical proficiency is typically achieved after 10 to 20 cases in our center. A structured surgical training program demonstrated consistent improvement in operative efficiency, low complication rates, and significant postoperative functional benefits, supporting its integration into contemporary urologic training programs.

Acknowledgments

The authors thank the Department of Urology and the Minimally Invasive and Robotic Surgery Program at Hospital Universitario "Dr. José Eleuterio González" for their continuous academic support. We particularly acknowledge Dr. José Antonio Zapata González for his supervision of all surgical procedures, mentorship throughout the ThuFLEP training process, and contribution to the development of this study. We also thank the nursing staff and operating room personnel for their assistance during all procedures.

Ethical considerations

The study was approved by the Ethics and Research Committee of the University Hospital "Dr. José Eleuterio González", Universidad Autónoma de Nuevo León, and conducted in accordance with the Declaration of Helsinki

Conflicts of interest

The authors declare no conflicts of interest.

Funding

This research received no external funding.

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