Comparative study between excisional hemorrhoidectomy and laser hemorrhoidoplasty in third-degree piles

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Background
One of the most prevalent benign anorectal conditions is hemorrhoids. It is thought to be the most problematic gastrointestinal illness. Sometimes, they may sag, prolapse, enlarge, and bleed.
Aim
This is a prospective randomized comparative study to compare excisional hemorrhoidectomy (EH) with laser hemorrhoidoplasty (LHP) in the treatment of symptomatic third-degree piles prospectively.
Patients and methods
In this study, 60 patients participated. The study participants were split into two groups in a randomized manner. EH was done for 30 patients using the Milligan–Morgan procedure, whereas another 30 patients underwent LHP.
Results
We compared between the outcomes of LHP with Milligan–Morgan open hemorrhoidectomy in terms of duration of surgery, intraoperative blood loss, postoperative pain, duration of hospital stay, days taken for return to work, and postoperative complications on both short and long runs.
Conclusion
In the treatment of third-degree piles, LHP was superior to EH by the Milligan–Morgan technique as LHP significantly reduced the length of the procedure, the amount of blood lost during the procedure, and the degree of postoperative pain while having no effect on fecal continence. Regarding postoperative complications, including postoperative hemorrhage, urine retention, stenosis, and recurrence rate, there were statistically nonsignificant differences between both the procedures.

Keywords:
excisional hemorrhoidectomy, laser hemorrhoidoplasty, third-degree piles

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Introduction

Hemorrhoidal illness is the oldest and most prevalent anal disease in the world, making it one of the most prevalent disorders in surgical clinics [1].

The abnormal downward displacement of anal cushions, which are prominences of the anal mucosa made of loose connective tissue, smooth muscle, and arterial and venous vessels, is referred to as hemorrhoids [2].

The most typical sign of hemorrhoids is bright red, painless rectal bleeding that occurs with bowel movements and occasionally with prolapsing anal tissue. For the accurate diagnosis of hemorrhoids, a complete physical examination must include a digital rectal examination as well as proctoscopy [3].

Internal hemorrhoids, which originate above the dentate line and are covered by anal mucosa; external hemorrhoids, which originate below the dentate line and are covered with anoderm; and mixed type hemorrhoids are the three main categories [4].

Hemorrhoids now have a pathogenesis that includes hyperperfusion of the hemorrhoidal plexus, vascular hyperplasia, and degenerative changes to the supporting tissue inside the anal cushions. Treatment options for low-grade hemorrhoids include medical intervention, dietary and lifestyle changes, and a few office-based treatments. Symptomatic high-grade and/or complex hemorrhoids typically require surgery [5].

Although hemorrhoidectomy has historically been the primary surgical procedure, additional methods have lately come into use. These include ligasure hemorrhoidectomy, stapled hemorrhoidopexy, Doppler-guided hemorrhoidal artery ligation, and laser hemorrhoidoplasty (LHP). The most difficult issues in the treatment of hemorrhoids continue to be post-procedural discomfort and disease recurrence [6].

Aim

The purpose of this study was to compare excisional hemorrhoidectomy (EH) with LHP in the treatment of symptomatic third-degree piles.

Patients and methods

This study compares the effectiveness of LHP against EH in the surgical management of third-degree piles that are symptomatic. From January 2021 until the end of June 2022, the study was carried out in the General Surgery Department of the Ain Shams University Hospitals. There were 60 patients with third-degree hemorrhoids who were symptomatic. With the use of a sealed envelope method, patients were randomly divided into two equal groups, each with 30 patients. Group A was treated with EH, whereas group B underwent LHP.

Inclusion criteria

Patients with third-degree piles who were able to retain the provided information and consent and fulfilled the exclusion criteria were included.

Exclusion criteria

The following were the exclusion criteria:

(1) Patients with previous anal surgery or recurrent hemorrhoids.
(2) Patients with impaired anal sphincter function or anal incontinence.
(3) Patients with inflammatory bowel disease.
(4) Age group less than 18 and more than 60 years old.
(5) Patients with history of previous anal carcinoma.
(6) Patients with complicated piles.
(7) Patients not fit for surgery (American Society of Anesthesiologists IV–American Society of Anesthesiologists V).
(8) Patients with portal hypertension or bleeding tendency.

Ethical considerations

After carefully explaining the surgery to the patients and outlining any potential consequences, the ethical committee's approval and signed informed permission from every patient were acquired. All patients who agreed to take part in the trial provided their informed permission. The patient was informed of the risks, drawbacks, and alternatives. The privacy of all patients' personal information and medical data was guaranteed.

