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# Laser Hemorrhoidoplasty Versus Milligan-Morgan Hemorrhoidectomy, A Comparative Study

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## Abstract

**Background:** Laser hemorrhoidoplasty (LHP) has been used recently for the advantages of less pain, faster recovery, and fewer complications to avoid postoperative consequences of conventional surgery, but it has more cost and needs sufficient experience.

**Aim of the study:** To compare outcomes of LHP to hemorrhoidectomy for 6 months after surgery.

**Materials and Methods:** Prospective randomized study was done on 94 patients divided into two groups; group A (43 patients) underwent LHP, and group B (51 patients) had Milligan-Morgan hemorrhoidectomy for treatment of grade II-III hemorrhoids, observation of operative and postoperative findings and questionnaire applied for patient satisfaction 6 months after Surgery.

**Results:** Mean pain severity was less in LHP on the day of the procedure without significant difference ( $P=0.2$ ), but on the seventh-day difference was significant ( $p=0.03$ ). The time for recovery from pain was significantly less in LHP patients. No significant difference found in hospital stay and pain after 6 months. One patient (2.3%) in the LHP group and 6 patients in hemorrhoidectomy group (11.7%) reported postoperative bleeding. Three patients in each group showed surgery site infection. No reported fistula, stenosis, or incontinence. Readmission done for 2 patients (2.12%), both in hemorrhoidectomy group. One patient (2.3%) in LHP group and 5 patients in the hemorrhoidectomy group (9.8%) reported recurrence. After 6 months of surgery, 88.4% (30 patients) of LHP and 68.6% (35 patients) of surgery group were satisfied.

**Conclusion:** LHP is safe and effective for grades II & III hemorrhoids with less pain, faster recovery, and fewer complications. More extensive studies are required for long term outcomes evaluation.

**Keywords:** LHP, Laser hemorrhoidoplasty, hemorrhoidectomy

## 1. Introduction

Hemorrhoids is a common disease all over the world. At least 35% of populations have suffered hemorrhoidal symptoms in males and females over the past decades at different age groups. Hemorrhoidal disease is a common cause of surgical clinic visits and admission for surgical treatment. Milligan-Morgan hemorrhoidectomy is still one of the most commonly utilized surgical interventions for hemorrhoids. Recently, other less invasive techniques could be Doppler ligation of hemorrhoidal artery (THD), stapler hemorrhoidectomy, and Laser hemorrhoidoplasty.<sup>1</sup>

Laser treatment techniques in hemorrhoids involve different types and wavelengths and work by 2 modalities: either by halting arterial blood flow in hemorrhoid pedicles using a Laser

beam to induce coagulation or induction of fibrosis. Hence, the pedicle shrinks towards the anal canal mucosa, which subsequently prevents its prolapse. Advantages of Laser use in hemorrhoidal disease include minimal tissue damage, better hemostasis, shorter duration of surgery, less hospital stay, fast healing, minimal affection of neighboring structures, better postoperative pain with fewer complications regarding hemorrhage and stenosis.<sup>2,3</sup> However, enough training and precautions must be applied for surgeons before the use of Laser in hemorrhoids therapy with eye protection by goggles from harmful lights produced by Laser.<sup>4</sup>

This study compared the effects of two surgical modalities for hemorrhoid treatment Milligan Morgan hemorrhoidectomy and Diode Laser. Results were evaluated in terms of operative time, postoperative outcomes, and the incidence of complications.

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## 2. Patients and methods

This study was carried out in Mouwasat Hospital, Qatif, Saudi Arabia, between April 2022 and March 2023; then, follow-up of patients for 6 months and involved Ninety-four patients consisted of 2 groups; forty-three patients were included in the first group treated by Laser hemorrhoidoplasty (LHP) and fifty-one patients were included in the second group treated by Ligasure Milligan and Morgan hemorrhoidectomy. Informative consents were taken before surgery after every patient was informed about all procedure details. The institutional ethical committee approved study according to hospital policy of medical research, and consents were taken from all patients before the procedure after being informed about all the procedure and study details.

**Inclusion criteria:** patients with symptomatic grade II or III hemorrhoids with no or minimal response to medical treatment, aged between 23 and 55 years old of both sexes; 62 males and 32 females.

**Exclusion criteria:** patients with acute anal conditions (such as thrombosed hemorrhoids, abscess, inflamed perianal area), grades I & VI hemorrhoids, those with associated other anorectal pathology (as perianal fistula, rectal cancer, inflammatory bowel diseases), patients with bleeding tendency, pregnancy and patients unfit for surgery and those who refused follow-up were excluded from the study.

