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Preliminary Outcomes of Laser Hemorrhoidoplasty for Hemorrhoidal Disease at Hanoi Medical University Hospital

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ABSTRACT

Background: Hemorrhoids are among the most common anorectal diseases, significantly affecting patients' quality of life. Currently, laser hemorrhoid surgery has been widely adopted worldwide due to its advantages of being minimally invasive, reducing postoperative pain, accelerating recovery, and lowering complication rates. At Hanoi Medical University Hospital, this technique has been routinely performed since September 2023. *Objective:* To evaluate the preliminary outcomes of laser hemorrhoidoplasty (LHP) at Hanoi Medical University Hospital.
Methods: A retrospective descriptive study was conducted on 257 patients undergoing LHP from September 2023 to December 2024.
Results: The mean age was 44.93 ± 14.46 years (range 17–84); 51.4% were male and 48.6% female. Emergency surgery accounted for 6.2% (16 cases). According to the BPRST classification: B0 (97.3%), P2 (99.2%), R1 (91.4%), S0 (80.5%), and T0 (96.5%). Based on the Goligher system, grade III accounted for 91.4% and grade IV for 8.6%. The mean number of hemorrhoidal piles treated was 3.54 ± 0.75; mean laser energy delivered was 990.63 ± 286.42 J. Associated lesions included rectal mucosal prolapse (12.1%) and anal polyps/papillomas (10.5%). Mean operative time was 33.5 ± 10.65 minutes; mean hospital stay was 1.19 ± 0.52 days. Postoperative pain scores (VAS) decreased from 2.62 ± 1.15 on day 1 to 0.06 ± 0.24 at 3 months. Postoperative complications included bleeding (5.1%) and urinary retention (3.1%); no cases of thrombosis, anal stenosis, or abscess were recorded. The recurrence rate was 5.83% during a mean follow-up of 13.31 months.
Conclusions: LHP provides significant pain reduction, short hospital stay, and low intra-operative and postoperative complication rates, even in emergency cases.
Keywords: laser, hemorrhoid surgery, hemorrhoidoplasty, minimally invasive

INTRODUCTION

Hemorrhoids are among the most common anorectal disorders, presenting with symptoms such as bleeding, prolapse, pruritus, and anal pain, all of which significantly impair quality of life. Recent epidemiological studies have reported prevalence rates ranging from 13.29% to 34.7% in adults, with variations

according to sex and associations with risk factors such as chronic constipation, low-fiber diet, and obesity (1-3). For decades, classical hemorrhoidectomy techniques such as Milligan-Morgan and Ferguson have been considered the standard surgical procedures for the treatment of hemorrhoidal disease. However, these methods are often associated with significant post-operative pain, prolonged recovery time, and a considerable rate of complications, including bleeding, anal stenosis, and sphincter dysfunction (4). In recent years, the surgical management of hemorrhoidal disease has shifted from traditional invasive procedures toward minimally invasive techniques, including Radiofrequency Hemorrhoidoplasty (RFH) and Laser Hemorrhoidoplasty (LHP). The primary goals are to reduce postoperative pain, shorten recovery time, and improve patients' quality of life, while maintaining long-term therapeutic efficacy (5,6). At Vietnam's Hanoi Medical University Hospital, Laser Hemorrhoidoplasty (LHP) has been routinely implemented since September 2023. Evaluating its early outcomes is essential to provide scientific evidence on efficacy and safety, while also guiding long-term strategies for broader clinical application.

MATERIALS AND METHODS

Study Population

This study included all patients diagnosed with hemorrhoidal disease who were indicated for surgery using the LHP technique at the Department of Colo-proctology and Pelvic Floor Surgery, Hanoi Medical University Hospital, between September 2023 and December 2024.

Inclusion criteria

- Confirmed diagnosis of hemorrhoids with surgi-cal indication (including emergency cases such as bleeding hemorrhoids, thrombosed hemor-rhoids, etc.).
- Patient consent to undergo LHP.
- Complete medical records with sufficient data for analysis.

