

Evaluation of the treatment outcomes of grade II and III hemorrhoids using a 1470NM 8W diode laser

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Summary

Objective: To evaluate the safety and efficacy of the treatment of hemorrhoids using a 1470 nm diode laser. **Subjects and method:** This prospective descriptive study was conducted on 30 patients with hemorrhoids treated with diode laser hemorrhoidoplasty at the 108 Military Central Hospital from May 2024 to February 2025. **Result:** The study included 30 patients with Grade II and III hemorrhoids treated using an 8 W 1470 nm diode laser. The average age was 38.93 ± 10.7 years, the male-to-female ratio of 1.14:1, and 63.3% of the cases were Grade III. The mean surgical time was 32.83 ± 7.51 minutes. The average pain score (VAS) during the first postoperative day was 4.20 ± 1.97 , and the average duration of pain medication use was 1.73 ± 0.52 days. Postoperative urinary retention occurred in 10% of patients. The average hospital stay was 2.17 ± 0.70 days. No significant complications were observed. The average follow-up period was 11.08 ± 3.43 weeks, with a mean HDSS score was 0.57 and SHS score was 0.63. **Conclusion:** The 1470nm diode laser at 8W is a safe and effective method for treating Grade II and III mixed hemorrhoids.

Keywords: Diode Laser, 1470 nm, Grade II and III hemorrhoids.

I. BACKGROUND

Hemorrhoids are the most common anorectal disease, affecting millions of people worldwide, with significant social and economic implications. The most common symptoms include bleeding, pain, itching, prolapsed hemorrhoids, and impaired quality of life. In the United States, studies estimate that over 50% of people aged 50 and above experience some form of hemorrhoidal disease during their lifetime ¹. In Vietnam, according to a study by Nguyễn Xuân Hùng, 81% of the population is aware of hemorrhoids, with a prevalence rate of 34.7% ². Given the high prevalence, the focus on surgical treatments that are effective, less painful, and provide optimal functional recovery is a key concern for both surgeons and patients.

The treatment of hemorrhoids has significantly advanced over recent years, with medical technology innovations leading to more effective, minimally invasive alternatives to traditional surgical methods ³. Among these innovations, diode laser therapy has attracted attention due to promising results in reducing pain, shortening recovery times, and improving outcomes while maximizing preservation of hemorrhoidal tissue ^{4,5,6}.

Hemorrhoidal laser procedure (HeLP) was developed to treat symptomatic hemorrhoids by causing the shrinkage of terminal branches of the superior rectal artery located approximately 3-4 cm above the dentate line. The principle of this surgery is based on reducing the arterial blood flow to the hemorrhoidal venous plexus, which helps alleviate hemorrhoidal symptoms. Additionally, the laser induces varying degrees of tissue contraction and tissue degeneration depending on the energy used and the duration of exposure.

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The application of diode lasers for hemorrhoidal disease treatment has been conducted in Vietnam, with some studies already published⁷. However, further research and outcome evaluations are limited. Our study aims to assess the efficacy and safety of this laser technique in treating patients with hemorrhoids.

II. SUBJECT AND METHOD

Study Design: This prospective descriptive study was conducted on 30 patients diagnosed with Grade II and III hemorrhoids, who were treated with diode laser hemorrhoidoplasty from May 2024 to February 2025 at the 108 Military Central Hospital.

Participants: Inclusion Criteria: Patients diagnosed with Grade II and III hemorrhoids (Goligher's classification) who had symptoms and did not respond to medical treatment, with minimal or no prolapse (< 2cm from the anal verge). Exclusion Criteria: Patients with inflammatory bowel disease, previous surgery involving the rectum or anastomosis less than 3cm from the anal verge; fecal incontinence; outlet obstruction syndrome (ODS) unresponsive to medical treatment; anal stenosis; comorbid conditions such as local (anal fissures, anal fistula) or systemic diseases (cirrhosis, renal failure, etc.); patients on anticoagulant therapy (relative contraindication); irritable bowel syndrome with diarrhea or severe constipation; Grade IV hemorrhoids or significant mucosal prolapse (> 2cm).

Evaluation Criteria: Patients underwent a clinical examination to assess hemorrhoidal grade according to Goligher and Masuda's classifications. Rectal or colonoscopy was performed to rule out malignant diseases or inflammatory bowel conditions before surgery. Surgery was performed using a Leonardo Diode Laser 45W (Biolitec®, Germany). Hemorrhoidal grade was assessed using both Goligher and Masuda classifications. Evaluation criteria included patient demographics (age, gender), hemorrhoidal lesion characteristics, technical aspects (laser energy, burn time), pain level after surgery, and postoperative complications (bleeding, infection, urinary retention, anal stenosis).

