



**ORIGINAL ARTICLE**

## Evaluation of Laser Pile Surgery versus Ligasure Hemorrhoidectomy in the Treatment of Hemorrhoids

Eslam Mohamed Ibrahim<sup>1</sup>, Hany Mohamed Hassan<sup>1</sup>, Sahar Abdnasser Atayp Beshna<sup>2</sup>, Mohamed Abdallah Zaitoun<sup>1</sup>

<sup>1</sup>General Surgery Department, Faculty of Medicine, Zagazig University, Egypt.

<sup>2</sup>General Surgery Department, Faculty of Medicine, Azzawia University, Libya.

### Corresponding author\*

Sahar Abdnasser Atayp Beshna,

### Email:

[saharnasser392015@gmail.com](mailto:saharnasser392015@gmail.com)

Submit date: 23-08-2023

Revise date: 29-08-2023

Accept date: 30-08-2023



### ABSTRACT

**Background:** Many treatment methods for hemorrhoids depend on the degree of hemorrhoids which may be non-operative measures or procedural intervention. Recently Laser has been used in the treatment of hemorrhoids with minimal surgical interventions, less post-operative pain and hospital stay. This study **Aimed** to evaluate effectiveness of laser pile surgery in comparison to ligasure hemorrhoidectomy in treatment of hemorrhoid. **Methods:** At Zagazig University's Faculty of Medicine, General Surgery Department, a randomized comparative clinical trial was carried out from January 2022 to July 2023. Thirty individuals with second and third-degree hemorrhoids were enrolled. equally divided into two groups; group (A) undergoing Laser pile procedure, and group (B) undergoing LigaSure hemorrhoidectomy. Evaluation of both surgical methods used, timing of the procedure, operative and postoperative bleeding, discomfort following surgery, length of hospital stay, and return to normal activities. **Results:** The operation The LPS group experienced much less time and a shorter hospital stay. The pain was significantly higher among ligasure group while bleeding and recurrence were significant in the laser group 46.7% of cases had bleeding and 26.7% had failure or recurrence. There was one case of bleeding among the Ligasure group and no failure or recurrence in the same group. There was a significant difference between the groups regarding pain. **Conclusion:** The laser Pile surgery was easy, with a short operation time, less pain, and less hospital stay but expensive with a high recurrence rate.

**Keywords:** LigaSure; Laser; hemorrhoidectomy; pain; pile.

### INTRODUCTION

In the anal canal, hemorrhoids are cushions of specialized submucosal tissue. The typical symptoms include hemorrhoidal tissue prolapse, anal pain, itching, discharge, and painless rectal bleeding [1].

The most prevalent conditions affecting the rectum and anal canal are hemorrhoidal disorders, which affect 4% of the global population [2].

Ages between 45 and 65 are most frequently impacted and show a drop after that. Men are more impacted than women [3].

Internal, external, and mixed hemorrhoids are all categorized according to how much of the anal canal they have prolapsed [4].

The first sign of piles is bleeding, however pain is less frequently noticed. There are four levels of hemorrhoids. First-degree hemorrhoids are defined as piles that bleed only; second-degree hemorrhoids are defined as true piles with lumps that appear at the anal orifice during feces and disappear afterward; third-degree hemorrhoids are defined as piles that must be manually replaced; and fourth-

degree hemorrhoids are defined as piles that remain outside permanently [5].

Treatment for hemorrhoids is dependent on their severity; minor grades can be managed without surgery, while severe grades require treatment [6].

Band ligation, stapled hemorrhoidopexy, sclerotherapy, Doppler-guided artery ligation, hemorrhoidal dearterialization, and surgical excision are a few of the treatment options [6].