Exclusion criteria

- Patients with anorectal infections.
- Incomplete medical records.

Study Design

A retrospective descriptive study was conducted on 257 patients who underwent LHP at the Department of Coloproctology and Pelvic Floor Surgery between September 2023 and December 2024.

Data Collection and Statistical Analysis

Data were collected from electronic medical records. All data were entered and analyzed using SPSS version 26.0. Quantitative variables were expressed as mean ± standard deviation (SD) or median (IQR), while qualitative variables were presented as frequencies and percentages. Group comparisons were performed using the Chi-square test or Fisher's exact test for categorical variables, and Student's t-test or Mann-Whitney U test for continuous variables. A p-value of < 0.05 was considered statistically significant.

Ethical Considerations

This retrospective descriptive study used fully anonymized data extracted from patients' electronic medical records and was conducted in accordance with the Declaration of Helsinki 2013. The study was approved by Hanoi Medical University Hospital, and the requirement for individual informed consent was waived due to the retrospective design and use of coded archival data.

RESULTS

General Characteristics of the Study Population (table 1)

Intraoperative and Postoperative Outcomes (table 2)

DISCUSSION

This study is limited by its retrospective, single-center design and the lack of a comparative control group. In addition, postoperative quality-of-life outcomes were not assessed, no multivariate analysis was performed, and the follow-up period was relatively short.

Characteristics of the Study Population

In this study, the mean patient age was 44.93 ± 14.46 years, which is significantly lower than that reported by Islam et al. (2024) in Bangladesh (55.43 ± 13.6 years) (7). This difference may be explained by socioeconomic factors and access to the technique. In Vietnam, the cost of laser hemorrhoidoplasty (LHP) is

Table 1 - Characteristics of the study population

Characteristic		Result
Male : Female ratio		1.06 : 1
Mean age (years)		44.93 ± 14.46 (range 17–84)
Medical history		
Chronic diseases (hypertension, diabetes mellitus, COPD, etc.)		102 (39.6%)
Previous hemorrhoidectomy		15 (5.8%)
Current anticoagulant use		4 (1.6%)
BPRST classification		
B	B0	250 (97.3%)
	B1	7(2.7%)
P	P1	2(0.8%)
	P2	255(99.2%)
R	R1	235(91.4%)
	R2	22(8.6%)
S	S0	207(80.5%)
	S1	55(21.4%)
T	T0	248(96.5%)
	T1	9(3.5%)
Goligher classification		
Grade III		235 (91.4%)
Grade IV		22 (8.6%)
Associated lesions		
Anal fissure		3 (1.2%)
Rectal mucosal prolapse		31 (12.1%)
Anal fistula		3 (1.2%)
Anal polyps/papillomas		27 (10.5%)
Emergency surgery rate		16 (6.2%)

Summary. The male-to-female ratio was 1.06:1. Most patients had Goligher grade III hemorrhoids (91.4%). Rectal mucosal prolapse was the most common concomitant lesion (12.1%). Emergency procedures accounted for 6.2%.

Table 2 - Intraoperative and postoperative outcomes

Mean operative time	33.5±10.65 (range, 10–90) minutes
Mean no. of hemorrhoidal columns treated by laser	3.54 ± 0.75 búi
Mean total laser energy per patient	990.6 ± 286.4 (286.0 – 2249.0) J
Mean laser energy per column	283.19 ± 71.17 J
Concomitant procedures	
Ligation–mucopexy	93 (36.2%)
Excisional hemorrhoidectomy	11 (4.3%)
Excision of skin tags	50 (19.5%)
Excision of anal polyps/papillae	27 (10.5%)
Fistulectom	3 (1.2%)
LHP alone	118 (45.9%)
Length of hospital stay	1.19 ± 0.52 (1-5)
Intraoperative complications	
Bleeding	10 (3.86%)
Mucosal burn	7 (2.72%)
Rectal mucosal perforation	3 (1.17%)
VAS pain score	
Day 1	2.62 ± 1.15
Week 1-2	1.06 ± 1.59
Month 3	0.06 ± 0.24
Mean follow-up months	13.31 ± 3.44
Postoperative complications	
Bleeding	13 (5.1%)
< 1 week	1
> 1 week	12
Urinary retention	8 (3.1%)
Thromboembolism	0
Anal stenosis	0
Anal absces	0
Readmission after surgery	5 (1.9%)
Recurrence	15 (5.83%)
Grade III recurrence	14
Grade IV recurrence	1

