



Comparison of Intra Haemorrhoidal Laser Diode Treatment with Milligan-Morgan Open Haemorrhoidectomy

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ABSTRACT

Background: Haemorrhoids are a common condition affecting the anal canal, often requiring surgical intervention when symptomatic. Surgical options include Milligan-Morgan Haemorrhoidectomy (MH), Trans-anal Haemorrhoidal Dearterialization (THD), and Procedure for Prolapse and Haemorrhoids (PPH). Despite advancements, post-operative pain remains a significant concern. Laser treatment, specifically Laser Haemorrhoidoplasty (LHP), has emerged as a promising alternative, potentially reducing pain and complications.

Objective: This study aimed to compare the efficacy and outcomes of Laser Haemorrhoidoplasty with Milligan-Morgan Haemorrhoidectomy in managing grade II and III haemorrhoids, focusing on post-operative pain, complications, recovery time, and recurrence rates.

Methods: A prospective observational study was conducted over two years at PBMH, KIMS, Bhubaneswar, involving 70 patients with grade II and III haemorrhoids. Patients were divided into two groups: Group A (LHP) and Group B (MH). Data collected included demographics, pre-operative symptoms, operative characteristics, post-operative pain (measured by Visual Analog Scale), complications, and recovery time. Statistical analysis was performed using unpaired t-tests and chi-square tests.

Results: Both groups had similar baseline characteristics. The LHP group reported significantly lower pain scores at 1, 7, and 14 days post-operatively ($p < 0.0001$). Operative outcomes showed shorter surgery duration (34.23 vs. 54.06 minutes, $p < 0.0001$), less intra-operative bleeding (12.78 vs. 21.96 cc, $p < 0.0001$), and quicker return to normal activities (3.72 vs. 4.63 days, $p < 0.0001$) in the LHP group. Post-operative bleeding was significantly lower in the LHP group (11.43% vs. 34.29%, $p = 0.04$).

Conclusion: Laser Haemorrhoidoplasty is more effective than Milligan-Morgan Haemorrhoidectomy, demonstrating reduced operative time, lower pain severity, and fewer complications. Patients undergoing LHP had a quicker return to basic activities. Future studies should evaluate the cost-effectiveness of laser treatments in various healthcare settings.

Keywords: Haemorrhoids, Laser Haemorrhoidoplasty, Milligan-Morgan Haemorrhoidectomy, Post-Operative Pain, Surgical Outcomes, Complications.

INTRODUCTION

The most prevalent condition affecting the anal canal, haemorrhoids affect a lot of people on average once in their lifetime.^{1,2} These are a typical component of the “ano-rectal anatomy” and aid in the anal canal's defecation, continence, as well as closure. Treatment is only administered if these start to show symptoms.³

Globally, the incidence of haemorrhoids is significantly higher than that of colon and rectum disorders.^{4,5}

Affected people may experience difficulties going about their everyday lives due to haemorrhoids.⁶ While various therapies had been proposed for this benign condition of anal canal, surgery is the most effective course of action for those with symptomatic haemorrhoids who do not respond to medical therapy.⁷⁻⁹ Despite numerous improvements to haemorrhoid surgery methods, post-

operative discomfort and pain continue to be the main issues.¹⁰

“Milligan-Morgan Haemorrhoidectomy”, “THD (trans-anal haemorrhoidal dearterialization)”, as well as “PPH (procedure for prolapse and haemorrhoids)” are among the surgical treatments used to treat haemorrhoids. Similar results have been shown by excisional procedures, such as haemorrhoidectomy, in terms of pain intensity, recovery time, and rate of complications.¹¹ Nevertheless, compared to non-excisional techniques like THD and PPH, they are linked with a greater risk of recurrence.¹² While THD and PPH have higher risks of recurrence after surgery, they are linked to less post-operative pain and fewer complications.¹¹ While PPH employs a circular stapler to remove haemorrhoidal tissue and reinsert the remaining tissue inside the anal canal, THD entails ligating the haemorrhoidal vessels trans-anally.¹¹



Before making a decision, it is crucial to carefully consider the advantages as well as disadvantages of each surgical operation and have a full discussion with the patient.

As an alternative to traditional treatment options, laser treatment of haemorrhoids has shown promise in lowering post-operative pain and morbidity. In a research, 21 patients with haemorrhoidal illness who had laser haemorrhoidoplasty (LHP) experienced minimal post-operative pain, no return of symptoms, and a low rate of stenosis or incontinence.¹²

LHP uses a diode laser generator that is pulsed and set to provide between 12 and 15 W of laser energy through a radial fibre.¹² Patients can get relief with little discomfort from this minimally invasive surgery, which has demonstrated special efficacy in treating grades II or III haemorrhoids with no considerable prolapse.¹²

Following epidural anaesthesia, a 1470 nm conical tip laser fibre is inserted into each haemorrhoid's sub-mucosal plane, with a maximum energy delivery of 250 J per pile mass.¹³

While there may be specific benefits associated with Milligan-Morgan haemorrhoidectomy, such as less pain following surgery, its long-term effectiveness should be carefully evaluated when choosing the best course of action.

