Laser hemorrhoidoplasty versus Milligan–Morgan hemorrhoidectomy (short-term outcome)

Original Article

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ABSTRACT

Background: Hemorrhoidal disease refers to the abnormal changes in blood vessels within the anal cushion. Surgery is recommended when conservative treatments are unsuccessful or for severe cases. One of the surgical techniques used is Milligan–Morgan (MM) hemorrhoidectomy. Nonexcisional laser hemorrhoidoplasty (LHP) is a recently developed and less invasive procedure.

Objective: To assess the amount of bleeding during surgery, the duration of the operation, the level of pain after surgery, the incidence of infection, and the time it took for patients to resume their work and complete recovery between LHP and MM procedures.

Patients and Methods: A cross-sectional study was performed on a cohort of 40 patients diagnosed with the hemorrhoidal disease who were eligible for surgery. The study was conducted in the General Surgery Department of a tertiary hospital. The individuals were categorized into two groups: 20 individuals with MM and 20 individuals with LHP.

Results: The average age of study participants was 33.4±10.3 years. Most of them were males (62.5%). The average duration of the surgical procedure in the LHP group was significantly shorter compared to the MM group (20.3±1.1 min against 25.3±2.5 min, respectively). The LHP group exhibited a notable reduction in intraoperative hemorrhage compared to the MM group. The pain score in the LHP group was less after 6 h. The MM group saw significantly longer periods required for returning to work and completing recuperation.

Conclusion: LHP results in reduced operative time, intrasurgical bleeding, and postoperative pain. Additionally, it promotes faster healing, quicker return to work, and shorter recovery time.

Key Words: Hemorrhoidal disease, laser hemorrhoidoplasty, Milligan–Morgan hemorrhoidectomy, postoperative pain.

Received: 23 May 2024, **Accepted:** 6 June 2024, **Published:** 4 October 2024

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ISSN: 1110-1121, October 2024, Vol. 43, No. 4: 1428-1434, © The Egyptian Journal of Surgery

INTRODUCTION

Hemorrhoidal disease is characterized by the abnormal enlargement and deformation of blood vessels associated with connective tissue changes in the anal cushion[1]. It is one of the most prevalent anorectal diseases[2]. The disease has the highest incidence rate among individuals aged 45–65 years and declines beyond the age of 65[3]. Although hemorrhoidal disease is benign, it does create significant discomfort, anxiety, and distress[4]. Hemorrhoids are categorized as either internal or external depending on their position relative to the dentate line[5]. The management of the condition relies on patient factors and grading. Surgery is typically recommended when conservative approaches fail or for higher grades (III and IV)[6]. The condition can be classified using grading systems such as the Banov, Goligher, or BPRST classification[7]. The therapeutic options for symptomatic hemorrhoids have changed over time. The measures encompass a range of conservative medical interventions, noninvasive therapies, and surgical techniques[5]. The conservative approach involves making changes to one's diet and using venotonics. Noninvasive treatments for this condition encompass rubber-band ligation, sclerosing injection, cryotherapy, and infrared coagulation[8,9]. If conventional approaches are ineffective, patients undergo surgical treatment. Postoperative pain and discomfort are the predominant issues encountered in surgical treatment[10]. One of the classic surgical techniques used is Milligan–Morgan (MM) hemorrhoidectomy. Subsequent alternative procedures, including the Ferguson closed hemorrhoidectomy, rubber-band ligation, and stapled hemorrhoidopexy, were found to be compromised by postoperative bleeding and a higher rate of recurrence[11,12]. Nonexcisional laser hemorrhoidoplasty (LHP) is a new and minimally invasive procedure. It involves using a laser probe that is inserted through a minute skin incision near the mucocutaneous junction and then introduced into the hemorrhoidal tissue[13]. The laser's thermal energy induces the closure of the hemorrhoidal plexus through the formation of blood clots inside the hemorrhoidal plexus,

DOI: 10.21608/EJSUR.2024.291999.1084

which leads to the adhesion of the rectal mucosal and submucosal layers to the underlying muscle layer. This process triggers fibrosis and tissue remodeling, leading to the obliteration of the hemorrhoidal tissues[14].

Thus, this study was conducted to assess the amount of bleeding during surgery, the duration of the operation, the level of pain after surgery, the incidence of infection, and the time it took for patients to resume their work and complete recovery between LHP and MM procedures.

