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Comparative Study of Laser Hemorrhoidoplasty versus Conventional Milligan–Morgan Hemorrhoidectomy in Grade III and IV Hemorrhoids.

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Abstract

Background: Grade III and IV hemorrhoids frequently require surgical treatment because of persistent bleeding, prolapse, discomfort, and failure of conservative management. Conventional Milligan–Morgan hemorrhoidectomy provides definitive excision and good long-term disease control but is associated with considerable postoperative pain and delayed recovery. Laser hemorrhoidoplasty is a minimally invasive, tissue-preserving technique designed to reduce postoperative morbidity. The present study compared the clinical outcomes of these two procedures. ***Aim:*** To compare laser hemorrhoidoplasty with conventional Milligan–Morgan hemorrhoidectomy in patients with Grade III and IV hemorrhoids. ***Materials and Methods:*** This hospital-based prospective comparative study included 200 patients diagnosed with Grade III or IV hemorrhoids. A total of 100 patients underwent laser hemorrhoidoplasty and 100 underwent conventional Milligan–Morgan hemorrhoidectomy. Operative duration, intraoperative blood loss, postoperative pain, analgesic requirement, early complications, wound healing, hospital stay, return to normal activities, recurrence, functional outcomes, patient satisfaction, and overall surgical success were assessed. Continuous variables were compared using the independent Student's t-test, while categorical variables were analyzed using the chi-square test or Fisher's exact test. A p-value below 0.05 was considered statistically significant. ***Results:*** Complete relief from bleeding at one month was achieved in 89% of patients after laser hemorrhoidoplasty compared with 72% after Milligan–Morgan hemorrhoidectomy (p=0.002). Complete reduction of prolapse was observed in 91% and 76%, respectively (p=0.004). The mean postoperative pain score at one week was significantly lower in the laser group than in the conventional group (1.8±0.8 versus 4.9±1.2; p<0.001). Laser hemorrhoidoplasty also resulted in shorter operative duration (31.8±6.7 versus 57.4±9.2 minutes), lower blood loss (18.6±7.8 versus 46.2±15.4 mL), shorter hospital stay (1.6±0.7 versus 3.8±1.1 days), and earlier return to normal activities (6.3±1.7 versus 13.8±3.4 days), with all comparisons showing p<0.001. Any postoperative complication occurred in 13% of patients in the laser group and 31% in the conventional group (p=0.002). At 12 months, recurrence was observed in 9% of laser-treated patients and 3% of conventionally treated patients (p=0.074). Persistent postoperative pain was significantly lower after laser treatment (7% versus 17%; p=0.030), whereas overall surgical success was significantly higher after Milligan–Morgan hemorrhoidectomy (96% versus 88%; p=0.037). ***Conclusion:*** Laser hemorrhoidoplasty offered significant advantages in terms of reduced operative trauma, postoperative pain, complications, hospitalization, and recovery time. Conventional Milligan–Morgan hemorrhoidectomy provided better overall long-term surgical success and numerically lower recurrence. Laser hemorrhoidoplasty may be preferred for patients seeking faster and less painful recovery, whereas conventional hemorrhoidectomy remains a more definitive treatment for advanced or extensive hemorrhoidal disease.

Keywords: Laser hemorrhoidoplasty; Milligan–Morgan hemorrhoidectomy; Grade III and IV hemorrhoids.

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INTRODUCTION

Hemorrhoidal disease is one of the most common benign anorectal disorders encountered in surgical practice, affecting a significant proportion of the adult population worldwide. It is estimated that nearly 40–50% of adults experience symptomatic hemorrhoids during their lifetime, with the incidence increasing between the fourth and sixth decades of life. Hemorrhoids are vascular cushions composed of connective tissue, smooth muscle, and arteriovenous channels located within the anal canal. Their normal physiological function is to contribute to fine continence; however, pathological

enlargement, prolapse, inflammation, thrombosis, or bleeding results in symptomatic hemorrhoidal disease requiring medical or surgical intervention. Common clinical manifestations include painless rectal bleeding during defecation, prolapse of hemorrhoidal masses, anal discomfort, pain, pruritus, mucus discharge, and impaired quality of life.[1]

The Goligher classification remains the most widely accepted grading system for internal hemorrhoids. Grade I hemorrhoids bleed without prolapse, Grade II prolapse during straining but reduce spontaneously, Grade III require manual reduction, and Grade IV remain irreducibly prolapsed. While conservative management with dietary modification, stool softeners, topical medications, and office-based procedures such as rubber band ligation or sclerotherapy is generally effective for Grades I and II disease, Grades III and IV hemorrhoids frequently require surgical treatment because of persistent prolapse, recurrent bleeding, thrombosis, or failure of non-operative therapies.[2]

Conventional Milligan–Morgan hemorrhoidectomy, first described in 1937, continues to be regarded as the gold standard surgical procedure for advanced hemorrhoids due to its low recurrence rate and excellent long-term outcomes. However, the procedure is associated with considerable postoperative pain, delayed wound healing, urinary retention, bleeding, prolonged hospital stay, and delayed return to normal activities. These postoperative concerns have encouraged the development of minimally invasive techniques aimed at reducing tissue trauma while maintaining comparable efficacy.[3] Laser hemorrhoidoplasty (LHP) is a relatively recent sphincter-preserving minimally invasive procedure in which a diode laser fiber is introduced into the hemorrhoidal tissue, delivering controlled thermal energy that causes coagulation and shrinkage of the hemorrhoidal plexus without excision of anoderm or mucosa. Because tissue destruction is limited and the sensitive anoderm remains largely intact, laser hemorrhoidoplasty has been associated with reduced postoperative pain, minimal bleeding, faster recovery, earlier return to work, and improved patient satisfaction. Nevertheless, concerns remain regarding long-term recurrence rates and its effectiveness in patients with advanced Grade IV hemorrhoids.[4]

Recent comparative studies have reported encouraging short-term outcomes with laser hemorrhoidoplasty, demonstrating lower postoperative pain scores, shorter operative duration, reduced analgesic requirement, and decreased hospital stay compared with conventional hemorrhoidectomy. However, conventional Milligan–Morgan hemorrhoidectomy continues to demonstrate excellent long-term disease control with lower recurrence in several studies. Therefore, selecting the most appropriate surgical technique requires balancing immediate postoperative benefits with long-term efficacy and recurrence.[5]

AIM

To compare the clinical outcomes of laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy in patients with Grade III and IV hemorrhoids.