**Technique of Laser procedure:** A Pouch is created within each hemorrhoid pedicle through a small skin incision. A diode Laser machine with a wavelength of 980nm and cable 400mm was used. Laser probe is inserted, and 3-6 Laser shots are applied according to pedicle size. Each Laser shot has a maximum time of three seconds, maximum energy for every pouch ranges from 80 to 160 Joules. The total energy applied ranged from 150 to 550 Joules, with a mean value of 287 Joules. [Figure 1](#) show LHP procedure for grade III hemorrhoids at 3, 7, and 11 O'clock positions & [Figure 2](#) shows picture at the end of surgery with regression and minor wound size.

**Surgical Hemorrhoidectomy technique:** Conventional surgery was done by Miligan-Morgan hemorrhoidectomy technique using a Ligasure device; a V-shaped incision on the pedicle, then pedicle excised and transfixed at dentate line level.

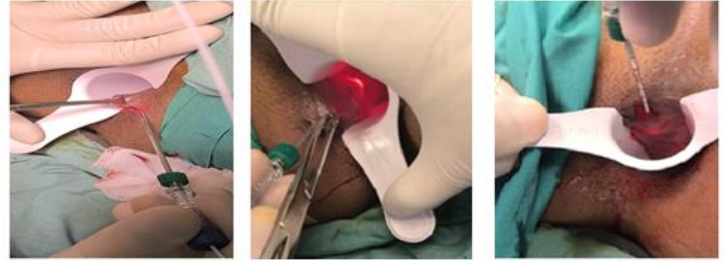


Figure 1. LHP for hemorrhoids at 3, 7 & 11 O'clock positions



Figure 2. Picture at end of LHP shows regression of hemorrhoids and small wounds

In hospital, patients were followed for pain, bleeding and recovery from anesthesia, passage of stools and other parameters. Postoperative pain was reported using numeric visual analog scale (VAS); 10 points score from 0 to 10 with 0 score represents no pain and 10 score reflects the worst intolerable pain. VAS score was used to measure the pain severity on day of surgery and following postoperative days then weekly for one month and monthly till 6th month postoperative. Mean score of early postoperative pain at day of surgery and after 1 week then at end of study were reported and analyzed for every patient and time of recovery from pain was reported. Mean operative time, need for analgesia, postoperative complications and total hospital stay were reported. Patients were followed after 3 days then after 7 and 14 days and regular visits done and follow-up continued for 6 months to report healing, post-operative pain, presence of complications as infection bleeding, perianal fistula, stenosis and recurrence. A satisfaction questionnaire was applied at end of 6th month after surgery to assess patient opinion as regard social, emotional and physical aspects after experience. Patients were asked about how they feel currently in comparison to preoperative time and health-related quality of life, including activity limitations, physical complains, effect on social activities. Higher score indicates better quality of life.

### Statistical Analysis

Data was collected, revised and analyzed using R software version 4.4.0 and SPSS version 28 for Windows. Shapiro-Wilk test was used for quantitative data and results were presented as mean and SD. Student's t test was used for comparing variables between the two groups. Qualitative data was demonstrated in frequency and percentage with Chi-square test and Fisher's exact tests for association between variables. P value was considered significant when equal or less than 0.05.

### 3. Results

The mean age of the patients in the Laser and the surgery groups were  $39.55 \pm 4.29$  years and  $36.73 \pm 2.53$  years respectively. 62 patients (66.6%) were males; 28 patients (65.1%) in the Laser group and 34 patients (66.7%) in the surgery group. The main cause of referring to hospital in both groups was pain (58% in Laser group Vs 63% in surgery group) and grade III hemorrhoids was 72% in Laser group and 69% in surgery group. As regard age, gender, hemorrhoids size and complaint there were no statistically significant differences between the studied groups (Table 1).