PATIENTS AND METHODS:

This study was a prospective cross-sectional study involving 40 patients with piles, who were divided into two groups: 20 patients in the MM hemorrhoidectomy group and 20 patients in the LHP group. We enrolled patients who presented to the outpatient clinic of a tertiary hospital's general surgical department with hemorrhoids and were eligible for surgery from March 2022 to August 2022. We enrolled patients aged 18 years or older who had third-degree hemorrhoids. We eliminated individuals with uncontrolled diabetes mellitus, liver cell failure, regular use of anticoagulant medications, and those who had undergone previous anal procedures. Screening colonoscopy was done for all patients older than 40 years of age to exclude colorectal cancers.

Participants were assigned randomly to two groups using the closed envelope method.

After the ethical committee's approval of code MS-169-2020, participants were provided with comprehensive information regarding the procedures, potential risks, and benefits. A written informed consent was then obtained from each participant. Voluntary participation was required. Strict confidentiality and privacy were upheld during the whole process of data collection, entry, and analysis in accordance with the principles outlined in the Declaration of Helsinki.

Patients were observed, and their progress was documented during weeks 1, 2, 3, 4, and after 8 weeks.

A single colorectal surgeon conducted all the procedures. The surgeries were performed using regional anesthesia.

Prior to surgery, depilatory creams were used to shave the perianal area. The patients were operated on while in the lithotomy position. For pain control, every patient was administered intravenous nonsteroidal analgesics (75 mg diclofenac) every 12 h as required following surgery. If the discomfort continues, we provide 50 mg of pethidine intramuscularly as required. Home treatment was in the form of paracetamol 0.5 g twice daily, NSAIDs if required, sitz bath and laxative if needed.

Within the LHP group, an anoscope was utilized, followed by a laser employing Bio-Litec equipment equipped with a light emitting diode from Bonn, Germany. The diode operates at a wavelength of 980±30 nm and has an optical power of 8–15 W in pulse mode.

Initially, we made a little cut in the skin, ~1–1.5 cm away from the anal verge at the intersphincteric groove, in a circular shape, with a diameter of around 1 mm. The laser probe was inserted into the skin or mucous membrane until it reached the area beneath the distal rectal mucosa above the hemorroidal tissue. Subsequently, around six pulses were administered, each tailored to the specific dimensions of the piles. Each node has 30 J of energy, with half of it concentrated in the submucosal region and the other half in the intranodal region.

Within the MM hemorrhoidectomy group, a V-shaped incision was made in the skin around the base of the hemorrhoid, followed by precise dissection in the submucous area to completely remove the hemorrhoid from its position. The dissection was performed in a direction towards the head, reaching the pedicle, which was tied off, and the lower half was removed. Additional hemorrhoids were treated similarly, resulting in a skin bridge to prevent stenosis. The wound remains unclosed, and a hemostatic gauze pad was inserted into the anal canal.

The evaluation of bleeding during surgery was conducted using a visual analog scale. Furthermore, the evaluation of pain experienced after surgery was conducted by employing the visual analog scale on specific days: 1, 7, 14, 21, 30, and 60 postsurgery.

The visual analog scale score is a score from 0 to 10 depending on the level of intensity (Fig. 1)[15].

For pain, the numerical range of 0–1 indicates the absence of any pain.

Reduced pain intensity, ranging from 1.1 to 3.

Pain of moderate severity, ranging from 3.1 to 7.

Severe pain ranging from 7.1 to 9.

Intense and difficult-to-endure pain experienced ranges from 9.1 to 10.

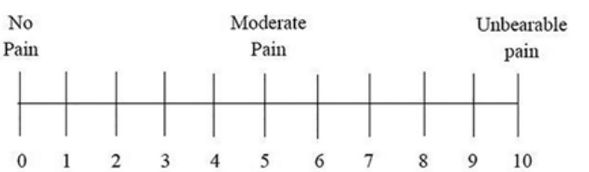

Fig. 1: A visual analog scale.

Patient observation for bleeding occurred during weeks 1, 2, 3, and 4, as well as during the first and second months

after treatment. Additionally, observation for significant bleeding at any time occurred.