Postoperative outcomes were evaluated using the Hemorrhoidal Disease Symptom Score (HDSS) (0 points: Never, 1 point: Less than once a month, 2 points: Less than once a week, 3 points: 1-6 days a week, 4 points: Daily), and the Short Health Scale (SHS) which assesses symptoms and impact on quality of life (Quality of life: 1 point: No impact, 7 points: Severe impact.)

Surgical Technique: Preoperative preparation included rectal cleansing with Fleet Enema (133 ml) and prophylactic antibiotics (second-generation cephalosporins) administered intravenously before anesthesia. Spinal anesthesia was used, and the patient was placed in the lithotomy position. The surgeon was positioned between the patient's legs (Figure 1). The 45W Leonardo Diode Laser (Biolitec, Germany) was used, with laser energy set between 8-10W, each pulse lasting 3 seconds with a 0.5-second interval.

Surgical Steps:

Dilate the anus to expose the hemorrhoidal masses.

Use Vicryl 2.0 sutures to suspend prolapsed hemorrhoids if necessary.

Make a 1 cm incision 1 mm from the anal margin. Insert the laser probe (1.8mm) into the hemorrhoidal mass, under the mucosa.

Move the laser probe in and out of the hemorrhoidal tissue, delivering 3-second pulses in a radial trajectory, with energy focused on the tissue 5 to 6 mm in depth.

After laser treatment, compress the treated tissue for 3-5 seconds using a finger. Apply cold compresses to the hemorrhoidal mass for 90 seconds.

After confirming adequate hemostasis at the surgical site, apply a hemostatic dressing (such as Surgicel or Spongel) to the surgical area if needed.

Statistical Analysis: Data were analyzed using SPSS 26.0. Quantitative variables were expressed as means $\pm$ standard deviations, and proportions were expressed as percentages. Comparisons of means between two groups were performed using the t-test, with $p < 0.05$ considered statistically significant.



Figure 1. Spinal anesthesia was administered, and the patient was placed in the lithotomy position. The surgeon positioned themselves between the patient's legs



Figure 2. Images showing a 29-year-old female with grade III hemorrhoids who was performed by diode laser hemorrhoidoplasty, PID: 25340073.

III. RESULT

A total of 30 patients with Grade II and III hemorrhoids underwent laser surgery, consisting of 16 males and 14 females, with an average age was 38.93 ± 10.7 . The age distribution was as follows: <20 years (3.3%), 20-39 years (53.3%), 40-59 years (40.0%), and ≥ 60 years (3.3%). According to the Goligher's classification, Grade III hemorrhoids were the most common (63.3%). In the Masuda's classification, P1, E1, and C2 stages were predominant at 90.0%, 66.7%, and 50.0%, respectively (Table 2).

As shown in Table 3, there are 9 patients underwent laser surgery in combination with other

methods (30,0%) and 9 patients who need hemorrhoidal Suspension before laser. There was no significant difference in the average laser burn time or total energy used for each hemorrhoid mass between the Grade II and Grade III groups ($p > 0.05$).

The pain score (VAS) after surgery showed no significant difference between the laser-only group and the group combining laser with other methods ($p = 0.077 < 0.05$). Most patients were managed with non-opioid analgesics (66.67%). Eight patients (26.67%) used preoperative epidural analgesia. The HDSS and SHS scores indicated that laser surgery had minimal impact on the patients' quality of life post-surgery (Table 4).

Table 1. Clinical and Paraclinical Characteristics

Characteristic	Percentage
History of Treatment, n (%)	
No treatment	24 (80.0%)
Medical treatment	4 (13.3%)
Surgical procedure	2 (6.7%)
Clinical Signs, n (%)	
Prolapsed hemorrhoidal mass	27 (90.0%)
Bleeding	12 (46.7%)
Anal pain	6 (20.0%)
Anemia, n (%)	
No anemia	30 (100%)
Anemia	0 (0%)

Table 2. Hemorrhoidal Classification

Classification	Percentage
Goligher's Classification, n (%)	
Grade II	11 (36.7%)
Grade III	19 (63.3%)
Masuda's Classification, n (%)	
Prolapse degree (P)	
P0	1 (3.3%)
P1	27 (90.0%)
P2	2 (6.7%)
External hemorrhoidal condition (E),	
E0	0 (0%)
E1	20 (66.7%)
E2	10 (33.3%)
Hemorrhoidal mass combination (C)	
C0	0 (0%)
C1	15 (50.0%)
C2	15 (50.0%)

Table 3. Laser Surgical Characteristics

Characteristics		
Surgical procedure, n (%)		
Laser only	12 (40%)	
Laser + Milligan- Morgan	9 (30.0%)	
Laser + Hemorrhoidal Suspension *	9 (30.0%)	
Surgical Time (minutes), $\bar{X} \pm SD$		
Laser only	32.27 $\pm$ 6.47	
Laser with additional methods	33.16 $\pm$ 8.20	
Overall surgical time	32.83 $\pm$ 7.51	
Laser Burn Energy (J), $\bar{X} \pm SD$		p
Grade II	850.55 $\pm$ 280.12	0.395
Grade III	1024.68 $\pm$ 371.57	
Laser Burn Energy per Hemorrhoid (J), $\bar{X} \pm SD$		
Grade II	240.20 $\pm$ 70.30	0.419
Grade III	271.98 $\pm$ 116.35	
Laser Burn Time (seconds), (sec), $\bar{X} \pm SD$		
Grade II	104.45 $\pm$ 32.84	0.563
Grade III	118.68 $\pm$ 48.34	

