Comparative study between laser hemorrhoidoplasty and conventional open surgical hemorrhoidectomy (Milligan–Morgan technique) in second and third-degree piles

Original Article

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ABSTRACT

Background : In contrast to the gold standard surgical treatment, conventional hemorrhoidectomy, a variety of minimally invasive surgical techniques have been developed over the past few decades for the management of grade II and III hemorrhoidal disease.

Objective: To evaluate the effectiveness of laser hemorrhoidoplasty (LHP) versus Milligan–Morgan hemorrhoidectomy for the treatment of symptomatic second and third-degree piles.

Patients and Methods: This research was carried out at the University Hospital of Ain Shams. We recruited 40 patients with grades II and III hemorrhoidal disease; 20 underwent open conventional (Milligan–Morgan) hemorrhoidectomy (group A); the remaining 20 underwent LHP (group B). Evaluation of late postoperative problems, such as stenosis, incontinence, fistula, and recurrence of symptoms, and early postoperative complications, such as operational time, intraoperative blood loss, postoperative discomfort, usage of analgesics, postoperative bleeding, and postoperative discharge.

Results: Postoperative pain was significantly lower in LHP than Milligan–Morgan hemorrhoidectomy group (*P<0.001*). The operative time and intraoperative blood loss, hospital stay, and postoperative analgesics requirements were less in the LHP group (*P<0.001*). Postoperative bleeding, urinary retention, anal stenosis, and recurrence rate were seen with no statistical difference in both groups.

Conclusion: When compared to the traditional Milligan–Morgan technique, laparoscopic hemorrhoidectomy is a good technique for managing primary hemorrhoids of the second and third degree. It has a shorter operative duration, less postoperative pain, a shorter hospital stay, and less intraoperative blood loss. It also shows no significant difference in terms of postoperative bleeding, urinary retention, stenosis, and recurrence rate.

Key Words: Hemorrhoids, hemorrhoidectomy, laser hemorrhoidoplasty, pain.

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INTRODUCTION

Millions of people worldwide are affected by hemorrhoidal disease (HD), a common anorectal ailment that presents serious medical and socioeconomic issues and significantly lowers patient quality of life[1,2].

Venules, arterioles, and smooth muscle fibers make up the submucosal cushions known as hemorrhoids or hemorrhoidal columns. These structures provide soft-tissue support and guarantee that the anal canal is securely closed, which, when combined with the internal anal sphincter, plays a critical role in maintaining continence[2].

HD is mostly treated with surgery when there is bleeding or prolapse. The selection of surgical intervention is still controversial. Postoperative pain, discomfort, limits in daily activities, serous-mucous discharge, and recurrence remain major issues even after several breakthroughs and revisions in HD surgical procedures[1].

The resective method, whether closed (Ferguson) or open (Milligan–Morgan), is now linked to a low recurrence rate despite significant postoperative pain and suffering. Suspensive techniques, on the other hand, have a high recurrence rate and, although causing less pain and suffering after surgery, are often associated with the development of new symptoms such as tenesmus, excruciating pain, and urgency during defecation[3,4].

Currently, depending on the procedure employed, individuals having surgical intervention for HD may endure varied degrees of discomfort. Bleeding, possible incontinence to flatus or liquid feces, and a postoperative recovery period longer than 5 days are examples of

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postoperative problems. In particular, because of the surgical incisions, the Milligan–Morgan procedure may cause persistent serous discharge, which calls for professional support from nurses and family members[5].

Furthermore, it is important to keep in mind that there might be other consequences after surgery, such as subcutaneous abscess (0.5%), urine retention (2.4–6%), and other issues such as anal fissures (1–2.6%), anal stenosis (1%), incontinence (0.4%), fistulas (0.5%), and the return of hemorrhoids which are examples of long-term consequences[6–8]. Therefore, patients with modest symptoms frequently hesitate and delay receiving surgical treatment for this benign illness out of fear of pain and complications following surgery.

A new, painless, and minimally invasive technique for treating symptomatic hemorrhoids during day surgery is called laser hemorrhoidoplasty (LHP). Using a diode laser, hemorrhoidal piles are shrunk in this procedure[2,9]. The laser energies Nd:YAG, argon, and carbon dioxide are often employed in medicine. Depending on the laser strength and the length of time the laser light is applied, the laser beam causes tissue shrinkage and degeneration at different depths.