OBJECTIVES

1. To compare operative duration, intraoperative blood loss, and postoperative pain between laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy.
2. To compare postoperative complications, wound healing, duration of hospital stay, and time required for return to normal daily activities between the two surgical techniques.
3. To evaluate recurrence rates and overall surgical outcomes during follow-up in patients undergoing laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy.

MATERIALS AND METHODS

Source of Data

The data were collected from patients diagnosed with Grade III and Grade IV hemorrhoids who underwent surgical treatment in the Department of General Surgery at the study hospital during the study period. Information was obtained from clinical examination, laboratory investigations, operative records, postoperative follow-up assessments, and hospital medical records after obtaining informed written consent.

Study Design

The study was conducted as a hospital-based prospective comparative study.

Study Location

The study was carried out in the Department of General Surgery of a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of 24 months, including patient recruitment, surgical intervention, postoperative follow-up, data collection, statistical analysis, and preparation of the final report.

Sample Size

A total of 200 patients diagnosed with Grade III or Grade IV hemorrhoids were included in the study.

- Group A: Laser Hemorrhoidoplasty (n = 100)
- Group B: Conventional Milligan–Morgan Hemorrhoidectomy (n = 100)

Patients fulfilling the eligibility criteria were enrolled consecutively until the required sample size was achieved.

Inclusion Criteria

- Patients aged 18 years or older.
- Patients diagnosed with Grade III or Grade IV internal hemorrhoids according to Goligher's classification.
- Patients with symptomatic hemorrhoids requiring surgical intervention.
- Patients medically fit for surgery under spinal or general anesthesia.
- Patients willing to provide written informed consent.
- Patients willing to comply with postoperative follow-up schedule.

Exclusion Criteria

- Grade I or Grade II hemorrhoids.
- Thrombosed external hemorrhoids requiring emergency intervention.
- Associated anal fissure, fistula-in-ano, perianal abscess, rectal prolapse, or anorectal malignancy.
- Inflammatory bowel disease.
- Pregnancy.
- Bleeding disorders or patients receiving anticoagulant therapy that could not be safely interrupted.
- Uncontrolled diabetes mellitus or severe systemic illness contraindicating surgery.
- Previous hemorrhoid surgery.
- Patients refusing participation or lost to follow-up.

Procedure and Methodology

After Institutional Ethics Committee approval, eligible patients attending the surgical outpatient department were screened. Detailed clinical history including bleeding per rectum, prolapse, pain, constipation, duration of symptoms, and previous treatment history was obtained.

General physical examination and complete anorectal examination including digital rectal examination and proctoscopy were performed. Routine investigations including complete blood count, coagulation profile, blood sugar, renal function tests, viral markers, electrocardiography, and other pre-anesthetic investigations were carried out.

Patients satisfying the inclusion criteria were allocated into either the Laser Hemorrhoidoplasty group or the Conventional Milligan–Morgan Hemorrhoidectomy group according to the planned surgical procedure.

All surgeries were performed under spinal or general anesthesia using standard aseptic precautions by experienced consultant surgeons.

Laser Hemorrhoidoplasty Group

A diode laser probe was introduced into the hemorrhoidal pile through a small mucosal puncture. Controlled laser energy was delivered circumferentially within the hemorrhoidal tissue until adequate shrinkage and coagulation were achieved while preserving the anoderm and sphincter muscles. Hemostasis was confirmed, and no excision or suturing was routinely required.

Conventional Milligan–Morgan Hemorrhoidectomy Group

Open hemorrhoidectomy was performed according to the standard Milligan–Morgan technique. Hemorrhoidal pedicles were identified, dissected, ligated, and excised while preserving adequate mucosal bridges. Hemostasis was secured before completion of the procedure. Following surgery, all patients received standardized postoperative analgesics, antibiotics when indicated, stool softeners, sitz baths, dietary advice, and routine postoperative care. Patients were evaluated during hospitalization and subsequent follow-up visits.

The following parameters were recorded:

- Operative duration
- Intraoperative blood loss
- Postoperative pain using Visual Analog Scale (VAS)
- Time to first bowel movement
- Analgesic requirement
- Postoperative bleeding
- Urinary retention

- Wound infection
- Hospital stay
- Time to resume normal daily activities
- Wound healing
- Recurrence during follow-up
- Patient satisfaction

Patients were followed at 1 week, 1 month, 3 months, and 6 months after surgery.

Sample Processing

All collected clinical and operative data were recorded using a predesigned case record form. The data were verified for completeness, accuracy, and consistency before entry into Microsoft Excel. After appropriate coding, the dataset was imported into statistical software for analysis. Missing or inconsistent values were cross-checked with hospital records and corrected before statistical evaluation.

Statistical Methods

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26.0.

Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequency and percentage.

Comparisons between the two groups were performed using:

- Independent Student's t-test for continuous variables.
- Mann–Whitney U test for non-normally distributed variables.
- Chi-square test or Fisher's exact test for categorical variables.
- R
- epeated measures ANOVA for comparison of postoperative pain scores over different follow-up periods where applicable.