Study tools

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

Clinical assessment

Detailed medical, surgical and family history, careful analysis of symptoms like constipation, and bloody stools, general and full abdominal examination, and digital per-rectal examination.

Investigations

Routine preoperative investigations and colonoscopy for bleeding hemorrhoids for all patients were done.

Intervention

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

Study operation

The night before surgery, patients were kept off of all oral medications. During the anesthesia for surgery, a single dosage of ciprofloxacin and metronidazole was administered. All procedures were carried out under spinal or general anesthesia and in the lithotomy posture. To establish the severity of hemorrhoids and rule out concomitant anal diseases such anal fissure and fistula as well as any masses, patients had a second examination while under anesthesia. The same team performed the surgery in each group according to a set protocol.

Group A: excisional hemorrhoidectomy

A cutting cautery tool is used to make a V-shaped incision in the skin next to the hemorrhoid's base (Fig. 1). The hemorrhoid was then separated from its bed by cautery dissection in the submucous region. Up until the pedicle, the dissection was carried out in a cranial direction. To prevent harm to the internal sphincter, dissection was done in the submucosal plane. The distal portion of the hemorrhoid was then surgically removed after the pedicle was double-ligated with a 2/0 vicryl suture (Fig. 2). The additional hemorrhoids were treated using the same procedures but with a skin bridge between them to prevent anal stenosis (Fig. 3). Gelfoam sponge and a cautery instrument were used to achieve hemostasis. An external gauze pack was inserted, and the incision was left exposed.

Figure 1

V-shaped incision made with a cutting cautery device.

Figure 2

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

Group B: laser hemorrhoidoplasty

The Ceralas diode laser biolitic system (biolitec) was used (Fig. 4). biolitec (Otto-Schott-Str. 15, Jena, Germany), is one of the world's leading medical technology companies in the field of minimally invasive laser applications and has focused primarily on the development of innovative minimally invasive, gentle laser procedures for a broad range of therapeutic fields since 1999. Nearly every year, biolitec innovates or improves their products. The biolitec laser fibers are a leader in the quality of glass fiber material and in security of their fiber cap connection FUSION technology. Therefore, the laser systems of biolitec allow easy set-up, operation, and maintenance. A c-shaped anoscope was introduced into the anal canal to examine each hemorrhoid, and the laser port made a tiny incision on the skin around 1 cm from the anal edge (Fig. 5). The shrinkage of tissues up to a depth of 5 mm was caused by five to six pulses (laser shots) that were generated through the optical fiber with a durations of 3 s each shot followed by a pause of 0.5 s (pulsed manner used to minimize the damage to the adjacent normal tissues, and the depth can be controlled accordingly).

The strength and duration of the laser beam may be adjusted depending on the size of the hemorrhoid to control the depth of shrinking. To lessen the heat effect, an iced finger was placed intra-anally after each hemorrhoid was treated (Fig. 6).

According on the patient's condition and the size of the hemorrhoids, the laser total dose was adjusted (Fig. 7).

Figure 3

Skin bridges between excised piles to avoid anal stenosis.

Figure 4

The Ceralas diode laser.

Figure 5

Laser optic fiber within pile.

Figure 6

Iced finger within anal canal to decrease heat effect.

If hemostasis was required, it was accomplished with simply laser and pressure (no sutures or hemostatic medications were used), and an external dressing was put after the procedure.

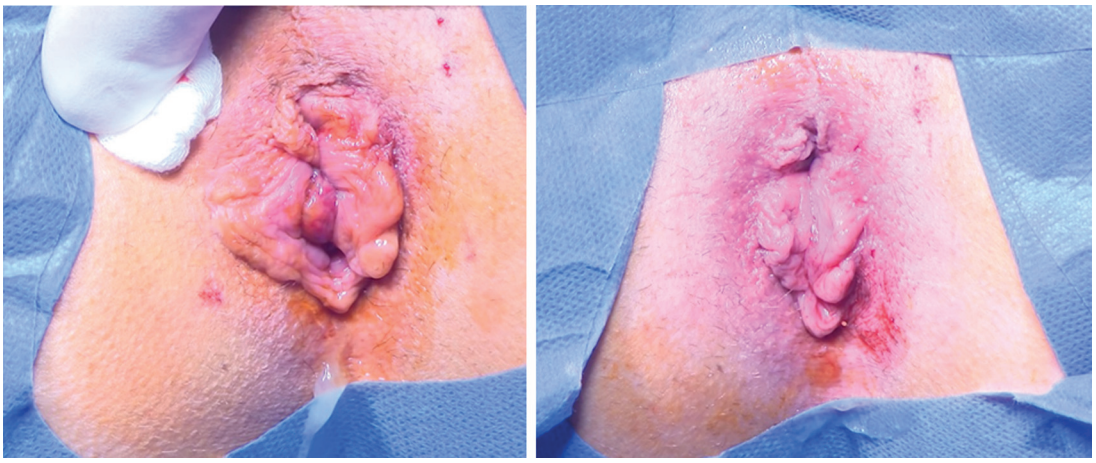
Follow-up: the follow-up of the patient (with clinic visits or by phone) was carried out on 1, 2, 4, and 8 weeks and again after 6 months of the operation for symptoms of recurrence or any complications.