Sample size

The sample size was determined using the formula: n=(Zα/2+Zβ)2 * (p1(1-p1) +p2(1-p2)) / (p1-p2)2. Here, Zα/2 represents the critical value of the normal distribution at α/2, which is 1.96 for a confidence level of 95% (where α equals 0.05). Zβ is the critical value of the normal distribution at β (with a power of 80%, β is 0.2, and the critical value is 0.84). p1 and p2 are the predicted sample proportions of the two groups[16]. The sample size was approximated as N per group=20 patients.

Statistical analysis

The data was analyzed by SPSS (statistical software for social science), version 26.0 on IBM compatible computer (SPSS Inc., Chicago, Illinois, USA). The qualitative data was reported as number and percentage and evaluated using χ^2 test. Quantitative data were assessed for normality using the Shapiro–Wilks test, assuming normality at *P value* more than 0.05. Quantitative data was described as mean and SD, examined using a t test, and Mann–Whitney U test. The acceptable threshold of significance in this investigation was begun at 0.05 (*P<0.05* was considered significant).

RESULTS:

This study was conducted on 40 patients with piles divided into two group: 20 in the MM hemorrhoidectomy group and 20 in the LHP group, to assess the difference between the two groups.

The mean age of the studied group was 33.4±10.3 years. They included 25 (62.5%) males and 15 (37.2%) females.

All the patients had third-degree piles, and the majority (34; 85%) had the piles at 3, 7, 11 o'clock. There was no significant difference between the two groups regarding the site of the piles (Tables 1 and 2).

Table 1: Lesion-related characteristics of the studied group (N=40)

	n (%)
Site	
3, 7	1 (2.5)
3, 11	2 (5)
7, 11	3 (7.5)
3, 7, 11	34 (85)
Anesthesia	
Spinal	1 (2.5)
Sedation	39 (97.5)

Table 2: Lesion-related, operative, and postoperative characteristics of the studied group (N=40)

	Milligan–Morgan hemorrhoidectomy (*N*=20)	Laser hemorrhoidoplasty (*N*=20)	*P* value
Site			
3, 7	1 (5)	0	0.070
3, 11	2 (10)	0	
7, 11	3 (15)	0	
3, 7, 11	14 (70)	20 (100)	
Operative time (min)	25.5±2.2	20.0±0.0	<0.001
Intraoperative bleeding (Gauze)	5.3±1.1	1.0±0.0	<0.001
Postoperative superficial infection	9 (45)	3 (15)	0.038
Postoperative pain score	5.0±0.8	3.0±0.0	<0.001
Time to return to work (days)	15.5±1.5	7.0±0.0	<0.001
Time to complete healing (days)	31.5±4.9	15.0±0.0	<0.001

Values are expressed as mean±SD or n (%).

There was a significant difference between the MM hemorrhoidectomy group and the LHP group regarding the operative data. The operative time and the amount of intraoperative bleeding were significantly higher among the MM hemorrhoidectomy group, as shown in Table 2 (Figs 2 and 3).

Table 2 also shows that there was a significant difference between the MM hemorrhoidectomy group and the LHP group regarding the postoperative data. Infection with systemic manifestations was not found in any of the cases. However, nine (45%) patients from the MM group suffered superficial infection in the form of oozing and anal discharge versus three patients from the LHP group (15%), showing a statistically significant difference between both groups (*P=0.038*). The pain score, time to return to work (15.5±1.5 vs. 7.0±0.0 for MM and LHP, respectively), and time to return to complete healing (31.5±4.9 vs. 15.0±0.0 for MM and LHP, respectively) were significantly higher among the MM hemorrhoidectomy group (Table 2, Figs 4 and 5).

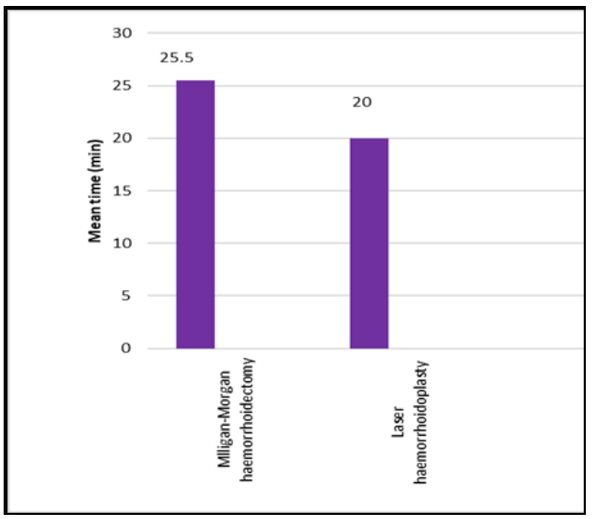

Fig. 2: Bar chart graph displaying the difference the two groups regarding the operative time.