The surgical removal of bothersome hemorrhoidal columns, the reduction of mucopexy, the redundant tissue responsible for prolapsing hemorrhoidal tissues, and the minimization of pain and consequences are the three objectives of hemorrhoidectomy. Generally speaking, the more definitive the excision, the more painful it is and the longer it takes to recuperate without significantly reducing the likelihood of problems. Only main piles can be treated with conventional surgery [7]. Modifications to the traditional hemorrhoidectomy have been suggested to lessen the post-procedure pain that is a common consequence. The Ligasure-TM (Valley Lab, Boulder, CO) is a bipolar electro-thermal sealing device that uses a very high-frequency current to denaturize collagen and elastin from the vessel wall and surrounding connective tissue to provide hemostasis [8]. The goal of this study was to compare laser therapy to ligasure to determine the most effective hemorrhoid treatment. Report any difficulties that might arise with these techniques as well. Analyze the results of both techniques as well.

## METHODS

Thirty individuals with second and third-degree hemorrhoids participated in this investigation. from January 2022 to July 2023 at the General Surgery Department of the Zagazig University Faculty of Medicine. All thirty patients were placed into two groups

based on patient selection: Group (A) consisted of fifteen patients undergoing a laser pile operation. Group (B) 15 patients who had LigaSure hemorrhoidectomy procedures. Male and female patients between the ages of 18 and 65 who complained of bothersome grade II and grade III hemorrhoids met the inclusion criteria. The exclusion criteria were Asymptomatic 1<sup>st</sup> and 2nd-degree piles. Patient refusal. Complicated piles. (Thrombosis, prolapsed and infection). Unfit patients either for surgery or anesthesia due to bad general conditions, hematological disorders, liver cirrhosis, and uncontrolled diabetes.

All patients underwent history taking, and general and local examination (PR), The standard position was the left lateral decubitus position, though patients who have trouble resting in that position can also be checked while supine. the following laboratory investigations thorough blood count (CBC), Liver and Kidney Function Tests. Random blood sugar. Coagulation Profile Prothrombin time (PT), Partial thromboplastin time (PTT), and International normalized ratio (INR). Cardiac investigations if needed.

### *Surgical technique*

*Techniques were applied by using (Laser pile procedure) (figure 1)*

All patients received spinal anesthesia. The patient is positioned for a lithotomy, and betadine is used for sterilizing. transmission of digital rectal examination was done to evaluate any mass and the tone of anal sphincter, modified proctoscope inserted in anal canal to locate the superior hemorrhoid arteries' terminal branches around 3 cm above the dentate line. The laser optic fiber was placed in the center of the hemorrhoid under vision through 3 mm stab incisions was done directly enter the submucosal plane by laser probe. The hemorrhoidal arteries sealed by firing the laser in pulsed fashion by mean of (980 nm diode laser optic fiber 5 pulses 13 w of 1.2 seconds, with 0.6 seconds pause) take

in mind that the laser fiber must be in parallel to the anal canal to prevent injury or burn to the surrounding structures. The proctoscope was rotated clockwise, and the process was repeated for each hemorrhoidal artery. Ice is used after the procedure to alleviate the heat produced by a laser. If necessary, do hemostasis using simple pressure (no sutures) will be applied). 40% of obliteration of the hemorrhoidal arteries obtained within the procedure and 6 weeks later to achieve the final result.

Suture less closed hemorrhoidectomy with ligaSure (figure 2)

All patients received spinal anesthesia. To assess the position of the piles and rule out any additional anal pathology, the patient was placed in the lithotomy posture. The hemorrhoidal cushion is held by an Allis clamp distally and an artery forceps proximally. The hemorrhoidal cushion is divided between the mucocutaneous junction and the hemorrhoidal pedicle with the anal sphincter preserved still the pedicle of the hemorrhoid. The pile pedicle is sealed twice to ensure good hemostasis and reduce post-operative bleeding. The same procedure is repeated for 2<sup>nd</sup>, and 3<sup>rd</sup> hemorrhoids with skin bridges between them, and if necessary, an anal pack.

#### *Follow up*

Postoperative pain was assessed according to the numeric pain score (10 points). Post-operative in the first 24 hours post-operative pain, bleeding, and urine retention. Then follow up after 7 days 14 days then 4 to 6 weeks, and monthly till 6 months after complete wound healing. Late post-operative

complications such as stenosis, incontinence, and recurrence

#### **STATISTICAL ANALYSIS**

Data analysis was performed using (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represented as number and percentage, and the quantitative continues group is represented by mean  $\pm$  SD, the following tests were used to test differences for significance; difference, and association of qualitative variable by Chi-square test (X<sup>2</sup>). Differences between quantitative independent groups by t-test. P value was set at  $<0.05$  for significant results &  $<0.001$  for high significant results.