Aim

In order to treat bothersome second and third-degree piles, this research compared the use of LHP to Milligan–Morgan hemorrhoidectomy (MMH).

PATIENTS AND METHODS:

This study evaluates the efficacy of LHP compared to MMH in the surgical management of symptomatic second and third-degree hemorrhoids. Conducted from August 2022 to May 2024 in the General Surgery Department of Ain Shams University Hospitals, the study included 40 patients with symptomatic second and third-degree hemorrhoids. Using a sealed envelope method, patients were randomly assigned into two equal groups of 20 each. Group A underwent MMH, while group B underwent LHP.

Inclusion criteria

The study included patients with symptomatic second and third-degree hemorrhoids who matched the exclusion criteria, could understand and remember the information given to them, and supplied informed permission.

Exclusion criteria

The following were the exclusion criteria:

(1) Patients with debilitating diseases such as liver cirrhosis, portal hypertension, and bleeding tendencies.

(2) Patients are classified in the fourth and fifth risk group of American Society of Anesthesiologists.

(3) Patients with previous anal surgery.

(4) Patients with concurrent anorectal diseases as perianal fistula, abscess, colorectal carcinoma, or inflammatory bowel disease.

(5) Patients with impaired anal sphincter function or fecal incontinence.

(6) Patients with acute hemorrhoidal episodes with thrombosis.

Ethical considerations

Following a thorough explanation of the surgical procedure and its potential consequences, approval from the ethical committee was obtained, and informed consent was signed by each patient. All participants who agreed to join the trial provided their informed consent. Patients were made aware of the risks, drawbacks, and alternative treatments. Patients' medical records and personal information were kept completely secret.

Study tools

All patients included in the study were candidates for the following:

Clinical assessment

A thorough assessment was carried out, encompassing an in-depth medical, surgical, and familial background. Bloody stools and constipation were among the symptoms that were closely examined. In addition, a digital per-rectal examination and a general and abdominal examination were carried out.

Investigations

Every patient with bleeding hemorrhoids had a colonoscopy and standard preoperative investigations.

Intervention

Patients were subjected to MMH and LHP according to our study groups.

Study operation

A single dosage of metronidazole and ciprofloxacin was given during the anesthesia for the procedure. Patients were placed in the lithotomy posture for all procedures, which were carried out under either spinal or general anesthesia. A second examination was conducted while the patients were sedated in order to evaluate the extent of hemorrhoids and rule out concurrent anal disorders such as anal fistula, anal fissure, and any masses. Both groups were

operated by the same surgical team and in accordance with a standardized operating protocol.

Group A: Milligan–Morgan hemorrhoidectomy

A cutting cautery tool was employed to create a V-shaped incision in the skin adjacent to the hemorrhoid's base (Fig. 1). The hemorrhoid was then dissected from its bed using cautery in the submucosal region, proceeding cranially towards the pedicle. To avoid damage to the internal sphincter, the dissection was performed within the submucosal plane. The distal portion of the hemorrhoid was surgically excised after double-ligating the pedicle with a 2/0 vicryl suture (Fig. 2). Additional hemorrhoids were treated similarly, ensuring a skin bridge between them to prevent anal stenosis (Fig. 3). Hemostasis was achieved using a Gelfoam sponge and a cautery instrument. An external gauze pack was placed, and the incision was left open.

Group B: laser hemorrhoidoplasty

The Ceralas diode laser biolitic system (Biolitec) was utilized (Fig. 4). A C-shaped anoscope was introduced into the anal canal to inspect each hemorrhoid. The laser port created a small incision ~1 cm from the anal verge (Fig. 5). Tissue shrinkage up to a depth of 5 mm was achieved by delivering five to six laser pulses through the optical fiber, each pulse lasting 3 s with a 0.5-s pause between pulses. This pulsed approach was employed to minimize damage to adjacent normal tissues, allowing for a controlled depth of tissue shrinkage.

The intensity and duration of the laser beam can be adjusted based on the size of the hemorrhoid to control the depth of tissue shrinkage. To mitigate the thermal effect, an iced finger was placed intra-anally after each hemorrhoid was treated (Fig. 6). This cooling technique helps to reduce heat-induced damage to surrounding tissues and enhances

Fig. 1: V-shaped incision made with a cutting cautery device.