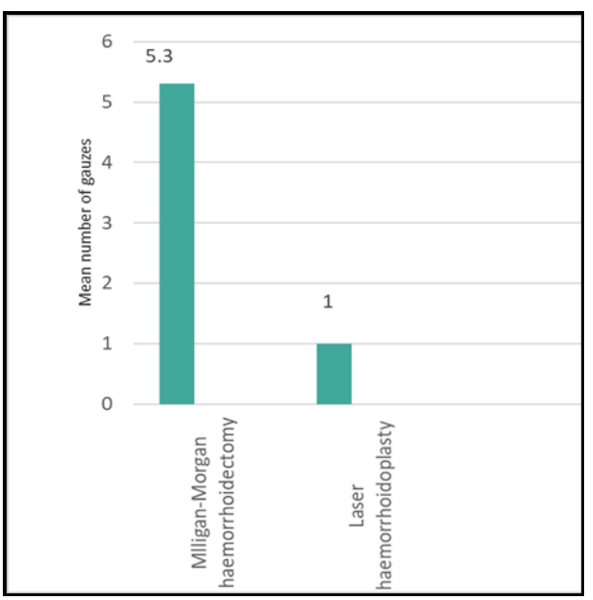

Fig. 3: Bar chart graph displaying the difference the two groups regarding the intraoperative bleeding.

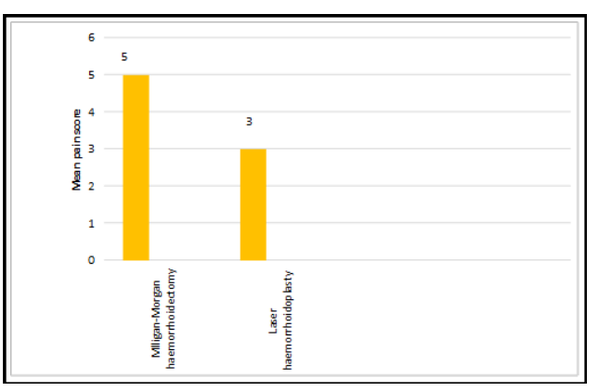

Fig. 4: Bar chart graph displaying the difference the two groups regarding the pain score.

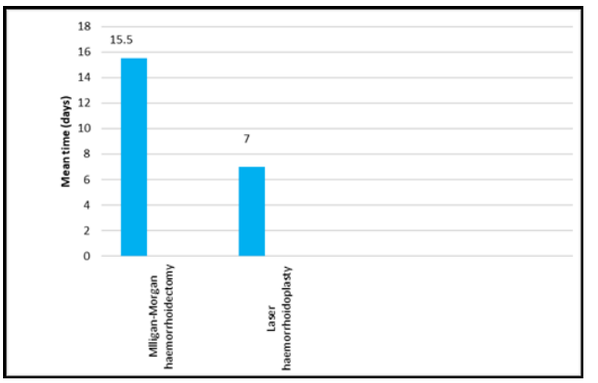

Fig. 5: Bar chart graph displaying the difference the two groups regarding the time to return to work.

DISCUSSION

The decision to manage hemorrhoids depends on patient factors and the grade of disease[6]. Surgery is considered a line of treatment after failure of conservative therapy or higher grades of disease (III and IV)[7]. A balance between avoidance of recurrence, minimizing complications, and pain is a great concern.

Hemorrhoidectomy, particularly MM hemorrhoidectomy, is a painful procedure. Pain is induced by injuring the tissue of the anal area, which is highly innervated by nerve endings. Postoperative pain is the most common complication in surgical therapy[17].

Nonexcisional LHP is a relatively innovative, minimally invasive method comprising a diode laser to focus treatment on the hemorrhoidal tissue[13].

Consequently, this study was conducted to compare intraoperative bleeding, operative time, postoperative pain, postoperative bleeding, and postoperative infection following each procedure.

This prospective cross-sectional study was conducted on 40 patients with third-degree piles divided into two group: 20 in the MM hemorrhoidectomy group and 20 in the LHP group,

The mean age of the study population was 33.4±10.3 years. The majority of these study participants were males (62.5%), and only 37.2% were females.