Short-term outcomes

(1) Intraoperative: duration of surgery and intraoperative blood loss.
(2) During hospital stay: postoperative pain, postoperative bleeding, urinary retention, postoperative anal discharge, and duration of hospital stay.
(3) Time needed to return to normal daily activities.

Long-term outcomes (after 6 months postoperatively) were as follows: stenosis, recurrence, perianal fistula and incontinence evaluation according to Wexner score. The Wexner score is also termed 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 based on

Figure 7



Preoperative and postoperative LHP. LHP, laser hemorrhoidoplasty.

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, revised, coded, and entered to the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.), version 23. The quantitative data were presented as mean, SDs, and ranges when parametric and median and interquartile range when data found nonparametric.

Moreover, qualitative variables were presented as number and percentages. The comparison between groups with qualitative data was done using χ^2 test. The comparison between two groups with quantitative data and parametric distribution was done using independent t test. However, the comparison between two groups with quantitative data and nonparametric distribution was done using Mann–Whitney test. The confidence interval was set to 95% and the margin of error accepted was set to 5%. Therefore, the P value was considered significant as follows:

(1) P value more than 0.05: nonsignificant.
(2) P value less than 0.05: significant.
(3) P value less than 0.01: highly significant.

Results

(1) The mean age of the patients was 40.57 years, comprising 39 (65%) patients males, and 21 (35%) females.
(2) In the EH group, 46.7% of the patients were females versus 53.3% males. In the LHP group, 23.3% of the patients were females versus 76.7% males.
(3) The mean duration of surgery in the EH group was 46.33 min, with a range from 30 to 60 min. The mean duration of surgery in the LHP group was 34 min, with a range from 20 to 50 min. There was a highly significant difference between the two groups regarding the duration of surgery, being shorter in the LHP group.
(4) The mean volume of intraoperative blood loss in the EH group was 59.67 ml, with a range from 40 to 75 ml. The mean volume of intraoperative blood loss in the LHP group was 38.33 ml, with a range from 20 to 50 ml. There was a highly significant decrease in the volume of intraoperative blood loss in the LHP group.
(5) Postoperative pain was evaluated using the visual analog scale (VAS 0–10), where 0–1=no pain, 1.1–3=low pain intensity, 3.1–7=pain of medium intensity, 7.1–9=pain of high intensity, and 9.1–10=strong and unbearable pain.

The VAS protocol was performed on day 0 and weeks 1, 4, and 8 after surgery. According to the VAS, on day 0 postoperatively, the median pain score in the EH group was 7 compared with 6 in the LHP group, and then the median pain score after the first, fourth, and eighth week postoperatively in the EH group was 5, 4, and 2, respectively, compared with 3, 2, and 0, respectively, in the LHP group. There was a highly significant decrease in pain score in the LHP group compared with the EH group (Table 1).

A total of three (10%) cases had postoperative bleeding in the EH group, and they were treated conservatively. Only one (3.3%) case had postoperative bleeding in the LHP group and was treated conservatively. There was no significant difference in postoperative bleeding between the two groups.

A total of nine (30%) cases developed postoperative urine retention in the EH group, whereas four (13.3%) cases developed urine retention in the LHP group, with no significant difference between both groups.

There was a significant difference in the incidence of postoperative discharge, being more in the LHP group: 20 (66.7%) cases compared with 11 (36.7%) cases in the EH group.

LHP group had significant shorter duration of hospital stay with a median score of 1 day compared with the EH group, with a median score of 2 days.