There are very few studies conducted globally that had evaluated and compared laser diode treatment versus Milligan Morgan Haemorrhoidectomy for the management of grade II and grade III haemorrhoids. In Indian settings, the evidences for comparative effectiveness of these interventions are relative more scarce.

We hypothesized that laser diode treatment would be more effective in the management of grade II and grade III haemorrhoids. We planned this study to test whether one intervention have significantly better efficacy than other intervention in management of grade II and grade III haemorrhoids.

So, this study was conducted to compare the efficacy and outcome of laser haemorrhoidoplasty with that of open surgical haemorrhoidectomy. The primary objective was to compare the pain levels between two groups on the 1st and 7th postoperative days using the Visual Analog Scale (VAS) and the need for analgesics. The secondary objectives included comparing the incidence of postoperative hemorrhage, pain on the 14th postoperative day, the time taken to return to normal activities, and the recurrence rate between the two groups.

MATERIALS AND METHODS

The study was a prospective observational study conducted at the Department of General Surgery, PBMH, KIMS, Bhubaneshwar, over a duration of two years from June 2022 to May 2024. The source of data included all

patients admitted to the General Surgery Department at KIMS and PBM Hospital with grade II and III haemorrhoids who were planned for surgery.

Sample Size: Based on the number of patients admitted to the Dept. of General Surgery, KIMS and PBM Hospital, Bhubaneswar, who would be undergoing surgery, the time frame dictates the estimated sample size to be around 70 cases per annum. So, the sample size to be encountered during the study period was calculated to be around 35 cases per group.

Inclusion Criteria: The inclusion criteria for the study were patients of either sex, patients with grade II haemorrhoids that did not respond to medical treatment, and patients with clinically detected grade III haemorrhoids.

Exclusion Criteria: The exclusion criteria for the study were patients with fistula and fissures, patients with perianal abscess, patients with prolapsed, thrombosed, or gangrenous haemorrhoids, and patients with grade IV haemorrhoids.

Methodology: The intervention involved two groups: Group A underwent Laser Haemorrhoidoplasty, and Group B underwent Milligan-Morgan Haemorrhoidectomy. Data collected for analysis included baseline demographics (age and gender), grade of haemorrhoids, symptomatology prior to surgery (bleeding, discomfort, itching), operative characteristics (blood loss and operative time), postoperative data at 1, 7, 14, and 30 days of follow-up, postoperative pain (VAS scales) and need for analgesics, length of hospital stay, and recovery time.

The assessment included late postoperative problems such as abrupt thrombosis, anal discharge, as well as anal stenosis, as well as early complications following surgery such as secondary bleeding and urine retention.

Elimination of Bias: Selection bias, the most frequent kind of bias that could arise throughout the trial, was eliminated by adding all of the patients who met the eligibility requirements.

Statistical Analysis: Continuous data such as age, BMI, operative time, VAS score, duration of hospital stay, recovery time were expressed as mean \pm SD (standard deviation). Statistical significance of difference in continuous data between group A (LH) and B (MH) was evaluated by unpaired t-test. Categorical data, including outcome, age group, gender, grade of haemorrhoids, preoperative symptoms and incidence of complications were reported as percentages and frequencies and then compared by chi-square test. A p-value of less than 0.05 was taken as cut-off for statistical significance.

RESULTS

In this prospective observational study, 70 patients were enrolled with 35 patients in each group.



Table 1: Comparison of Baseline Demographic and Clinical Characteristics between LH Group (Group A) and MH Group (Group B)

Parameters	Group A (n=35)	Group B (n=35)	P-Value
Age in Years, mean ± SD	44.37 ± 14.05	44.66 ± 14.35	0.9322**
Male Gender, n (%)	16 (45.71)	14 (40.00)	0.81*
BMI in kg/m ² , mean ± SD	25.87 ± 3.14	25.83 ± 3.25	0.9584**
Haemorrhoid Grade, n (%)			0.62*
Grade II	15 (42.86)	12 (34.29)	
Grade III	20 (57.14)	23 (65.71)	
Pre-operative Symptoms, n (%)			
Bleeding	28 (80.00)	30 (85.71)	0.75*
Pain	12 (34.29)	11 (31.42)	>0.99*
Itching	6 (17.14)	9 (25.71)	0.56*

*Fisher’s Exact Test, **Unpaired t-test

Both groups have similar ages and BMIs, with no statistically significant differences (p-values of 0.9322 and 0.9584, respectively). The male gender distribution is also comparable between the groups (p = 0.81). The distribution of haemorrhoid grades and pre-operative symptoms (bleeding, pain, itching) shows no significant differences, with p-values ranging from >0.99 to 0.56.