Summary: The most common concomitant procedure was ligation–mucopexy (dearterialization) (36.2%). The mean operative time was 33.5 minutes, and the mean length of stay was 1.19 days. The postoperative bleeding rate was 5.1%, and the recurrence rate was 5.83% over a mean follow-up of 13.31 months

approximately USD 800 - about twice that of conventional excisional hemorrhoidectomy - making LHP more commonly chosen by higher-income patients, predominantly those aged 30-50 years. These patients tend to seek medical care earlier at symptom onset, resulting in a lower mean age at surgery. In our cohort, the male-to-female ratio was approximately 1.06:1 (51.4% male). By contrast, classical excisional techniques often show a marked male predominance; for example, in Barman's series of 100 patients undergoing Milligan-Morgan hemorrhoidectomy (MMH), 79% were men and 21% were women (8). Part of this may stem from sex-related differences in pain perception and thresholds; psychophysiological studies have shown that women generally exhibit greater pain sensitivity and are more susceptible to anxiety related to postoperative pain (9). This may make them more cautious when considering conventional invasive procedures, which are typically associated with greater postoperative pain and prolonged recovery. In our study, 39.6% of patients had chronic comorbidities, including cardiovascular disease (19.5%), endocrine disorders (8.6%), respiratory disease (12.8%), renal disease (1.9%), and gastrointestinal disease (2.3%); notably, 1.6% were on preoperative anticoagulation. These findings indicate that LHP is a safe technique that can be applied in patients with chronic conditions or those receiving anticoagulants, without significant systemic impact. Additionally, 5.8% of patients had undergone at least one prior hemorrhoid surgery, yet LHP could still be performed safely and effectively.

In the preoperative assessment, we applied both the Goligher and BPRST classifications in parallel. The Goligher system offers an overarching, easy-to-use staging for patient stratification, whereas BPRST provides a granular appraisal of clinical features-

bleeding, the number of prolapsing columns, reducibility, skin tags, and thrombosis - thereby supporting a tailored surgical choice for each patient (10). In the early phase of adopting LHP, we primarily selected patients with Goligher grade III hemorrhoids (91.4%), with most procedures performed electively (93.8%). Emergency operations accounted for only 6.2%, comprising 2.7% with active bleeding (B1 in the BPRST system) and 3.5% with thrombosed hemorrhoids (T1 in BPRST). Focusing on grade III disease and predominantly planned cases reflects a cautious approach during the initial roll-out of a new technique, enabling surgeons to better control technical variables and limit complications while experience accumulates. Regarding concomitant conditions, the most frequent finding was anal skin tags (21.4%; S1 in BPRST), followed by rectal mucosal prolapse (12.1%) and anal polyps/papillae (10.5%); less common were anal fissures (1.2%) and anal fistula (1.2%). These lesions typically complicate management and are associated with greater postoperative pain and higher complication rates. Owing to its tissue-sparing nature and the absence of open wounds, LHP can address these co-existing lesions in the same setting. This not only reduces postoperative pain, bleeding, and complications but also shortens recovery time and improves patient acceptance. Our findings further support LHP as a flexible and safe modality that can effectively substitute for conventional excisional techniques in the current context.