*For hemorrhoidal masses with significant prolapse, we suspend the hemorrhoid mass before laser treatment
Student's t-test

Table 4. Postoperative Outcomes

Postoperative Results	
Pain After Surgery (VAS Score), $\bar{X} \pm SD$	
Laser only	4.20 ± 1.97
Laser with additional methods	3.36 ± 1.36
Pain Management	
Non-opioid, n (%)	20 (66.67%)
Opioid, n (%)	8 (26.67%)
No pain management, n (%)	2 (6.67%)
Urinary Retention Post-Surgery	
Urinary retention, n (%)	3 (10.0%)
No urinary retention, n (%)	27 (90.0%)
Long-Term Results	
Skin tag after surgery, n (%)	9 (30.0%)
HDSS Score (Mean), $\bar{X} \pm SD$	0.57
SHS Score (Mean), $\bar{X} \pm SD$	0.63

IV. DISCUSSION

The treatment of hemorrhoidal disease is multi-method, involving lifestyle modifications, medical therapy, and surgical interventions. The goal is to reduce symptoms, improve patients' quality of life, and prevent recurrence. Traditional hemorrhoidectomy techniques, although effective in preventing recurrence, are often associated with significant pain, bleeding, anal stenosis, and impaired bowel function post-surgery⁸. Recently, laser hemorrhoidoplasty has gained popularity as a minimally invasive treatment with good outcomes, aiming for "minimal intervention, maximum effect"^{4,6,7}.

In our study, 30 patients diagnosed with Grade II and III hemorrhoids were treated with diode laser therapy. Symptom improvement (indication for surgery) was observed in 100% of cases, with an average follow-up period of 11 weeks. Most cases showed sufficient results after 3 months for evaluation. Postoperative complications were low, with 10.0% of patients experiencing urinary retention, which was managed with urinary catheters. There were no significant bleeding complications or surgical re-interventions. Most patients reported mild to moderate pain after surgery (VAS score for laser-only surgery: 3.36; laser

combined with other methods: 4.68). The majority of patients required only non-opioid analgesics.

In addition, 9 patients presented with hemorrhoids with thrombosed external hemorrhoids and anal skin tags, necessitating excisional hemorrhoidectomy supplemented by the Milligan-Morgan technique. The presence of thrombosed hemorrhoids is generally considered a contraindication for laser treatment. However, in patients with 1-2 thrombosed hemorrhoidal columns, we implemented laser surgery combined with a principle of maximal preservation of hemorrhoidal tissue. Several studies have indicated the advantages of combining laser with other methods, demonstrating superior outcomes compared to conventional method only^{9,10}.

Long-term results showed 9 patients (30.0%) had redundant anal skin post-surgery, with 2 patients (6.67%) requiring skin excision due to discomfort. This suggests that for patients with significant hemorrhoidal prolapse, additional surgical methods may be needed to prevent cosmetic issues and improve quality of life. Overall, most patients were satisfied with their symptoms and quality of life post-surgery, as assessed by the HDSS and SHS scores (HDSS: 0.57, SHS: 0.63).

A study by Bruscianno et al. (2019), conducted on 50 patients (28 males and 22 females), showed that

no significant complications occurred during the surgery, and no spontaneous bleeding was observed postoperatively. There was minimal postoperative pain, and 100% of the patients returned to their daily activities within 2 days after surgery. With an average follow-up period of 8.6 months, the recurrence rate was 0%¹¹.

Several studies indicate that laser surgery (HeLP) is more suitable for low-grade hemorrhoids (Grade II and III) with a low recurrence rate. A systematic review by Longchamp et al. showed that the recurrence rate of hemorrhoids after laser surgery ranged from 0% to 11.3% after 1 year in this group¹². A study by Faes et al (2019) in Switzerland, involving 50 males and females with Grade II to III hemorrhoids, estimated a 36% recurrence rate after 5 years of laser surgery¹³.

A limitation of our study is the small sample size and insufficient follow-up duration. However, patient interviews suggest very promising results in terms of symptoms and quality of life following surgery.

V. CONCLUSION

Our study of 30 patients with Grade II and III hemorrhoids treated with diode laser therapy (HeLP) showed that it is a safe and effective method with good postoperative outcomes. The procedure significantly improves patients' quality of life after surgery. Further studies with larger sample sizes and longer follow-up periods are needed for a more comprehensive evaluation.

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