Fig. 2: Skin bridges between excised piles to avoid anal stenosis.

Fig. 3: The pedicle is then double-ligated with a 2/0 vicryl suture.

Fig. 4: The Ceralas diode laser.

Fig. 5: Laser optic fiber within the pile.

Fig. 6: Iced finger within anal canal to decrease heat effect.

Fig. 7: Preoperative and postoperative LHP. LHP, laser hemorrhoidoplasty.

If hemostasis was required, it was achieved using only the laser and applied pressure, without the use of sutures or hemostatic medications. An external dressing was applied following the procedure.

Follow-up: the patient was followed up by phone or clinic visits on the first and third day, as well as the first, second, fourth, and eighth weeks following the procedure, to check for any problems or symptoms of recurrence. This was done again after 6 months.

Short-term outcomes

Intraoperative: operative time and blood loss during surgery.

Postoperative discomfort, bleeding, retention of urine, postoperative anal discharge, and length of hospital stay during hospital stay. Analgesic usage, discomfort, and time before pain subsides.

Long-term outcomes (after 6 months postoperatively) were as follows:

Stenosis, recurrence, perianal fistula, and incontinence were evaluated. Incontinence was assessed using the Wexner score, also known as the Cleveland Clinic Fecal Incontinence Severity Scoring System. It is a fecal incontinence score that ranges from 0 to 20, where 0 is perfect continence, and 20 is complete incontinence. This score is determined based on questions related to incontinence of gas, liquid, and solid stool, as well as the need for lifestyle modifications and pad usage.

Statistical analysis

Data were collected, reviewed, coded, and entered into the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 23.0.; IBM Corp., Armonk, New York, USA), version 23. Quantitative data were presented as mean, SDs, and ranges for parametric data and as a median and interquartile ranges for nonparametric data.

Qualitative variables were presented as numbers and percentages. Comparisons between groups with qualitative data were performed using the χ^2 test. For quantitative data with a parametric distribution, comparisons between two groups were conducted using the independent t test. For quantitative data with a nonparametric distribution, the Mann–Whitney test was used. The confidence interval was set at 95%, and the accepted margin of error was 5%. Therefore, the P value was considered significant as follows:

P value more than 0.05: nonsignificant.

P value less than 0.05: significant.

P value less than 0.01: highly significant.

RESULTS:

The patient's average age was 39.92 years, with 19 (47.5%) females and 21 (52.5%) men. There were 45% male patients and 55% female patients in the MMH group. Of the patients in the LHP group, 40% were female and 60% were male. In the MMH group, surgery took an average of 47 min, ranging from 30 to 60 min. In the LHP group, the average surgical time was 33.75 min, ranging from 20 to 45 min. Regarding the length of surgery, there was a highly significant difference between the two groups, with the LHP group having less operative time.

Within the MMH group, intraoperative blood loss ranged from 40 to 75 ml, with a mean of 58.5 ml. In the LHP group, the intraoperative blood loss ranged from 20 to 50 ml, with a mean of 38.75 ml. In the LHP group, there was a statistically significant less intraoperative blood loss.

The visual analog scale (VAS 0–10) was used to measure postoperative pain. A score of 0–1 indicates no pain, 1.1–3 indicates moderate pain intensity, 3.1–7 indicates medium pain intensity, 7.1–9 indicates high pain intensity, and 9.1–10 indicates severe and intolerable pain.

After surgery, the VAS procedure was carried out on days 1, 3, and 7. The VAS showed that the MMH group had a median pain score of 6.15 on day 1 postoperatively, while the LHP group had a median pain score of 4.45. The MMH group also had a median pain score of 4.55 and 3.35 on days 3 and 7 postoperatively, respectively, while the LHP group had a median pain score of 3.45 and 2.2. The LHP group showed a statistically significant reduction in pain scores as compared to the MMH group.

There was a significant decrease in days till pain resolution in LHP group in comparison to MMH group, having a mean of 10.05 in the LHP group versus 14.35 in the MMH group.