Intraoperative and Postoperative Outcomes

In our cohort, beyond the subgroup undergoing LHP alone (45.9%), more than half of patients required adjunctive procedures such as ligation-mucopexy/dearterialization (36.2%), excision of skin tags (19.5%), polypectomy/papillectomy (10.5%), or management of concomitant conditions (e.g., anal fistula, anal fissure). The mean operative time was 33.5 ± 10.65 minutes (range, 10-90). Analysis of operative time by procedure showed that LHP alone was the shortest (25.7 ± 6.5 minutes), whereas LHP combined with ligation-mucopexy was the longest (41.2 ± 8.7 minutes); this difference was statistically significant ($p < 0.05$, one-way ANOVA). Compared with international series, the mean operative time in our study was longer: Islam et al. (2024) reported 14.7 ± 4.7 minutes, and Zakaria (2022) reported 12.67 ± 2.28 minutes (7,11). This discrepancy may be explained by several factors: (1) our study was conducted during the initial implementation phase of LHP, when surgeons proceeded more cautiously and

more slowly to ensure safety; (2) patients in our cohort had a larger number of hemorrhoidal columns requiring treatment (mean 3.54 ± 0.75); and (3) a substantial proportion had concomitant lesions requiring additional management (e.g., rectal mucosal prolapse, anal fissure, skin tags, anal fistula), which prolonged operative time. Taken together, LHP yields a relatively short operative time compared with classical excisional techniques; duration depends on surgeon experience, the number of columns treated, and associated lesions, and the procedure is broadly applicable-including in patients with systemic comorbidities. In the meta-analysis by Cheng et al. (2024), LHP demonstrated a clear advantage over conventional hemorrhoidectomy, with a mean reduction in operative time of 12.42 minutes (95% CI, −14.56 to −10.28) (12).

In our study, the mean laser energy delivered per hemorrhoidal column was 283.19 ± 71.17 J, with a mean total energy per case of 990.6 ± 286.4 J, corresponding to an average of 3.54 ± 0.75 columns treated. These values fall within the safety range (≤ 350 J/column) recommended by the LHP Recommendation Development Group, helping to minimize the risk of mucosal burns and other thermal complications (13). Compared with previous studies, Islam et al. (2024) reported a mean energy of approximately 275 J per hemorrhoidal column, and Poskus et al. (2020) reported 250 J per column; our findings are broadly consistent with these results (7,14). Additionally, we recorded intraoperative complications including bleeding (3.86%), mucosal burns (2.72%), and rectal mucosal perforation (1.17%), most of which occurred during the first 50 cases, before completion of the learning curve. Sub-optimal control of laser energy, working distance, and depth of application may result in mucosal burns or perforation. In comparison with international reports, Longchamp et al. (2021) noted an intraoperative bleeding rate of only 0-1.9%, which is markedly lower than that reported for HeLP (5.5-16.7%) (15). Harvitkar (2021) reported a higher intraoperative bleeding rate of approximately 8% (16). Accordingly, both our results and international reports indicate that although the intra-operative complication rate of LHP is within an acceptable range, risks remain - particularly bleeding and mucosal burns. Technical variables - laser energy control, working distance, and depth of application - are decisive for mitigating these events. We therefore recommend strict adherence to the ≤ 350 J per column threshold endorsed by the LHP Recommendation Development Group to minimize mucosal burns and other thermal injuries. In parallel, prudent patient selection (favoring simpler cases during the initial adoption phase) and

vigilant intraoperative monitoring to detect early signs of bleeding or mucosal injury are essential.