There was also significant difference between the two groups regarding time needed to return to normal daily activities, being less in the LHP group (median=9.5

Table 1 Relation between excisional hemorrhoidectomy and laser hemorrhoidoplasty regarding postoperative pain

Postoperative pain (VAS score)	Excisional hemorrhoidectomy *N*=30	Laser hemorrhoidoplasty *N*=30	Test value	*P* value	Significance
Day 0					
Median (IQR)	7 (6–8)	6 (5–6)			
Mean±SD	6.93±1.68	5.63±1.54	–2.850≠	0.004	HS
Range	4–10	2–9			
1st week					
Median (IQR)	5 (4–6)	3 (3–4)			
Mean±SD	5.33±1.27	3.43±1.10	–4.893≠	<0.001	HS
Range	3–7	1–6			
4th week					
Median (IQR)	4 (3–4)	2 (1–2)			
Mean±SD	3.67±0.88	1.70±0.92	–5.856≠	<0.001	HS
Range	2–5	0–3			
8th week					
Median (IQR)	2 (2–3)	0 (0–1)			
Mean±SD	2.43±0.82	0.50±0.73	–6.141≠	<0.001	HS
Range	1–4	0–3			

IQR, interquartile range; VAS, visual analog scale. ≠Mann–Whitney test. *P* value more than 0.05: nonsignificant. *P* value less than 0.05: significant. *P* value less than 0.01: highly significant.

Table 2 Relation between excisional hemorrhoidectomy and laser hemorrhoidoplasty regarding early postoperative factors

Early postoperative	Excisional hemorrhoidectomy [*n* (%)] *N*=30	Laser hemorrhoidoplasty [*n* (%)] *N*=30	Test value	*P* value	Significance
Postoperative bleeding					
No	27 (90.0)	29 (96.7)	1.071*	0.301	NS
Yes	3 (10.0)	1 (3.3)			
Urinary retention					
No	21 (70.0)	26 (86.7)	2.455*	0.117	NS
Yes	9 (30.0)	4 (13.3)			
Postoperative discharge					
No	19 (63.3)	10 (33.3)	5.406*	0.020	S
Yes	11 (36.7)	20 (66.7)			
Hospital stay duration (days)					
Median (IQR)	2 (1–2)	1 (1–1)	–2.452≠	0.014	S
Range	1–4	1–3			
Return to normal daily activities (days)					
Median (IQR)	18.5 (15–21)	9.5 (7–12)	–5.819≠	0.000	HS
Range	10–28	5–20			

IQR, interquartile range. *χ^2 test. ≠Mann–Whitney test. *P* value more than 0.05: nonsignificant. *P* value less than 0.05: significant. *P* value less than 0.01: highly significant.

days) compared with the EH group (median=18.5 days) (Table 2).

A total of three (10%) cases had spotting of blood after defecation in the EH group, and these patients still had residual piles. No cases were reported with bleeding in the LHP group.

Moreover, two (6.7%) cases developed anal stenosis in the EH group. No cases reported with stenosis in the LHP group. There was no significant difference between groups regarding stenosis.

In the EH group, eight (26.7%) cases had recurrent/residual hemorrhoids (internal and external components) that needed second-stage hemorrhoidectomy. A total of four (13.3%) cases in LHP group had recurrent/residual hemorrhoids with no significant difference between groups regarding the recurrence rate.

Only one case had mild incontinence in the EH group, and it was incontinence to flatus once per week (grade 2 on Wexner fecal incontinence score) (Table 3). However, no cases had incontinence in the LHP group.

Never, 0; rarely, less than 1/month; sometimes, less than 1/week but more than 1/month; usually, less than 1/day but more than 1/week; and always, more than 1/day, where 0 represents perfect and 20 represents complete incontinence (Table 1).

No cases of perianal fistula occurred in the EH group. In the LHP group, two (6.7%) patients had low intersphincteric perianal fistula on top of perianal abscess, and they were treated with lay open of the fistulous tract after abscess drainage (Table 4).

Discussion

Hemorrhoids, a very common anorectal condition, are defined as the symptomatic expansion and aberrant downward displacement of the anal cushions, together with vascular hyperplasia and hyperperfusion of the hemorrhoidal plexus [7].

Procedures are advised when medical therapy for hemorrhoidal disease symptoms is ineffective. The traditional surgical approach entails the removal of both the internal and external hemorrhoidal tissue

Table 3 Postoperative incontinence evaluation according to the Wexner score

E	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 excisional hemorrhoidectomy and laser hemorrhoidoplasty regarding long-term outcomes

Long-term outcomes	Excisional hemorrhoidectomy [*n* (%)] *N*=30	Laser hemorrhoidoplasty [*n* (%)] *N*=30	Test value	*P* value	Significance
Bleeding					
No	27 (90.0)	30 (100.0)	3.158*	0.076	NS
Yes	3 (10.0)	0			
Stenosis					
No	28 (93.3)	30 (100.0)	2.069*	0.150	NS
Yes	2 (6.7)	0			
Recurrence					
No	22 (73.3)	26 (86.7)	1.667*	0.197	NS
Yes	8 (26.7)	4 (13.3)			
Incontinence					
No	29 (96.7)	30 (100.0)	1.017*	0.313	NS
Yes	1 (3.3)	0			
Perianal fistula					
No	30 (100.0)	28 (93.3)	2.069*	0.150	NS
Yes	0	2 (6.7)			

*χ^2 test. *P* value more than 0.05: nonsignificant. *P* value less than 0.05: significant. *P* value less than 0.01: highly significant.

using a variety of procedures, with or without anoderm or anorectal mucosa closure [8].