Also, there is a difference in days of use of analgesics being significantly less in LHP, with a mean of 6.95 days compared to 11 days in MMH group (Table 1).

A total of two (10%) cases had postoperative bleeding in the MMH group, and they were treated conservatively. No cases of postoperative bleeding were found in the LHP group. There was no significant difference in postoperative bleeding between the two groups.

Only one (5%) of the cases developed postoperative urine retention in each group with no significant difference between both groups. The length of postoperative discharge and itching varied significantly, with a mean of 14.9 days in the LHP group and 12.4 days in the MMH group, respectively. Compared to the MMH group, which had a median score of 1.55 days, the LHP group's hospital stay was much lower, at a median of 1 day (Table 2).

Moreover, two (10%) cases developed anal stenosis in the MMH group. No cases reported with stenosis in the LHP group. There was no significant difference between groups regarding stenosis.

Three (15%) instances in the MMH group required a second-stage hemorrhoidectomy due to recurrence or persistent hemorrhoids. In the LHP group, there were a total of two (10%) patients with residual or recurring hemorrhoids; the recurrence rate did not significantly differ between the groups. In the MMH group, only one case (grade 2 on the Wexner fecal incontinence score) experienced mild incontinence, which was incontinence to flatus once per week (Table 3). However, the LHP group did not include any incidents of incontinence.

Perianal fistula instances did not arise in the MMH group. One (5%) patient in the LHP group developed a low intersphincteric perianal fistula on top of a perianal abscess. Abscess drainage was done, and then the fistulous tract lay open (Table 4).

Table 1: Relation between Milligan–Morgan hemorrhoidectomy and laser hemorrhoidoplasty regarding postoperative pain

	Groups		*t* test	
Postoperative pain (VAS score)	MMH	LHP	*t*	*P* value
Day 1				
Range	4–9	3–6	4.913	<0.001*
Mean±SD	6.150±1.309	4.450±0.826		
Day 3				
Range	3–6	2–5	4.213	<0.001*
Mean±SD	4.550±0.945	3.450±0.686		
Day 7				
Range	1–5	1–3	4.110	<0.001*
Mean±SD	3.350±1.089	2.200±0.616		
Days till pain resolution				
Range	8–24	7–14	3.962	<0.001*

Mean±SD	14.350±4.487	10.050±1.849		
Use of analgesic (days)				
Range	7–15	4–11	5.542	<0.001*
Mean±SD	11.000±2.449	6.950±2.164		

VAS, visual analog scale.
* means significant difference

Table 2: Relation between Milligan–Morgan hemorrhoidectomy and laser hemorrhoidoplasty regarding early postoperative factors

	Groups		*t* test	
	MMH	LHP	*t*	*P* value
Postoperative discharge				
Range	8–18	11–20	–2.748	0.009*
Mean±SD	12.400±3.050	14.900±2.693		
χ^2	*n* (%)	*n* (%)	χ^2	*P* value
Urinary retentions	1 (5.00)	1 (5.00)	0.000	1.000
Bleeding	2 (10.00)	0 (0.00)	2.105	0.147
Hospital stay duration (days)				
Range	1–3	1–2	2.675	0.011*
Mean±SD	1.550±0.686	1.100±0.308		

Table 3: Postoperative incontinence evaluation according to the Wexner score

	Frequency				
Type of incontinence	Never	Rarely	Sometimes	Usually	Always
Solid	0	1	2	3	4
Liquid	0	1	2	3	4
Gas	0	1	2	3	4
Wears pad	0	1	2	3	4
Lifestyle alteration	0	1	2	3	4

Table 4: Relation between Milligan–Morgan hemorrhoidectomy and laser hemorrhoidoplasty regarding late postoperative factors

	Groups [*n* (%)]		χ^2	
	MMH	LHP	χ^2	*P* value
Stenosis	2 (10.00)	0	2.105	0.147
Recurrence	3 (15.00)	2 (10.00)	0.229	0.633
Incontinence	1 (0.00)	0	–	–
Perianal fistula	0	1 (5.00)	1.026	0.311

DISCUSSION

Hemorrhoids, a very common anorectal condition, are defined as the symptomatic expansion and aberrant downward displacement of the anal cushions, accompanied by vascular hyperplasia and hyperperfusion of the hemorrhoidal plexus[10].