Keeping with this study results, Eskandaros and Darwish[18] found that among patients with third-degree hemorrhoids (120 patients), 70.83% were males and 29.17% were girls. Also, among 140 cases of hemorrhoids illness included in a study by Coulibaly *et al*.[19] males predominated with 75.71% of patients. A majority of the 30–39 years age group

was noticed. Although hemorrhoids are more common among females, these findings could be explained by their reluctant, quiet attitude and fear of surgery, which do not motivate them to approach any treatment and remain undetected[8].

In the present study, the mean operation time among the LHP group was substantially less than that in the MM group (20.3±1.1 min against 25.3±2.5 min, respectively). Also, intraoperative bleeding was decreased significantly among LHP group compared to MM hemorrhoidectomy group.

In conjunction with this study, a recent study by Nagdy[20], indicated that LHP is coupled with substantially reduced operating time compared with open surgical hemorrhoidectomy. The same results were found in other research like the study by Maloku *et al*.[21], and Eskandaros and Darwish[18], which detected that LHP operative time was shorter by 10 to 4 min than MM.

Also, research by Alsisy *et al*.[16], Naderan *et al*.[22], and Sadra and Keshavarz[23] concluded that the operative time was much shorter in the laser group than in the MM group with an average of 20 min difference between both techniques. Similarly, the intraoperative bleeding volume and postoperative bleeding episodes were considerably higher in the MM group than in the laser group in the aforementioned studies.

The shorter mean time of surgery utilizing LHP might be related to the direct access to the desired vascular cushions, which may be an advantage of LHP over more traditional procedures.

The results of the study suggest that LHP operations considerably lowered pain scores in the examined group. After 6 h, the pain score was significantly lower in the LHP group compared to the MM hemorrhoidectomy group. Additionally, at the first and second visits, the LHP group had significantly reduced pain scores compared to the MM hemorrhoidectomy group ($P<0.001$).

In concordance with this study, Eskandaros and Darwish[18] and Naderan *et al*.[22] indicated that the pain scores recorded were fewer among LHP patients than among MM patients, notably on postoperative day 1.

This was related to the nature of each surgery, where in MMH, there was a huge raw region following the excision of the hemorrhoids with exposure of the nerve endings, raising the strong sensation of pain. With the LHP, the operation includes minimal incisions in proportion to the base of the hemorrhoids, so minimal pain is evident[18].

Moreover, two studies conducted in 2014[21] and in 2019[24] showed that from day 1 to day 30 postoperative pain on follow-ups was considerably lower in the LHP group than in the MM. These results were also in conformity with different earlier studies[3,23].

This study showed that there was a significant difference between the MM hemorrhoidectomy group and the LHP group regarding time to return to work (15.5±1.5 vs. 7.0±0.0 for MM and LHP, respectively) and time to complete healing (31.5±4.9 vs. 15.0±0.0 for MM and LHP, respectively) were significantly higher among the MM hemorrhoidectomy group.

This can be corroborated by Eskandaros and Darwish[18] research findings, where the mean time to return to activity in MM hemorrhoidectomy patients was substantially greater (26.2±4.3 days) than that in LHP patients (11.3±2.4 days). These results are in line with the studies by Maloku *et al*.[24] and Alsisy *et al*.[16] where patients returned to normal activity faster than patients who underwent MM hemorrhoidectomy.

Also, according to Nagdy[20], the mean time to return to activity in laser ablation hemorrhoidoplasty was 0.7±0.2 days and in MM was 1.1±0.2 days, with an extremely significant difference.

Infection as a systemic consequence was not detected in any of the instances of our study; nevertheless, superficial infection in the form of oozing and anal discharge was found among 45% of MM group versus 15% of the LHP group. This comes in agreement with previous data demonstrating that clinically significant infections are relatively infrequent post-hemorrhoidectomy however, local superficial infections may be present[25–27].

In short, trials suggest that the LHP, as a minimally invasive procedure, can deliver benefits in terms of symptomatic relief with rapid recovery and the absence of serious consequences[28].

CONCLUSION

LHP method is preferable in comparison with conventional MM hemorrhoidectomy. Operative time and intraoperative hemorrhage are much decreased in laser technique. Less postoperative pain, less time to return to work, and less time to complete healing was noted among LHP patients.

CONFLICT OF INTEREST

There are no conflicts of interest.

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