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 [9].

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 [10].

Persistent discomfort, bleeding, rectal perforation, complicated fistulas, fecal incontinence, as well as a greater recurrence incidence as compared with hemorrhoidectomy are all reported complications with this treatment [11].

Advanced hemorrhoid issues can now be treated with LHP, a novel minimally invasive surgical modality [12].

In the presence of sufficient anesthesia and after endoluminal laser coagulation of the hemorrhoidal veins, LHP is used for the careful treatment of advanced hemorrhoids. Anoderm and mucosa (the surrounding healthy tissue) were unaffected as the laser beam's energy is exclusively administered to hemorrhoidal arteries [13].

This technique of treatment avoids the use of foreign materials (buckles and surgical sutures), which significantly reduces the risk of postoperative stenosis (narrowing of the anal canal) and postoperative discomfort [14].

Owing to the lack of incisions, exposed wounds, and sutures, healing and recovery are great, quick, and nearly invisible [15].

According to Halit *et al.* [16], the average degree of postoperative discomfort on day 1 following hemorrhoidal operation with the LHP was 2.2 (SD=0.3) in a research including 200 patients; however, it was 4.5 (SD=0.8) following hemorrhoidal intervention with the EH technique.

The average degree of pain or VAS at 4 weeks after surgery was 0.2 (SD=0.1) in the LHP group and 0.8 (0.2=SD) in the EH group. After 8 weeks, the same values remained. According to our study, the LHP group experienced considerably less postoperative pain than the EH group (P=0.001).

Eskandaros and Darwish [17] reported that there was a highly significant difference between LHP and EH in the operating time, length of hospital stay, and amount of time required to resume normal daily activities in favor of the laser technique (P=0.001) in a study of 80 patients, with a result similar to our study.

Hassan and El-Shemy [18] reported that in a study conducted on 40 patients, one case complained of recurrent/residual hemorrhoids postoperatively in the open surgical hemorrhoidectomy group and another case of anal stenosis within the same group, with no corresponding cases reported in the LHP group.

In contrast to our study, in the EH group, eight (26.7%) cases had recurrent/residual hemorrhoids (internal and external components) that needed second-stage hemorrhoidectomy. A total of four (13.3%) cases in the LHP group had recurrent/residual hemorrhoids, and two (6.7%) cases developed anal stenosis in the EH group. No cases were reported with stenosis in the LHP group.

Maloku *et al.* [19] reported that early postoperative pain is much less in the LHP group compared with the surgical group in a trial on 40 patients.

In our study, the VAS protocol was performed on day 0 and weeks 1, 4, and 8 after surgery. According to the VAS, on day 0 postoperatively, the median pain score in the EH group was 7 compared with 6 in the LHP group, and then the median pain score after the first, fourth and eighth week postoperatively in the EH group was 5, 4, and 2, respectively, compared with 3, 2, and 0, respectively, in the LHP group.

There was a highly significant decrease in the pain score in the case of LHP compared with EH. Only one case had mild incontinence in the EH group, and it was incontinence to flatus once per week (grade 2 on the Wexner fecal incontinence score). However, no cases had incontinence in the LHP group. No cases of perianal fistula occurred in the EH group. In the LHP group, two (6.7%) patients had low intersphincteric perianal fistula on top of perianal abscess and they were treated with lay open of the fistulous tract after abscess drainage. There was a significant difference in the incidence of postoperative discharge being more in LHP group

[20 (66.7%) cases] compared with 11 (36.7%) cases in the EH group.

Conclusion

This study clarified that LHP for management of primary third-degree hemorrhoids is a suitable technique when compared with the conventional EH by the Milligan–Morgan technique, with shorter operative time, less postoperative pain, shorter hospital stay, and less postoperative bleeding. The complication rate showed statistically nonsignificant difference with respect to the postoperative complications, such as postoperative bleeding, urinary retention, stenosis, and recurrence rate.

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Conflicts of interest

There are no conflicts of interest.

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