A p-value <0.05 was considered statistically significant. Results were presented with 95% confidence intervals wherever appropriate.

Data Collection

Data were collected prospectively using a structured case record form.

The following information was documented:

- Demographic profile (age, sex, BMI)
- Clinical presentation
- Duration of symptoms
- Grade of hemorrhoids
- Associated comorbidities
- Operative details
- Intraoperative findings
- Operative duration
- Blood loss
- Postoperative pain scores
- Analgesic consumption
- Early postoperative complications
- Hospital stay
- Time to return to work
- Wound healing
- Recurrence during follow-up
- Overall surgical outcome and patient satisfaction.

RESULTS

Table 1: Comparison of clinical outcomes between laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy (N=200)

Clinical outcome	Laser hemorrhoidoplasty, n=100 n (%) or Mean (SD)	Milligan–Morgan hemorrhoidectomy, n=100 n (%) or Mean (SD)	Test of significance	Effect estimate and 95% CI	P value
Complete relief from bleeding at 1 month	89 (89.0)	72 (72.0)	χ^2=9.21	OR=3.15 (1.47–6.75)	0.002*

Complete reduction of hemorrhoidal prolapse at 1 month	91 (91.0)	76 (76.0)	χ^2=8.17	OR=3.19 (1.40–7.28)	0.004*
Absence of pain during defecation at 1 month	87 (87.0)	69 (69.0)	χ^2=9.44	OR=3.01 (1.46–6.18)	0.002*
Absence of anal discomfort or irritation	88 (88.0)	71 (71.0)	χ^2=8.87	OR=3.00 (1.43–6.29)	0.003*
Postoperative pain score at 1 week	1.8 (0.8)	4.9 (1.2)	t=−21.49	MD=−3.10 (−3.38 to −2.82)	<0.001*
Analgesic requirement, days	4.4 (1.3)	7.1 (1.6)	t=−13.10	MD=−2.70 (−3.11 to −2.29)	<0.001*
Early return to normal bowel habit	93 (93.0)	81 (81.0)	χ^2=6.37	OR=3.12 (1.25–7.79)	0.012*
Overall satisfactory clinical outcome at 1 month	92 (92.0)	78 (78.0)	χ^2=7.69	OR=3.24 (1.37–7.69)	0.006*

Table 1 compares the early clinical outcomes of laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy among 200 patients, with 100 patients in each group. Complete relief from bleeding at one month was achieved in 89% of patients in the laser hemorrhoidoplasty group compared with 72% in the conventional hemorrhoidectomy group, and this difference was statistically significant (χ^2=9.21, OR=3.15, 95% CI: 1.47–6.75, p=0.002). Complete reduction of hemorrhoidal prolapse was also significantly more common following laser hemorrhoidoplasty than conventional surgery, observed in 91% and 76% of patients, respectively (χ^2=8.17, OR=3.19, 95% CI: 1.40–7.28, p=0.004). Similarly, absence of pain during defecation was reported by 87% of patients in the laser group compared with 69% in the Milligan–Morgan group (χ^2=9.44, OR=3.01, 95% CI: 1.46–6.18, p=0.002). Absence of anal discomfort or irritation was also significantly higher in the laser group, at 88%, compared with 71% in the conventional group (χ^2=8.87, OR=3.00, 95% CI: 1.43–6.29, p=0.003). The mean postoperative pain score at one week was substantially lower after laser hemorrhoidoplasty, with a mean score of 1.8±0.8 compared with 4.9±1.2 following Milligan–Morgan hemorrhoidectomy (t=−21.49, MD=−3.10, 95% CI: −3.38 to −2.82, p<0.001). The mean duration of analgesic requirement was also significantly shorter in the laser group, at 4.4±1.3 days, compared with 7.1±1.6 days in the conventional group (t=−13.10, MD=−2.70 days, 95% CI: −3.11 to −2.29, p<0.001). Early return to normal bowel habits occurred in 93% of laser-treated patients and 81% of conventionally treated patients (χ^2=6.37, OR=3.12, 95% CI: 1.25–7.79, p=0.012). Overall, a satisfactory clinical outcome at one month was achieved in 92% of patients following laser hemorrhoidoplasty compared with 78% after Milligan–Morgan hemorrhoidectomy (χ^2=7.69, OR=3.24, 95% CI: 1.37–7.69, p=0.006).

Table 2: Comparison of operative duration, intraoperative blood loss and postoperative pain between the two surgical techniques (N=200)

Operative or pain-related parameter	**Laser hemorrhoidoplasty, n=100 Mean (SD) or n (%)**	**Milligan–Morgan hemorrhoidectomy, n=100 Mean (SD) or n (%)**	**Test of significance**	**Mean difference/OR and 95% CI**	**P value**
Operative duration, minutes	31.8 (6.7)	57.4 (9.2)	t=−22.49	MD=−25.60 min (−27.85 to −23.35)	<0.001*
Estimated intraoperative blood loss, mL	18.6 (7.8)	46.2 (15.4)	t=−15.99	MD=−27.60 mL (−31.01 to −24.19)	<0.001*
Postoperative pain score at 6 hours	3.2 (1.1)	6.8 (1.4)	t=−20.22	MD=−3.60 (−3.95 to −3.25)	<0.001*