#### **RESULTS**

Table 1; showed that there was no significant difference between groups. Age was distributed as  $37.66\pm 9.25$  and  $39.20\pm 8.31$  respectively between groups with no significant difference between groups.

Operation Time was significantly lower among the LPS group as it was distributed as  $23.20\pm 2.45$  and  $16.40\pm 1.54$  respectively between Ligasure and LPS as shown in Table 2.

Hospital stay was significantly shorter among the same group as it was distributed as  $16.80\pm 4.05$  and  $7.60\pm 2.74$  hours respectively as shown in Table 3.

Table 4; Bleeding and failure were significantly associated with LPS group, with only one case of bleeding among Ligasure group and no case of recurrence in the same group.

**Table1:** Age and sex distribution between studied groups

			Ligasure	LPS	X <sup>2</sup>	P
<b>Age</b>			<b>37.66±9.25</b>	<b>39.20±8.31</b>	<b>0.477</b>	<b>0.637</b>
<b>Sex</b>	<b>Female</b>	N	6	5		
		%	40.0%	33.3%		
	<b>Male</b>	N	9	10	0.14	0.70
		%	60.0%	66.7%		
<b>Total</b>			N 15	15		
			% 100.0%	100.0%		
<b>Technique</b>						
<b>Degree of pile</b>	2 <sup>nd</sup>	N	10	11	0.15	0.69
		%	66.7%	73.3%		
	2 <sup>nd</sup> to 3 <sup>rd</sup>	N	5	4		
		%	33.3%	26.7%		
<b>Total</b>		N	15	15		

**Table 2:** Operation time distribution between studied groups

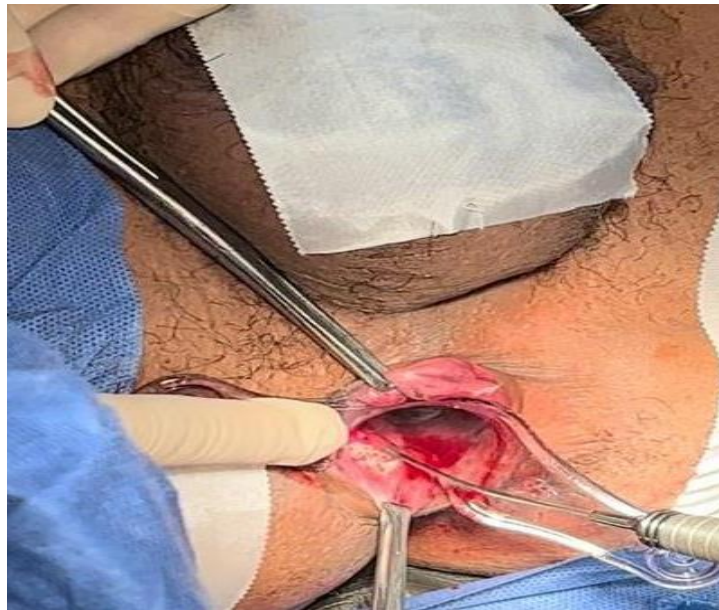
	Ligasure	LPS	t	P
<b>Operation Time/ Minutes</b>	<b>23.20±2.45</b>	<b>16.40±1.54</b>	<b>9.071</b>	<b>0.00**</b>

**Table 3:** Hospital stays distribution between studied groups

	Ligasure	LPS	t	P
<b>Hospitalization/ hours</b>	<b>16.80±4.05</b>	<b>7.60±2.74</b>	<b>5.337</b>	<b>0.00**</b>