Table 1. Demographic and clinical data in both groups

	LASER (N=43)	SURGERY (N=51)	P VALUE
MALE GENDER %	28 (65.1 %)	34 (66.7 %)	0.934
AGE (YEARS)	$39.55 \pm 4.29$	$36.73 \pm 2.53$	0.812
PAIN PRESENTATION %	58%	63%	0.216
BLEEDING PRESENTATION %	37%	49.50%	
GRADE III HEMORRHOID %	72%	69%	0.314

The mean pain severity based on VAS score after surgery at day of operation was less in Laser group patients  $1.77 \pm 0.9$  and in surgery group it was  $4.5 \pm 0.7$  but difference was insignificant;  $p = 0.19$  (Figure 3). Four patients in Laser group has pain score more than 3/10 in the operation day, in 2nd postoperative day, 3 of them were  $\leq 2/10$ . In Surgery group, 7 patients had pain more than 5/10 in the operation day, 5 of them improved in 2nd postoperative days and became  $\leq 3/10$ . One female patient returned to hospital 3 days after discharge (5th postoperative day) with pain score 8/10, patient suffered constipation at home followed by passage of hard stools associated with severe pain, patient was re-admitted and received injectable pain killers and analgesics, improved and discharged 2 days later.

After 7 days of surgery, mean pain in Laser group was  $1.11 \pm 0.4$  versus  $3.5 \pm 0.9$  in surgery group ( $p = 0.0312$ ) which is statistically significant. At 6 months after surgery, pain on defecations had markedly reduced intensity with mean pain of 1 / 10 in both the groups, but the mean of pain was  $1.10 \pm 0.30$  in the Laser group and  $1.42 \pm 0.68$  in those of surgery group, ( $p = 0.178$ ) which is statistically insignificant (Figure 4).

Time for pain to disappear and duration of need for analgesics to control pain were followed in all patients of both groups, found that mean time for Laser group is shorter,  $8.1 \pm 3.55$  days versus  $14.86 \pm 1.8$  days in surgery group, difference was statistically significant;  $p = 0.007$  (Figure 5). Data regarding mean pain scores and time for recovery were demonstrated in Table 2.

The hospital stay after Laser procedure was  $1.43 \pm 0.35$  days for the Laser group and  $1.61 \pm 0.55$  days for the surgery group. Results show no significant difference between the two groups in length of hospital stay ( $p = 0.156$ ).

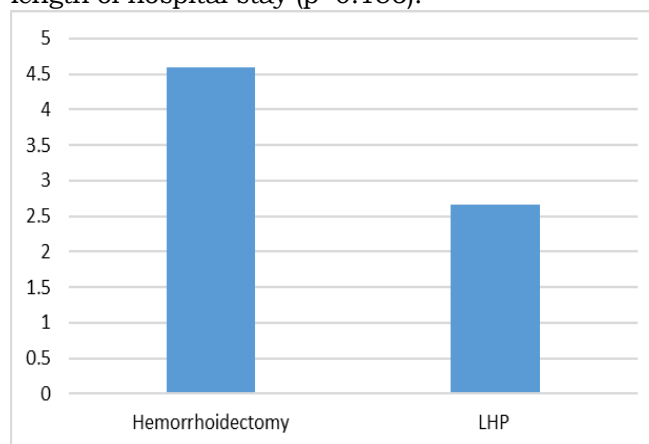


Figure 3. Mean pain score in 1st day of surgery

As regard early postoperative bleeding, in Laser group; only one patient had significant bleeding in 1st postoperative days (2.3%), patient was treated conservatively using medications, stool softeners, rest and observation then bleeding stopped in following days. On the other group, 6 patient reported postoperative bleeding (11.7 %), 5 of those patient has mild to moderate bleeding improved on conservative treatment and remaining one patient showed massive bleeding, he was admitted examination under anesthesia was done in OR revealed bleeding from bed and pedicle of one hemorrhoid pedicle and bleeding stopped by electrocautery and sutures in the pedicle and bed then discharged after 2 days then no recurrence of bleeding reported.





Figure 4. Mean pain score after 7 days of surgery

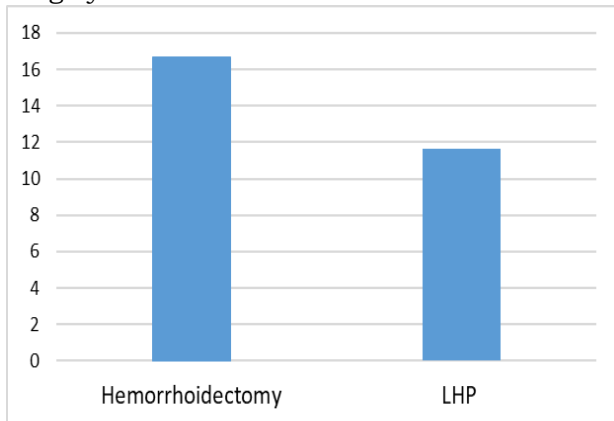


Figure 5. Mean time for recovery from pain (days)