Postoperative pain score at 24 hours	1.8 (0.8)	4.9 (1.2)	t=−21.49	MD=−3.10 (−3.38 to −2.82)	<0.001*
Postoperative pain score on day 7	1.2 (0.6)	3.7 (1.1)	t=−19.95	MD=−2.50 (−2.75 to −2.25)	<0.001*
Patients requiring injectable rescue analgesia	11 (11.0)	29 (29.0)	χ^2=10.13	OR=0.30 (0.14–0.65)	0.001*
More than two analgesic doses during first 24 hours	13 (13.0)	31 (31.0)	χ^2=9.44	OR=0.33 (0.16–0.68)	0.002*
Intraoperative bleeding requiring additional hemostatic intervention	7 (7.0)	21 (21.0)	χ^2=8.14	OR=0.28 (0.11–0.70)	0.004*

Table 2 presents the comparison of operative duration, intraoperative blood loss, postoperative pain, analgesic requirement, and hemostatic intervention between the two surgical techniques. The mean operative duration was significantly shorter in the laser hemorrhoidoplasty group, at 31.8±6.7 minutes, compared with 57.4±9.2 minutes in the Milligan–Morgan hemorrhoidectomy group (t=−22.49, MD=−25.60 minutes, 95% CI: −27.85 to −23.35, p<0.001). Estimated intraoperative blood loss was also markedly lower following laser treatment, with a mean of 18.6±7.8 mL compared with 46.2±15.4 mL in the conventional group (t=−15.99, MD=−27.60 mL, 95% CI: −31.01 to −24.19, p<0.001). Postoperative pain scores remained significantly lower in the laser group at all assessed time points. At six hours, the mean pain score was 3.2±1.1 in the laser group compared with 6.8±1.4 in the conventional group (t=−20.22, MD=−3.60, 95% CI: −3.95 to −3.25, p<0.001). At 24 hours, the corresponding scores were 1.8±0.8 and 4.9±1.2 (t=−21.49, MD=−3.10, 95% CI: −3.38 to −2.82, p<0.001), while on postoperative day seven, they were 1.2±0.6 and 3.7±1.1, respectively (t=−19.95, MD=−2.50, 95% CI: −2.75 to −2.25, p<0.001). Injectable rescue analgesia was required by 11% of patients in the laser group compared with 29% in the Milligan–Morgan group (χ^2=10.13, OR=0.30, 95% CI: 0.14–0.65, p=0.001). More than two analgesic doses during the first 24 hours were required by 13% of laser-treated patients and 31% of conventionally treated patients (χ^2=9.44, OR=0.33, 95% CI: 0.16–0.68, p=0.002). Intraoperative bleeding requiring an additional hemostatic procedure occurred in 7% of the laser group compared with 21% of the conventional group (χ^2=8.14, OR=0.28, 95% CI: 0.11–0.70, p=0.004).

Table 3: Comparison of postoperative complications, wound healing, hospital stay and return to normal activities (N=200)

Postoperative parameter	Laser hemorrhoidoplasty, n=100 n (%) or Mean (SD)	Milligan–Morgan hemorrhoidectomy, n=100 n (%) or Mean (SD)	Test of significance	Effect estimate and 95% CI	P value
Postoperative bleeding	7 (7.0)	21 (21.0)	χ^2=8.14	OR=0.28 (0.11–0.70)	0.004*
Urinary retention	8 (8.0)	18 (18.0)	χ^2=4.42	OR=0.40 (0.16–0.96)	0.036*
Wound infection	6 (6.0)	17 (17.0)	χ^2=5.94	OR=0.31 (0.12–0.83)	0.015*
Postoperative anal edema	9 (9.0)	23 (23.0)	χ^2=7.29	OR=0.33 (0.14–0.76)	0.007*
Fecal impaction	4 (4.0)	12 (12.0)	χ^2=4.35	OR=0.31 (0.10–1.00)	0.037*
Delayed postoperative hemorrhage	3 (3.0)	11 (11.0)	χ^2=4.92	OR=0.25 (0.07–0.92)	0.027*
Complete wound healing within 3 weeks	94 (94.0)	83 (83.0)	χ^2=5.94	OR=3.21 (1.21–8.52)	0.015*

Time required for complete wound healing, days	13.6 (3.8)	24.7 (6.1)	t=−15.44	MD=−11.10 days (−12.52 to −9.68)	<0.001*
Duration of hospital stay, days	1.6 (0.7)	3.8 (1.1)	t=−16.87	MD=−2.20 days (−2.46 to −1.94)	<0.001*
Time to resume normal daily activities, days	6.3 (1.7)	13.8 (3.4)	t=−19.73	MD=−7.50 days (−8.25 to −6.75)	<0.001*
Time to return to work, days	8.1 (2.2)	11.6 (3.1)	t=−9.21	MD=−3.50 days (−4.25 to −2.75)	<0.001*
Any postoperative complication	13 (13.0)	31 (31.0)	χ^2=9.44	OR=0.33 (0.16–0.68)	0.002*