**Table 4:** Complication distribution between studied groups

			Technique		X <sup>2</sup>	P
			Ligasure	LPS		
<b>Bleeding</b>	<b>No</b>	N	14	8		
		%	93.3%	53.3%		
	<b>Yes</b>	N	1	7	6.13	0.013*
		%	6.7%	46.7%		
<b>Urinary retention</b>	<b>No</b>	N	12	14		
		%	80.0%	93.3%		
	<b>Yes</b>	N	3	1	1.15	0.28
		%	20%	6.7%		
<b>Failure or recurrence</b>	<b>No</b>	N	15	11		
		%	100.0%	73.3%		
	<b>Yes</b>	N	0	4	4.61	0.032*
		%	0.0%	26.7%		
<b>Total</b>		N	15	15		
		%	100.0%	100.0%		



**Figure 1:** laser optic fiber is placed in the center of the hemorrhoid



**Figure 2:** Excision with LigaSure by Allis clamp distally and artery forceps proximally

### DISCUSSION

According to the most recent findings, the average age of cases in LigaSure and LPS were  $37.66 \pm 9.25$  and  $39.20 \pm 8.31$  years respectively. Males represented 60 and 66.7% in LigaSure and LPS groups respectively. Furthermore, females represented 40 and 33.3% of LigaSure and LPS groups respectively. Age and gender did not significantly differ between the groups.

In accordance with our results, Yassin et al had a prospective randomized comparative study to compare excisional hemorrhoidectomy (EH) with the use of laser hemorrhoidoplasty (LHP) to cure

symptomatic third-degree piles prospectively. The mean age of cases in LPH was 40.57 years, 23.3% of the patients were females versus 76.7% males[9].

Regarding the degree of pile the second degree of piling was represented in the current investigation in 66.7 and 73.3% in LigaSure and LPS, respectively. While the second to third degree of pile was represented in 33.3 and 26.7% in LigaSure and LPS, respectively. There was no discernible variation in the degree of piling between groups.

In accordance with our results, Jian et al. reported that regarding the Laser group of hemorrhoid, 23.3% had 2<sup>nd</sup> grade pile, 53.4%

had 3<sup>rd</sup> grade pile, and 23.3% had 4<sup>th</sup> grade of pile[10].

The operation in our study, the LPS group had much less time because of how it was dispersed as  $23.20 \pm 2.45$  and  $16.40 \pm 1.54$  respectively between Ligasure and LPS.

Yassin et al. reported showed the LHP group's average procedure lasted 34 minutes on average, with a range from 20 to 50 min[9].

Jian et al. indicated that the average laser session took 19.8 4.9 minutes (range, 10–22 minutes) [10].

According to our data, the LPS group's hospital stay was much shorter as it was distributed as  $16.80 \pm 4.05$  and  $7.60 \pm 2.74$  hours respectively between Ligasure and LPS.

Concerning complications in LigaSure group, 6.7% of cases had bleeding and 20% urinary retention, there was no case of failure or recurrence. On the other side, regarding complications in LPS group, 46.7% of cases had bleeding, and 26.7% had failure or recurrence. Bleeding and failure were significantly associated with LPS group, with only one case of bleeding among Ligasure group and no case of recurrence in the same group. With relation to bleeding and failure/recurrence, there were notable differences across the groups.

In disagreeing with our results, Maloku et al. reported that neither significant negative effects nor problems occurred in the LHP group. In one instance, bleeding was seen (the patient was taking aspirin). One instance required surgical hemostasis. One instance of minor discomfort that necessitated medication was reported in the LHP group. None of the instances required blood transfusions [11].

In line with the current results, Alsisy et al. reported that regarding the Laser group 86.7% of cases had bleeding, 40% of cases had postoperative pain, and 20% had itching[12].

In a cross-sectional study, De Nardi et al. reported that there was In 96.7% of their patients, the bleeding was completely resolved, all patients' discomfort subsided, and no serious complications surfaced over the two years of follow-up [13].

In disagreeing with the current results, Yassin et al. reported that only one (3.3%)

case had postoperative bleeding in the LHP group and was treated conservatively. Four (13.3%) cases developed urine retention. Four (13.3%) cases had recurrent/residual hemorrhoids. No cases were reported with stenosis[9].