Table 2. Mean pain scores in 1st day, 7th postoperative day and time of recovery

	LHP	HEMORRHOIDECTOMY	P VALUE
PAIN SCORE IN 1 <sup>ST</sup> DAY OF SURGERY	1.77±0.9	3.90±0.7	0.1981
PAIN SCORE IN 7 <sup>TH</sup> POSTOPERATIVE DAY	1.11 ± 0.4	3.50 ± 0.9	0.0312
TIME FOR RECOVERY OF PAIN (DAYS)	8.1 ± 3.55	14.86 ± 1.8	0.0078

In Laser group, 3 patients (6.97 %) reported surgical site infection, one of them has mild infection presented by tender swelling at one pouch with no pointing or fever. Patient was treated by oral antibiotics for 7 days and improved without additional intervention. The other patient was presented by tender swelling also at one pouch and received oral antibiotics but in the 5th day of treatment the swelling became worse and pointing (abscess collection), incision and drainage done under local anesthesia as outpatient procedure and patient improved later on. In the Surgery group, 3 patients (5.88 %) presented by infected surgery site with purulent discharge, all of them treated by oral antibiotics for 7-10 days and improved with no additional procedures. No cases in both groups reported incidence of fistula in ano, anal fissures, fecal incontinence or anal stenosis till end of follow-up

period (Figure 6).

The overall readmission was 2 patients (2.12 %), both in surgery group; one for bleeding and other for pain control. Other patients with postoperative complains treated conservatively with oral medications at home.

Data regarding recurrence were collected on basis that every patient without primary improvement of symptoms or recurrence of symptoms during follow-up has been considered as recurrent cases. In Laser group, one patient (2.3 %) reported recurrence of minor self-limiting anal bleeding on defecation with recurrent constipation, no clinically prolapsed hemorrhoids and patient was treated conservatively. In surgery group, 5 patients (9.8 %) were complaining recurrence, one patient did not improve after surgery and continued to complain burning pain on defecation, 2 patients complains prolapsed hemorrhoids on defecation and 2 patients complains mild bleeding on defecation. All patients has mild symptoms, treated medically and follow-up continued. Numbers and percentages of complications in both groups are shown in Table 3.

Replies in the applied questionnaire showed that 88.4 % (30patients) of LHP patients were satisfied and feel better, while 68.6 % (35 patients) of surgery group felt better. Nonetheless, there was no statistical significance as regard this point ( $p=0.135$ ). All patients of both groups at the end of this study replied that there is no effect after surgery on physical or social activity despite higher symptomatic recurrence in surgery group.

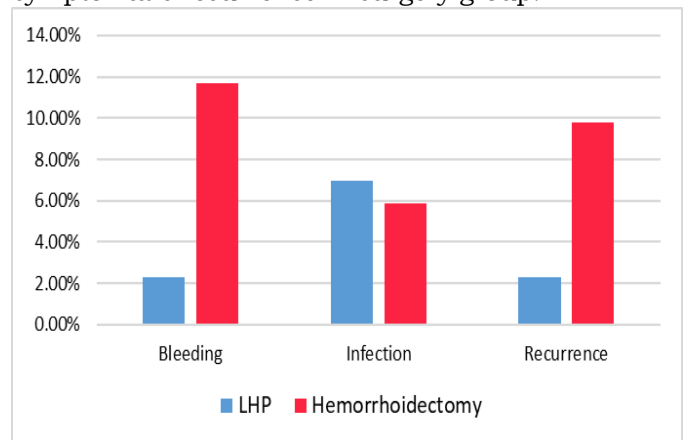


Figure 6. Percentage of complications in both groups

Table 3. Numbers and percentage of complications in both groups

COMPLICATION	LHP	HEMORRHOIDECTOMY
N		
BLEEDING	1 (2.3%)	6 (11.7%)
INFECTION	3 (6.97%)	3 (5.88%)
RECURRENCE	1 (2.3%)	5 (9.8%)

#### 4. Discussion

Despite postoperative pain being a predictable consequence after surgery, patients consider it as a complication. Acute pain is the most most familiar complaint in patients post-hemorrhoidectomy surgical techniques with variety of other postoperative complaints such as bleeding and infection.<sup>5,6</sup> Patients are also usually worried about the time needed to recover, the incidence of recurrence, or failure to control symptoms after surgery.<sup>7</sup> New techniques were proposed with expectations to minimize post-surgical complaints with fewer hospital stays to allow earlier return of the patient to work and social activities with a good quality of life after surgery. Many requirements affect decision-making during selection of surgical procedures, including patient factors (such as the degree of hemorrhoids, symptoms, nature of anal pathology, GIT, and general diseases.... etc.) and experiences & skills of the surgeon.<sup>8</sup> In this work, postoperative findings were compared between conventional surgery and an emerging techniques in surgical field (LHP) which avoids excision of the pedicles and large wounds so, expected to allow more rapid healing and less postoperative pain and complications.