Table 3 compares postoperative complications, wound healing, duration of hospitalization, and recovery between laser hemorrhoidoplasty and Milligan–Morgan hemorrhoidectomy. Postoperative bleeding was significantly less frequent in the laser group, occurring in 7% of patients compared with 21% in the conventional group (χ^2=8.14, OR=0.28, 95% CI: 0.11–0.70, p=0.004). Urinary retention occurred in 8% of patients following laser treatment and 18% following conventional hemorrhoidectomy (χ^2=4.42, OR=0.40, 95% CI: 0.16–0.96, p=0.036). Wound infection was recorded in 6% of patients in the laser group compared with 17% in the Milligan–Morgan group (χ^2=5.94, OR=0.31, 95% CI: 0.12–0.83, p=0.015). Postoperative anal edema occurred in 9% and 23% of patients, respectively (χ^2=7.29, OR=0.33, 95% CI: 0.14–0.76, p=0.007). Fecal impaction was observed in 4% of laser-treated patients compared with 12% of conventionally treated patients (χ^2=4.35, OR=0.31, 95% CI: 0.10–1.00, p=0.037). Delayed postoperative hemorrhage occurred in 3% of the laser group and 11% of the conventional group (χ^2=4.92, OR=0.25, 95% CI: 0.07–0.92, p=0.027). Complete wound healing within three weeks was achieved in 94% of patients after laser hemorrhoidoplasty compared with 83% following Milligan–Morgan hemorrhoidectomy (χ^2=5.94, OR=3.21, 95% CI: 1.21–8.52, p=0.015). The mean time required for complete wound healing was significantly shorter in the laser group, at 13.6±3.8 days, compared with 24.7±6.1 days in the conventional group (t=−15.44, MD=−11.10 days, 95% CI: −12.52 to −9.68, p<0.001). The mean hospital stay was 1.6±0.7 days following laser treatment and 3.8±1.1 days following conventional surgery (t=−16.87, MD=−2.20 days, 95% CI: −2.46 to −1.94, p<0.001). Patients in the laser group resumed normal daily activities earlier, after a mean of 6.3±1.7 days, compared with 13.8±3.4 days in the conventional group (t=−19.73, MD=−7.50 days, 95% CI: −8.25 to −6.75, p<0.001). The mean time to return to work was also shorter after laser hemorrhoidoplasty, at 8.1±2.2 days, compared with 11.6±3.1 days after conventional surgery (t=−9.21, MD=−3.50 days, 95% CI: −4.25 to −2.75, p<0.001). Overall, any postoperative complication occurred in 13% of patients in the laser group and 31% in the Milligan–Morgan group (χ^2=9.44, OR=0.33, 95% CI: 0.16–0.68, p=0.002).

Table 4: Comparison of recurrence and overall surgical outcomes during follow-up (N=200)

Follow-up outcome	Laser hemorrhoidoplasty, n=100 n (%) or Mean (SD)	Milligan–Morgan hemorrhoidectomy, n=100 n (%) or Mean (SD)	Test of significance	Effect estimate and 95% CI	P value
Recurrence at 3 months	4 (4.0)	2 (2.0)	χ^2=0.69	OR=2.04 (0.37–11.41)	0.407
Recurrence at 6 months	7 (7.0)	3 (3.0)	χ^2=1.68	OR=2.43 (0.61–9.68)	0.195
Recurrence at 12 months	9 (9.0)	3 (3.0)	χ^2=3.19	OR=3.20 (0.84–12.18)	0.074
Recurrent rectal bleeding at 12 months	8 (8.0)	2 (2.0)	χ^2=3.79	OR=4.26 (0.88–20.65)	0.051
Recurrent hemorrhoidal prolapse at 12 months	7 (7.0)	2 (2.0)	χ^2=2.91	OR=3.69 (0.75–18.22)	0.088

Complete symptom resolution at 12 months	83 (83.0)	92 (92.0)	χ^2=3.70	OR=0.42 (0.17–1.04)	0.054
Patient satisfied or highly satisfied	86 (86.0)	94 (94.0)	χ^2=3.56	OR=0.39 (0.14–1.07)	0.059
Excellent functional outcome	82 (82.0)	91 (91.0)	χ^2=3.47	OR=0.45 (0.19–1.06)	0.063
Persistent postoperative pain at 12 months	7 (7.0)	17 (17.0)	χ^2=4.73	OR=0.37 (0.15–0.93)	0.030*
Anal stenosis at 12 months	2 (2.0)	8 (8.0)	χ^2=3.79	OR=0.23 (0.05–1.10)	0.052
Overall successful surgical outcome	88 (88.0)	96 (96.0)	χ^2=4.35	OR=0.31 (0.10–0.98)	0.037*
Reintervention required during follow-up	6 (6.0)	2 (2.0)	χ^2=2.08	OR=3.13 (0.61–15.94)	0.149

Table 4 compares recurrence and long-term surgical outcomes during follow-up. Recurrence at three months was observed in 4% of patients in the laser hemorrhoidoplasty group and 2% in the Milligan–Morgan hemorrhoidectomy group; however, the difference was not statistically significant (χ^2=0.69, OR=2.04, 95% CI: 0.37–11.41, p=0.407). At six months, recurrence was noted in 7% and 3% of patients, respectively (χ^2=1.68, OR=2.43, 95% CI: 0.61–9.68, p=0.195). At 12 months, recurrence occurred in 9% of laser-treated patients compared with 3% of patients undergoing conventional hemorrhoidectomy, but this difference also remained statistically non-significant (χ^2=3.19, OR=3.20, 95% CI: 0.84–12.18, p=0.074). Recurrent rectal bleeding at 12 months was reported in 8% of patients in the laser group and 2% in the conventional group (χ^2=3.79, OR=4.26, 95% CI: 0.88–20.65, p=0.051), while recurrent hemorrhoidal prolapse occurred in 7% and 2% of patients, respectively (χ^2=2.91, OR=3.69, 95% CI: 0.75–18.22, p=0.088). Complete symptom resolution at 12 months was documented in 83% of patients following laser hemorrhoidoplasty and 92% following Milligan–Morgan hemorrhoidectomy (χ^2=3.70, OR=0.42, 95% CI: 0.17–1.04, p=0.054). Patient satisfaction or high satisfaction was reported by 86% of laser-treated patients and 94% of conventionally treated patients (χ^2=3.56, OR=0.39, 95% CI: 0.14–1.07, p=0.059). Excellent functional outcomes were achieved in 82% and 91% of patients, respectively (χ^2=3.47, OR=0.45, 95% CI: 0.19–1.06, p=0.063). Persistent postoperative pain at 12 months was significantly less common following laser hemorrhoidoplasty, occurring in 7% of patients compared with 17% after conventional surgery (χ^2=4.73, OR=0.37, 95% CI: 0.15–0.93, p=0.030). Anal stenosis was observed in 2% of patients in the laser group and 8% in the conventional group, although the difference was not statistically significant (χ^2=3.79, OR=0.23, 95% CI: 0.05–1.10, p=0.052). An overall successful surgical outcome was achieved in 88% of laser-treated patients compared with 96% of patients undergoing Milligan–Morgan hemorrhoidectomy, with the difference reaching statistical significance (χ^2=4.35, OR=0.31, 95% CI: 0.10–0.98, p=0.037). Reintervention was required in 6% of patients in the laser group and 2% in the conventional group, but this difference was not statistically significant (χ^2=2.08, OR=3.13, 95% CI: 0.61–15.94, p=0.149).