In our study, postoperative pain on the visual analogue scale (VAS) averaged 2.62 ± 1.15 on postoperative day 1, declined markedly to 1.06 ± 1.59 at weeks 1-2, and was nearly zero at 3 months (0.06 ± 0.24) - reflecting the sustained analgesic efficacy of LHP. These findings are consistent with the systematic review by Tan et al. (2022), in which LHP was associated with a mean reduction in VAS pain of 2.07 points on day 1, 3.34 points during the first week, and 0.52 points at 1 month compared with conventional surgery (17). In a separate study by Ghani et al. (2025), 90% of patients were pain-free by the end of week 6, underscoring the early and sustained analgesic efficacy of LHP (18). When compared with radiofrequency ablation (RFA), data from a French multicenter study show a median pain score of 4/10 at week 1, falling to 1/10 at week 2 and reaching 0 by weeks 3-4, Similarly, in a two-center study by Tolksdorf et al. (2022), the immediate post-procedure mean VAS score was 2.5 ± 2.7, and approximately 60% of patients required no analgesic medication. Accordingly, both LHP and RFA are associated with low postoperative pain, with rapid improvement within the first 1-2 weeks and sustained long-term relief compared with conventional excisional techniques. Specifically, in Khannan (2010), postoperative VAS was 6.8 ± 1.8 after Ferguson hemorrhoidectomy versus 4.1 ± 0.8 after LigaSure hemorrhoidectomy (p < 0.001) (19). This difference can be attributed to the mechanism of action. Classical excisional techniques such as Ferguson and Milligan-Morgan create large open wounds in the anal canal, exposing numerous sensory nerve endings and provoking a strong inflammatory response; consequently, patients often experience substantial pain, particularly during defecation. Stapled hemorrhoidopexy (PPH) is less painful than MMH/Ferguson because it operates above the dentate line; however, the residual purse-string suture may still cause tension and discomfort. By contrast, LHP and RFA deliver thermal energy selectively to the hemorrhoidal venous plexus without tissue excision or creation of open wounds, thereby limiting neurovascular injury, minimizing sphincter trauma, and shortening recovery time. These features underpin the growing preference for LHP and RFA in contemporary practice.

Postoperative complications. In our series, the postoperative bleeding rate was 5.1% (13/257). One early bleed occurred within the first week in a patient who had developed an intraoperative hematoma; at that early stage of our learning curve we did not place proactive hemostatic sutures, and the patient subsequently underwent rectoscopy with clip application. The remaining 12 cases were late bleeds (>1 week postoperatively) and were managed conservatively; 4/12 required readmission for observation, and none required reoperation. Notably, 10/13 bleeding events occurred within the first 50 cases, and 2/13 involved patients who required postoperative anticoagulation-highlighting the impact of surgeon experience and early anticoagulant use on LHP bleeding risk. Regarding delayed bleeding after LHP, the main mechanisms include: (i) excessive energy delivery causing mucosal necrosis with eschar sloughing, typically on postoperative days 7–10; (ii) injury to submucosal vessels during intraoperative passage of the laser fiber to coagulate the hemorrhoidal cushion; (iii) rectal mucosal perforation; and (iv) systemic factors (coagulopathy, use of anticoagulants/antiplatelet agents). Accordingly, our preventive strategy focuses on technical control: (a) keep the laser-fiber tip in the submucosal plane, track close to the mucosa and angle the needle downward during firing to avoid vascular injury, perforation, and mucosal burns; (b) limit the total energy per pile to approximately ≤300-350 J based on our experience (adjusted for pile size and degree of fibrosis); (c) if a mucosal tear or burn is identified, place an immediate figure-of-eight suture at the site to reduce the risk of delayed bleeding; and (d) optimize hemostasis by appropriately managing antithrombotic therapy according to protocol. Compared with other reports, Porwal's series of 1,088 patients showed early postoperative bleeding in 5.88% and late bleeding in 6.25%. By contrast, Chishti (2024) reported higher postoperative bleeding rates after Ferguson (FH) and Milligan-Morgan (MMH) hemorrhoidectomy (22.6-29.5%), and Rahman (2021) found a higher rate after stapled hemorrhoidopexy (PPH) (25.6%) (20-22). The discrepancy is chiefly attributable to the mechanism of action: classical techniques create large open wounds or involve mucosal resection with a stapler, which more readily injures blood vessels. By contrast, LHP uses laser energy to selectively coagulate and sclerose the hemorrhoidal plexus without leaving an open cut surface, thereby achieving better hemostasis and reducing complications. With respect to postoperative urinary retention, our study recorded a rate of 3.1% (8/257). This is a common event after hemorrhoid surgery and is mainly associated with spinal anesthesia, which can transiently inhibit the sacral roots (S2-S4) that govern bladder function, lowering detrusor tone and making micturition difficult. Additional risk factors include postoperative pain triggering reflex urethral