A systematic review by Longchamp et al. reveals that one year following Laser Hemorrhoidectomy (LH), the risk of hemorrhoids returning varies from 0% to 11.3% [14].

Therefore, this operation is probably safe in cases of moderate hemorrhoidal illness and this pilot study may serve as a roadmap for bigger clinical studies in Australia because LH has been demonstrated to have minimal intraoperative complications and low rates of recurrence for patients with grade II and III hemorrhoids [15].

In contrast, with our result, Hassan and El-Shemy 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[16].

In line with the current results, Chen et al. A meta-analysis demonstrates the advantages of using the Ligasure vessel sealing device for hemorrhoidectomy, including a quicker procedure and fewer recurrences [17].

Wang et al. reported that concerning LigaSure group (n=32), one case had hemorrhage. Anal stenosis, constipation, and urinary retention wererepresented in two cases[18].

Concerning pain in the present study, the pain score was 7 and 4.73 in Ligasure and LPS respectively. Regarding pain, there were notable differences across the groups.

In accordance with our results, Yassin et al. reported that, on day 0 postoperatively, the LHP group's median pain score was 6, and then the median pain score after the first, fourth, and eighth week postoperatively was 3, 2, and 0, respectively, in the LHP group[9].

Alsisy et al. reported that regarding the Laser group, From 1 to 8, with a mean value of 1, postoperative pain was measured at 2

according to VAS. mild pain (1–3) was represented in 21 (70% of patients) patients, moderate pain (4–6) was in six patients representing 20% of patients, and severe pain (7–10) was represented in three (10% of patients) patients[12].

Based on the outcomes of our research, Bakhtiar et al. reported that for LigaSure group the mean immediate postoperative VAS score was 4.61 and decreased to 1.34 in the 7<sup>th</sup> postoperative day[19].

Another study conducted in India found that the post-operative pain was 4.10.8 on the first postoperative day and that it decreased to 1.2±0.2 on 7<sup>th</sup> postoperative day[20].

### CONCLUSION

The laser Pile surgery was easy, with a short operation time, less pain, and less hospital stay but expensive with a high incidence of bleeding and recurrence in comparison to ligasuer which is cheaper and more effective with less bleeding and recurrence rate but more painful and more urine retention.

### RECOMMENDATION

Further studies are needed on larger sample sizes, and longer follow-up periods, which may elucidate effective treatment modalities of hemorrhoids to assess complications and outcomes of different methods of treatment. LPS need Doppler-guided sealing of feeding arteries to decrease bleeding and failure rate.

### ETHICAL APPROVAL

Approval was obtained from the Zagazig University Institutional Review Board (IRB# 9320). Written informed consent was obtained from all participants. The study was done according to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

### CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors are responsible for the content and writing of the paper.

### REFERENCES

- 1- Cengiz TB, Gorgun E. Hemorrhoids: a range of treatments. *Cleve Clin J Med.* 2019; 86(9):612–20.
- 2- Cerato MM, Cerato NL, Passos P, Treigue A, Damini DC. **Surgical** treatment of hemorrhoids: a critical appraisal of the current options. *Arq Bras Cir Dig.* 2014;27(1):66–70.
- 3- Sun Z, Migaly J. Review of hemorrhoid disease: presentation and management. *Clin Colon Rectal Surg.* 2016; 29(01), 022-9.
- 4- Fowler GE, Siddiqui J, Zahid A, Young CJ. Treatment of hemorrhoids: a survey of surgical practice in Australia and New Zealand. *World J Clin Cases.*2019; 7(22):3742–50.
- 5- Amarprakash D, Anaya P, Kumar A, Mukesh S. A Comprehensive Review on Management of Hemorrhoids (GUDARSHA)- AN INTEGRATED APPROACH. *Int J Mol Sci.*2019; 7(7), 310-20.
- 6- Lakmal K, Basnayake O, Jayarajah U, Samarasekera DN. Clinical **Outcomes** and Effectiveness of Laser Treatment for Hemorrhoids: A Systematic Review. *World J Surg.*2021;45(4), 1222–36.
- 7- Mott T, Latimer K, Edwards C. Hemorrhoids: diagnosis and treatment options. *Am Fam Physician.*2018; 97(3), 172-9.
- 8- Nienhuijs SW, de Hingh IH. Pain after conventional versus Ligasure haemorrhoidectomy. A meta-analysis. *Int J Surg.* (London, England), 2010; 8(4), 269–73.
- 9- Yassin MM, Nada MA, Ebeid EF, Boutrous AM. Comparative study between excisional hemorrhoidectomy and laser hemorrhoidoplasty in third-degree piles. *Egypt J Sur.* 2022; 41(4), 1801.
- 10- Jain A, Lew C, Aksakal G, Hiscock R, Mirbagheri N. Laser hemorrhoidoplasty in the treatment of symptomatic **hemorrhoids**: A pilot Australian study. *Ann Coloproctol.*2022; (19); 1-8.
- 11- Maloku H, Gashi Z, Lazovic R, Islami H, Juniku-Shkololli A. Laser Hemorrhoidoplasty Procedure vs Open Surgical Hemorrhoidectomy: A Trial Comparing 2 Treatments for Hemorrhoids of Third and Fourth Degree. *Acta Inform Med.* 2014; 22(6), 365–7.
- 12- Alsisy AA, Alkhateep YM, Salem IE. Comparative study **between** intrahemorrhoidal diode laser treatment and Milligan–Morgan hemorrhoidectomy. *Menouf Med J.* 2019. 32(2), 560.
- 13- De Nardi P, Tamburini AM, Gazzetta PG, Lemma M, Pascariello A, Asteria CR. Hemorrhoid laser **procedure** for second- and third-degree hemorrhoids: results from a multicenter prospective study. *Tech Coloproctol.* 2016; 20; 455-9.
- 14- Longchamp G, Liot E, Meyer J, Toso C, Buchs NC, Ris F. Non-excisional laser therapies for hemorrhoidal disease: A **systematic** review of the literature. *Lasers Med Sci.*2021; 36(3), 485–496.
- 15- Aibuedefe B, Kling SM, Philp MM, Ross HM, Poggio JL. An update on **surgical** treatment of hemorrhoidal disease: A systematic review and meta-analysis. *Int J Colorectal Dis.*2021; 36(9), 2041–9.
- 16- Hassan A, El-Shemy GG. Laser hemorrhoidoplasty versus open **hemorr=**

- hoidectomy** in Upper Egypt. *Al-Azhar Int Med J.* **2021**; 2(2), 84–9.
- 17- **Chen H, Woo X, Cui J, Chen C, Peng J.** Ligasure versus stapled **hemorrhoidectomy** in the treatment of hemorrhoids: A meta-analysis of randomized control trials. *Surgical Laparoscopy. Endosc Percutan Tech.* **2014**; 24(4), 285–9.
- 18- **Wang J-Y, Tsai H-L, Chen F-M, Chu KS, Chan H-M, Huang C-J et al.** Prospective, randomized, controlled trial of **Starion** vs Ligasure hemorrhoidectomy for prolapsed hemorrhoids. *Dis Colon Rectum.***2007**; 50(8), 1146–51.
- 19- **Bakhtiar N, Moosa FA, Jaleel F, Qureshi NA, Jawaid M.** Comparison of hemorrhoidectomy by LigaSure with conventional Milligan Morgan’s hemorrhoidectomy. *Pak J Med Sci.***2016**; 32(3), 657–61.
- 20- **Tan K-Y, Zin T, Sim H-L, Poon P-L, Cheng A, Mak K.** Randomized clinical trial comparing LigaSure haemorrhoidectomy with open diathermy haemorrhoidectomy. *Tech Coloproctol .***2008**; 12(2), 93.

### Citation:

Ibrahim, E., Hassan, H., Atayp Beshna, S., Zaitoun, M. Evaluation of Laser Pile Surgery versus Ligasure Hemorrhoidectomy in Treatment of Hemorrhoids. *Zagazig University Medical Journal*, 2024; (2679-2686): -. doi: 10.21608/zumj.2023.231281.2857