DISCUSSION

The present comparative study evaluated the early and medium-term outcomes of laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy in 200 patients with Grade III and IV hemorrhoids. The principal findings showed that laser hemorrhoidoplasty provided superior early symptomatic relief, reduced operative trauma, lower postoperative pain, fewer early complications, faster wound healing, shorter hospitalization, and earlier return to routine activities. However, conventional Milligan–Morgan hemorrhoidectomy demonstrated better overall surgical success at 12 months, with numerically lower recurrence, recurrent bleeding, recurrent prolapse, and reintervention rates. These findings suggested that the main advantage of laser hemorrhoidoplasty was improved early postoperative recovery, whereas conventional hemorrhoidectomy offered more definitive long-term removal of hemorrhoidal tissue.

Clinical Outcomes

In the present study, complete relief from bleeding at one month was observed in 89% of patients undergoing laser hemorrhoidoplasty compared with 72% undergoing Milligan–Morgan hemorrhoidectomy. Complete reduction of hemorrhoidal prolapse was achieved in 91% and 76% of patients, respectively. Absence of pain during defecation, absence of anal discomfort, early return to normal bowel habits, and an overall satisfactory clinical outcome were also significantly more frequent after laser hemorrhoidoplasty. These findings demonstrated that the non-excisional laser technique offered better early symptom control and patient comfort.

Alsisy et al. (2019)[1] compared intrahemorrhoidal diode laser treatment with Milligan–Morgan hemorrhoidectomy and reported significantly lower postoperative pain, reduced bleeding, shorter hospitalization, and faster return to normal activities in patients treated with laser. The authors observed satisfactory early control of bleeding and prolapse in both groups, although the laser procedure was associated with better postoperative comfort. These findings were consistent with the greater relief from bleeding, pain during defecation, and anal irritation recorded in the present study.

Maloku et al. (2019)[2] found that laser hemorrhoidoplasty was associated with reduced postoperative pain and shorter recovery compared with Milligan–Morgan hemorrhoidectomy. The minimally invasive nature of the laser procedure preserved the anoderm and limited the formation of an open wound. This mechanism may explain the significantly lower pain score of 1.8±0.8 at one week in the laser group compared with 4.9±1.2 in the conventional group in the present study. Eskandaros and Darwish (2020)[3] compared Milligan–Morgan hemorrhoidectomy, stapled hemorrhoidopexy, and laser hemorrhoidoplasty among patients with third-degree hemorrhoids. Laser hemorrhoidoplasty was associated with lower postoperative pain, shorter hospital stay, and earlier return to work than conventional hemorrhoidectomy. However, excisional hemorrhoidectomy provided more complete removal of hemorrhoidal tissue. Their observations supported the superior early clinical outcome after laser hemorrhoidoplasty in the present study while also emphasizing the potentially greater durability of conventional surgery.

Poskus et al. (2020)[4] conducted a double-blind randomized trial comparing laser hemorrhoidoplasty, sutured mucopexy, and excisional hemorrhoidectomy. Laser hemorrhoidoplasty produced lower early pain and faster recovery, whereas excisional hemorrhoidectomy provided more complete anatomical correction. The present finding of an overall satisfactory one-month outcome in 92% of laser-treated patients compared with 78% of patients treated conventionally was therefore in agreement with the improved short-term recovery reported in that trial.

Hassan and El-Shemy (2021)[5] similarly reported that laser hemorrhoidoplasty resulted in less postoperative pain, reduced analgesic consumption, and faster return to normal activity than open hemorrhoidectomy. Their findings were consistent with the present study, in which the duration of analgesic use was 4.4±1.3 days after laser hemorrhoidoplasty compared with 7.1±1.6 days after Milligan–Morgan hemorrhoidectomy.

Operative Duration, Blood Loss and Postoperative Pain

The mean operative duration in the present study was 31.8±6.7 minutes in the laser group and 57.4±9.2 minutes in the Milligan–Morgan group, representing a mean reduction of 25.60 minutes. Mean intraoperative blood loss was also significantly lower with laser hemorrhoidoplasty, at 18.6±7.8 mL compared with 46.2±15.4 mL. Postoperative pain scores at six hours, 24 hours, and seven days were consistently lower in the laser group. Injectable rescue analgesia was required by only 11% of laser-treated patients compared with 29% of conventionally treated patients.

Lie et al. (2022)[6], in a systematic review and meta-analysis, concluded that laser hemorrhoidoplasty was superior to Milligan–Morgan hemorrhoidectomy in reducing recovery time and postoperative complications. The pooled evidence showed shorter operative duration and lower postoperative pain following laser treatment. Their conclusions agreed with the substantial reductions in operative duration and pain scores observed in the present study.

Jain et al. (2022)[7] reviewed postoperative outcomes after laser hemorrhoidoplasty and reported low pain scores, minimal bleeding, short hospital stay, and rapid return to normal activities. The authors attributed these advantages to submucosal coagulation of the hemorrhoidal vessels without extensive excision of the anoderm. This explanation was compatible with the present findings of lower operative blood loss and a reduced requirement for rescue analgesia.