Pain was evaluated early in the postoperative period until it improved and at 6 months after surgery based on VAS. The study revealed that the pain score in the early postoperative days was lower in LHP patients, and those patients were free of pain and so returned to work and social activities earlier than conventional surgery patients.

The pain scores on the day of surgery were lower in LHP patients. However, scores regarding this item did not show statistical significance in both groups, and all patients received analgesics. However, dramatic improvement in scores in LHP patient was reported in scores in the seventh postoperative day ( $1.11 \pm 0.4$  Vs  $3.5 \pm 0.9$ ). Also, the mean time needed to stop pain medications and recover from pain was shorter in the LHP group than in the surgery group ( $8.1 \pm 3.55$  Vs.  $14.86 \pm 1.8$  days, respectively). Pain showed marked improvement at 6 months in both groups, with statistically insignificant value.

In the study of Mosavaret al differences in immediate pain after surgery was also insignificant between groups. This was also reported in the study of Singla as regards postoperative pain observed in Laser and non-Laser procedures. However, in another study by Sankar, postoperative pain was significantly better in LHP patients than in surgical groups. In the Shabahang et al., Laser procedures reported less postoperative pain when compared to surgical procedures.<sup>9,10,11,12</sup>

Mean hospital stay in the current study was

not significant between both groups; in another study by Zahir, 50 patients treated with Laser reported significantly less hospitalization and favorable postoperative outcomes regarding return to work and activities.<sup>13</sup>

In this study, collected data regarding postoperative bleeding revealed the incidence of postoperative bleeding in 7 patients in both groups (7.4 %), and it was lower in LHP patients (one patient) compared to the surgery group (6 patients). Moreover, LHP patients who suffered bleeding were successfully treated medically, and no re-operation was indicated in the LHP group. In contrast, one patient was re-operated for massive bleeding in the surgery group. Similar results were reported in the study of Fadil et al that showed post-LHP significantly lower than post-traditional hemorrhoidectomy.<sup>14</sup> Also, experience of Dawood revealed low bleeding rates in the Laser group compared to the conventional surgery group.<sup>15</sup>

In this study, total number of cases with surgery site infection was similar in both groups 3 patients in the LHP group (6.97 %) and 3 patients in surgery group (5.88 %), but infection was mild in the surgery group and treated medically while in Laser group infection led to abscess collection and indicated further drainage in one patient. These results were not correlating with the work of Fadil et al and Ram et al who documented a significantly lower rate of infection in the LHP group. Two patients were readmitted from surgery group throughout work for bleeding and pain control; no readmission was reported in LHP group.<sup>14,16</sup>

Symptomatic recurrence was reported only in one patient of the LHP group and 5 patients of the surgery group (2.3 % versus 9.8 %), with no clear indications for second surgery in all patients. This indicates more favorable results of this study as regard symptomatic relief. Similar results were reported in many studies as Crea et al., Plaper et al., and Wee et al.<sup>17,18,19</sup> On other hand, some studies reported higher recurrence rates in open surgery of Milligan – Morgan technique as Tümer & Ağca study.<sup>20</sup> Similar results to a current study reported in a meta-analysis of Cheng et al.<sup>21</sup>

In the questionnaire applied, there was no difference in affection for physical and social activities with relatively more satisfaction in the LHP group, but results were statistically insignificant. In contrary to these results, Ram et al., Dursun et al. and Sattar studies there was significantly higher patient satisfaction after Laser procedures.<sup>16,22,23</sup>

#### 4. Conclusion

This study showed that Laser hemorrhoidoplasty (LHP) is an effective and safe technique in treating grade II & III hemorrhoids with less pain, shorter

recovery time, less complications, and more patient satisfaction than conventional surgery. However, further large randomized trials with evaluation of long term effects are required for more reliable results.

## Disclosure

The authors have no financial interest to declare in relation to the content of this article.

## Authorship

All authors have a substantial contribution to the article

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## Conflicts of interest

There are no conflicts of interest.

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