Surgical intervention is recommended when medical therapy for HD symptoms proves ineffective. The traditional surgical approach entails the removal of both the internal and external hemorrhoidal tissue using a variety of procedures, with or without anoderm or anorectal mucosa closure[11].

The gold standard treatment for hemorrhoidal illness is currently surgical hemorrhoidectomy, which can be performed using either the open (Milligan–Morgan) or closed (Ferguson) approach. However, this procedure is frequently accompanied with postoperative discomfort and problems in up to 15% of cases[12].

To affect the vascular supply to hemorrhoids, avoid prolapse, and lessen postoperative discomfort, certain more recent, less-invasive procedures, such as stapled hemorrhoidopexy, have been created[13].

Persistent discomfort, bleeding, rectal perforation, complicated fistulas, fecal incontinence, as well as a greater recurrence incidence as compared with conventional hemorrhoidectomy are all reported complications with this treatment[14].

Advanced hemorrhoid issues can now be treated with LHP, a novel minimally invasive surgical modality[15].

In LHP, for the cautious treatment of advanced hemorrhoids, endoluminal laser coagulation of the hemorrhoidal veins is done in the presence of adequate anesthesia. Since the laser beam only targets hemorrhoidal arteries, anoderm, and mucosa, the surrounding healthy tissues were unharmed[16]. By avoiding the use of foreign materials (surgical sutures and buckles), this therapeutic method greatly lowers the likelihood of postoperative pain and postoperative stenosis or constriction of the anal canal[17]. The absence of sutures, open wounds, and incisions allows for rapid and excellent healing and recovery[18].

Similar to our findings, Eskandaros and Darwish[19] observed a very significant difference (*P=0.001*) between LHP and MMH in the operating time, intraoperative blood loss, and duration of hospital stay in favor of the laser approach in a study including 80 patients. In an RCT involving 40 patients, Maloku *et al*.[2] found that early postoperative pain is much lower in the LHP group than in the MMH group.

The VAS procedure was used in our study on days 1, 3, and 7 following surgery. Based on the VAS, the MMH group's median pain score on day 1 after surgery was 6.15, while the LHP group's was 4.45. On days 3 and 7, the MMH group's median pain score was 4.55 and 3.35, respectively, while the LHP group's was 3.45 and 2.2, respectively. In contrast to MMH, there was an extremely substantial drop in the pain score for LHP.

Similar to our study's findings, Hossain *et al*.[21] found that the LHP group's mean total days of analgesic use were considerably lower than those of the open hemorroidectomy group. A significant difference was seen in the postoperative discharge persistence, with a higher incidence in the LHP group. A longer mean duration of 14.9 days was found in the LHP group compared to 12.4 days in the MMH group.

Mahmood *et al*.[22] conducted a study involving 40 patients and found that while there were two cases of late postoperative complications in the MMH group (one with stricture and the other with recurrence after 6 months of follow-up), there were no incidences of late complications in the LHP group, such as fistula, stricture, incontinence, or recurrence.

In a study involving 40 patients, Hassan and El-Shemy[20] reported that one case complained of postoperative recurrent or residual hemorrhoids in the open surgical hemorrhoidectomy group and another case of anal stenosis within the same group. No comparable cases were reported in the LHP group. In contrast to our research, three (15%) cases in the MMH group required second-stage hemorrhoidectomy due to recurring or persistent hemorrhoids (internal and external components), and two (10%) cases had anal stenosis, while two (10%) cases in the LHP group had recurring or persistent hemorrhoids with no stenosis instances were reported.

In the MMH group, there was just one occurrence of mild incontinence, which was flatus incontinence once a week (grade 2 on the Wexner fecal incontinence score). The LHP group did not include any incidents of incontinence, though.

CONCLUSION

When compared to the traditional Milligan–Morgan approach, this study made it clear that LHP is a good procedure for managing primary second and third-degree hemorrhoids, with shorter operational times, less intraoperative blood loss, less postoperative discomfort, and shorter hospital stays. Regarding postoperative problems, including postoperative hemorrhage, urine retention, stenosis, and recurrence rate, the complication rate revealed a statistically nonsignificant difference.

CONFLICT OF INTEREST

There are no conflicts of interest.

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