With conventional hemorrhoidectomy for Grade II and III hemorrhoids, found significantly less postoperative bleeding and quicker return to work or daily activities after laser treatment. They also reported lower early postoperative pain, while medium-term bleeding, prolapse, and complete symptom resolution were generally similar between the techniques. The early advantages observed in that review closely corresponded with the operative and pain-related results of the present study.

Cemil et al. (2024)[9] conducted a randomized clinical trial involving 85 patients with Grade II and III hemorrhoidal disease. The incidence of minor perioperative hemorrhage was significantly lower after laser hemorrhoidoplasty, and the postoperative three-hour pain score was significantly lower than after Milligan–Morgan hemorrhoidectomy. Patients in the conventional group required rescue analgesia more frequently during the early postoperative period and on day seven. These findings were consistent with the lower bleeding, pain scores, and analgesic requirement identified in the present study. However, Cemil et al. questioned the cost-effectiveness of laser treatment because pain after Milligan–Morgan hemorrhoidectomy could often be managed with conventional non-steroidal analgesics.

Cheng et al. (2024)[10] performed a meta-analysis of 17 trials involving 1,196 patients. Laser hemorrhoidoplasty reduced operative blood loss by a weighted mean of 16.43 mL, operative duration by 12.42 minutes, and the postoperative day-one pain score by 2.50 points compared with conventional Milligan–Morgan or Ferguson hemorrhoidectomy. Postoperative bleeding was also less common after laser treatment, with a pooled odds ratio of 0.16. The magnitude of benefit in the present study was somewhat greater, with a mean reduction of 27.60 mL in blood loss, 25.60 minutes in operating time, and 3.10 points in the 24-hour pain score. Differences in hemorrhoid grades, laser wavelength, surgeon experience, energy delivered, anesthetic protocols, and perioperative analgesia may account for variations in effect size.

Khadr et al. (2024)[11] compared laser hemorrhoidoplasty with LigaSure hemorrhoidectomy and diathermy hemorrhoidectomy in 93 patients with Grade III and IV hemorrhoids. Laser hemorrhoidoplasty was associated with significantly shorter operative time, reduced intraoperative blood loss, less postoperative pain, and faster return to work than diathermy hemorrhoidectomy. These observations were highly consistent with the present results, particularly because both studies included patients with advanced Grade III and IV disease.

Postoperative Complications and Recovery

The present study demonstrated significantly lower rates of postoperative bleeding, urinary retention, wound infection, anal edema, fecal impaction, and delayed hemorrhage in the laser group. Any postoperative complication occurred in 13% of patients undergoing laser hemorrhoidoplasty and 31% undergoing Milligan–Morgan hemorrhoidectomy. Complete wound healing within three weeks was achieved in 94% and 83% of patients, respectively. Laser hemorrhoidoplasty shortened complete wound healing by 11.10 days, hospital stay by 2.20 days, return to normal activities by 7.50 days, and return to work by 3.50 days.

Wee et al. (2023)[8] found that laser hemorrhoidoplasty significantly reduced postoperative bleeding and accelerated return to daily activity. The preservation of the anoderm and the absence of a large open surgical wound were considered major reasons for the reduced postoperative morbidity. These findings supported the lower wound infection, anal edema, and delayed bleeding rates recorded in the present study.

Cheng et al. (2024)[10] reported significantly lower postoperative bleeding and anal stenosis following laser hemorrhoidoplasty. However, pooled rates of urinary retention and fecal or flatus incontinence did not differ significantly between laser and conventional surgery. In contrast, the present study found urinary retention to be significantly less common in the laser group. This difference may have been influenced by the intensity of postoperative pain, type of anesthesia, intravenous fluid administration, opioid use, and institutional catheterization practices.

Khadr et al. (2024)[11] reported that laser hemorrhoidoplasty and LigaSure hemorrhoidectomy produced fewer postoperative complications and faster recovery than conventional diathermy hemorrhoidectomy. Laser hemorrhoidoplasty had a particular advantage regarding operative time, intraoperative bleeding, and time to return to work. Their findings corresponded with the shorter hospital stay and earlier resumption of work observed in the present study.

Verma et al. (2024)[12] compared laser hemorrhoidoplasty combined with digital-guided hemorrhoidal artery ligation with conventional Milligan–Morgan hemorrhoidectomy. The laser-based approach was associated with lower postoperative pain, shorter hospitalization, and faster functional recovery. Their results further supported the present observation that minimally invasive devascularization and shrinkage of hemorrhoidal tissue could reduce tissue trauma and improve early recovery.

The 2024 Laser Hemorrhoidoplasty Recommendations Development Group emphasized the need for standardized patient selection, laser wavelength, energy delivery, fiber placement, and procedural technique. The group considered symptomatic Grade II and III hemorrhoids the clearest indications for standalone laser hemorrhoidoplasty and advised caution in more advanced prolapse requiring additional mucopexy or excisional procedures. This qualification was relevant to the present study because Grade IV disease may respond less predictably to laser shrinkage alone than Grade III disease.

Recurrence and Long-Term Outcomes

At 12 months, recurrence occurred in 9% of laser-treated patients and 3% of patients treated with Milligan–Morgan hemorrhoidectomy. Recurrent bleeding was recorded in 8% and 2%, while recurrent prolapse occurred in 7% and 2%, respectively. Although these differences did not achieve conventional statistical significance, all recurrence-related outcomes numerically favored conventional hemorrhoidectomy. Complete symptom resolution, patient satisfaction, and excellent functional outcome were also numerically higher following Milligan–Morgan hemorrhoidectomy. The overall successful outcome was significantly higher after conventional surgery, at 96% compared with 88% after laser hemorrhoidoplasty.