spasm, excessive intraoperative fluid administration, advanced age, and benign prostatic hyperplasia in men. Compared with other reports, our rate is lower than that of Qing Long (2025) in 127 MMH patients (12.6%). A study on PPH (stapled hemorrhoidopexy) reported a lower rate of urinary retention, and Dung NT et al. (2025) observed a rate of 11.4% in patients undergoing ligation-mucopexy/dearterialization (23,24). All cases in our series recovered spontaneously within 24-48 hours after short-term urinary catheterization, indicating that urinary retention following LHP is typically transient and leaves no long-term sequelae. In addition, we observed no cases of thromboembolism or post-operative anal stenosis.

In our study, with a mean follow-up of 13.3 ± 3.44 months, the postoperative recurrence rate was 5.83%, comprising 14 cases of Goligher grade III and 1 case of grade IV. Notably, among the 22 grade IV cases, we proactively combined vertical ligation-mucopexy (TVLM) with laser hemorrhoidoplasty (LHP), which sub-stantially improved the recurrence profile. We also emphasize that 10/15 (66.7%) recurrences occurred within our first 50 cases, when the technique had not yet traversed the learning curve. These observations suggest that recurrence is influenced not only by hemorrhoid severity (grade III vs IV) but also by surgeon experience. As a practical recommendation, combining TVLM with LHP for grade IV disease yields very promising outcomes, potentially offering durable efficacy while preserving LHP's postoperative pain advantages. Nevertheless, dedicated studies are needed to rigorously evaluate this combined approach. For comparison, Porwal (2022) reported a very low 2-year recurrence rate of ~0.55% in a cohort of 1088 LHP cases (20). However, it should be noted that the study by Porwal (2022) was conducted at a high-volume center with extensive experience, where the LHP technique had already been standardized and the majority of patients presented with grade II–III hemor-rhoids. This may explain the differences compared with our results. In contrast, Kavraal (2024) reported a short-term recurrence rate of 0.8% and a long-term recurrence rate of 5% at 5 years, further supporting the evidence that LHP offers a relatively low recurrence rate, consistent with international studies. Nevertheless, these outcomes remain highly dependent on the experience and technical proficiency of the surgeon.

Based on our findings, we propose several recom-mendations for surgeons beginning to adopt LHP: (1) careful patient selection should be prioritized, with a focus on grade II–III hemorrhoids and elective cases rather than complex grade IV or emergency cases; (2) laser energy should be maintained within the safe threshold (≤ 350 J per pile) to minimize the risk of mucosal burns and recurrence; (3) in grade IV cases, combining LHP with suspension techniques such as TVLM should be considered to improve long-term outcomes; and (4) new surgeons should perform the first 50–60 procedures under close supervision, while establishing a structured postoperative follow-up program to evaluate effectiveness, durability, and enable early detection of recurrence.

CONCLUSION

Laser Hemorrhoidoplasty (LHP) is a safe and minimally invasive technique for the treatment of hemorrhoidal disease. It offers the advantages of low postoperative pain, rapid recovery, and a low rate of complications and recurrence. With these benefits, LHP is emerging as a mainstream therapeutic option, gradually replacing conventional hemorrhoidectomy techniques in modern clinical practice.

Author's Contributions

All authors made substantial contributions to one or more critical aspects of the study (conceptualization and design; data acquisition, analysis, or interpretation; drafting the manuscript or critical scholarly revision), approved the final version, and agree to be accountable for all aspects of the work. All authors confirm that they meet the ICMJE authorship criteria.

Competing Interests

The authors declare no competing interests.

Consent to Participate

Waived due to the retrospective design and anonymized data.

Data Availability

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

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