The tendency toward greater recurrence after laser treatment was clinically plausible because laser hemorrhoidoplasty coagulates and shrinks the hemorrhoidal plexus without removing the complete prolapsing tissue. In contrast, Milligan–Morgan hemorrhoidectomy excises the pathological hemorrhoidal tissue and ligates its vascular pedicle, providing a more definitive anatomical correction. Therefore, the improved early comfort offered by laser treatment may be accompanied by residual or recurrent prolapse, especially in extensive Grade IV hemorrhoids.

Poskus et al. (2020)[4] found that excisional hemorrhoidectomy provided more complete anatomical correction than non-excisional procedures, although it caused greater early postoperative discomfort. Their results supported the present finding that Milligan–Morgan hemorrhoidectomy had a higher overall long-term success rate despite slower recovery.

Wee et al. (2023)[8] reported that the 12-month risks of recurrent bleeding and prolapse and the probability of complete symptom resolution were broadly comparable between laser hemorrhoidoplasty and conventional hemorrhoidectomy. In the present study, recurrence differences were also statistically non-significant, although the numerical trend favored conventional surgery. The relatively wide confidence intervals around the recurrence odds ratios suggested limited precision and indicated that a larger sample or longer follow-up might be required to establish whether the observed differences represented a true long-term disadvantage of laser treatment.

Cheng et al. (2024)[10] similarly found no statistically significant pooled difference in hemorrhoidal recurrence between laser and conventional hemorrhoidectomy. However, the authors noted heterogeneity in follow-up duration, hemorrhoid grade, laser wavelength, use of associated mucopexy, and recurrence definitions. Therefore, recurrence findings should be interpreted cautiously, particularly in patients with Grade IV hemorrhoids.

Khadr et al. (2024)[11] found that although laser hemorrhoidoplasty improved pain and recovery, LigaSure hemorrhoidectomy produced greater improvement in hemorrhoidal disease symptom and quality-of-life scores. This observation supported the possibility that excisional techniques may provide better disease clearance in advanced hemorrhoids, despite a more difficult early postoperative course.

In the present study, persistent pain at 12 months was significantly less frequent after laser hemorrhoidoplasty, occurring in 7% compared with 17% after Milligan–Morgan hemorrhoidectomy. Anal stenosis was also less frequent in the laser group, although the difference narrowly failed to reach statistical significance. Cheng et al. (2024)[10] found a significantly lower pooled risk of anal stenosis with laser hemorrhoidoplasty, supporting the tissue-preserving advantage of the procedure. The lower rates of persistent pain and stenosis could be explained by the absence of extensive anodermal excision and preservation of mucosal bridges.

CONCLUSION

Laser hemorrhoidoplasty and conventional Milligan–Morgan hemorrhoidectomy were both effective surgical treatments for Grade III and IV hemorrhoids; however, they demonstrated different clinical advantages. Laser hemorrhoidoplasty provided significantly better early postoperative outcomes, including shorter operative duration, lower intraoperative blood loss, reduced postoperative pain, decreased analgesic requirement, fewer postoperative complications, faster wound healing, shorter hospital stay, and earlier return to normal activities and work. It was also associated with lower rates of persistent postoperative pain and a reduced tendency toward anal stenosis.

Conventional Milligan–Morgan hemorrhoidectomy, although associated with greater postoperative pain, longer recovery, and a higher frequency of early complications, achieved better long-term disease control. The procedure demonstrated a significantly higher overall successful surgical outcome and numerically lower rates of recurrent bleeding, recurrent prolapse, recurrence, and reintervention during follow-up. Therefore, laser hemorrhoidoplasty may be preferred in patients who prioritize minimal postoperative discomfort and rapid recovery, while Milligan–Morgan hemorrhoidectomy remains a more definitive option, particularly in patients with extensive Grade IV hemorrhoids or a high risk of recurrence. Selection of the surgical technique should be individualized according to hemorrhoidal grade, extent of prolapse, patient preference, comorbidities, cost considerations, surgeon experience, and the relative importance of early recovery versus long-term disease control.

LIMITATIONS OF THE STUDY

The present study had several limitations. It was conducted at a single tertiary care institution, which may limit the generalizability of the findings to other healthcare settings and patient populations. The sample size, although adequate for evaluating common early postoperative outcomes, may not have been sufficient to detect statistically significant differences in relatively uncommon complications, recurrence, anal stenosis, and reintervention. The follow-up duration was limited to 12 months, and longer follow-up would be necessary to evaluate late recurrence, persistent prolapse, long-term anal function, and durability of symptom control.

Allocation to the two treatment groups may not have been fully randomized, resulting in a possibility of selection bias. Complete blinding of patients and surgeons was not feasible because of the visible differences between the procedures and postoperative wounds. Pain scores and patient satisfaction were subjective outcomes and may have been influenced by individual pain tolerance, expectations, analgesic use, and awareness of the surgical technique. Variations in hemorrhoidal anatomy, proportion of Grade III and IV cases, surgeon experience, laser energy settings, and operative technique may also have affected the results.

The study did not include a detailed cost-effectiveness analysis, despite the higher equipment-related cost of laser hemorrhoidoplasty. Quality of life was not assessed using a validated disease-specific questionnaire, and anorectal manometry was not performed to objectively evaluate sphincter function. Furthermore, subgroup analyses according to hemorrhoidal grade, number of hemorrhoidal cushions, extent of external components, and associated mucosal prolapse were not undertaken. Multicentric randomized controlled trials with larger samples, standardized operative protocols, validated patient-reported outcome measures, economic evaluation, and longer follow-up are therefore required.

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