Table 2: Comparison of Pain Severity with respect to VAS Score between Group A (LH) and Group B (MH)

Post-Operative Period in Days	VAS Score (Mean ± SD)		P-Value (Unpaired t-test)
	Group A (N = 35)	Group B (N = 35)	
1	4.62 ± 0.93	6.97 ± 1.25	<0.0001
7	2.56 ± 0.51	5.25 ± 1.04	<0.0001
14	0.54 ± 0.07	1.19 ± 0.16	<0.0001
P-Value (Repeated Measure ANOVA)	<0.001	<0.001	

There was significant fall in VAS score from 1st post-operative day to 14th post-operative day (p<0.0001). Pain severity was significantly less in LH as compared to MH group (p<0.0001).

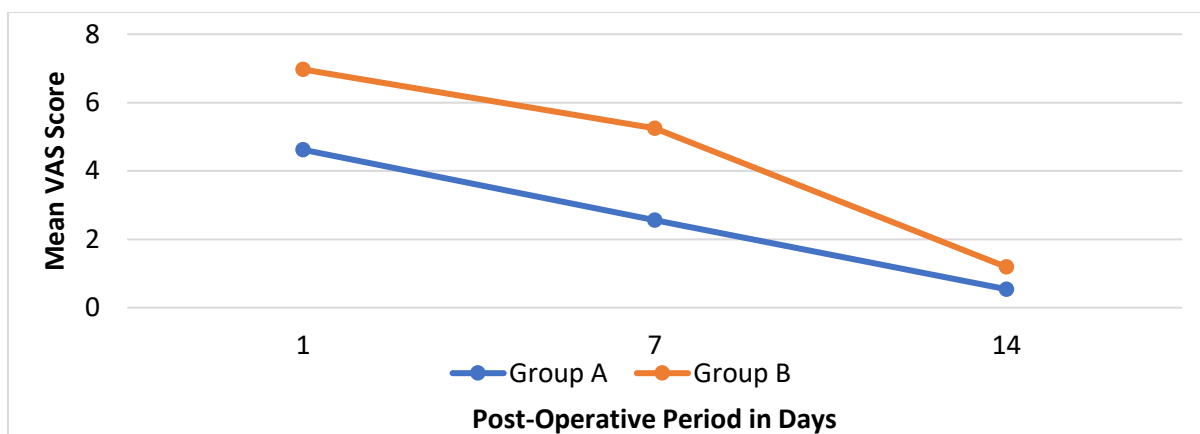


Figure 1: Comparison of VAS Score

Table 3: Comparison of Operative Outcomes between LH Group (Group A) and MH Group (Group B)

Outcomes	Value in Mean ± SD		P-Value (Unpaired t-test)
	Group A (N = 35)	Group B (N = 35)	
Duration of Surgery in Minutes	34.23 ± 4.42	54.06 ± 9.79	<0.0001
Intra-operative Bleeding in cc	12.78 ± 2.51	21.96 ± 4.37	<0.0001
Dose of Morphine in mg	5.13 ± 0.89	10.64 ± 1.76	<0.0001
Mean Time to Basic Activities in Days	3.72 ± 0.69	4.63 ± 0.92	<0.0001

Group A showed significantly shorter surgery duration, less intra-operative bleeding, lower morphine doses, and quicker return to basic activities compared to Group B.

Table 4: Comparison of Complications between LH Group (Group A) and MH Group (Group B)

Post-Operative Period in Days	Number of Patients (%)		P-Value (Fisher's Exact Test)
	Group A (N = 35)	Group B (N = 35)	
Post-operative Bleeding	4 (11.43)	12 (34.29)	0.04
Urinary Retention	1 (2.86)	4 (11.43)	0.36
Acute Thrombosed Haemorrhoid	3 (8.57)	0 (0.00)	0.24
Recurrence	0 (0.00)	4 (11.76)	0.054

Group A had significantly fewer post-operative bleeding incidents (11.43% vs. 34.29%, $p = 0.04$). There were no significant differences in urinary retention (2.86% vs. 11.43%, $p = 0.36$), acute thrombosed haemorrhoids (8.57% vs. 0%, $p = 0.24$), and recurrence (0% vs. 11.76%, $p = 0.054$).

DISCUSSION

A new less invasive surgery called laser haemorrhoidoplasty is now available to address severe haemorrhoid issues. In India, this approach is quite new. As far as we are aware, not many studies have addressed the use of laser hemorrhoidoplasty in the treatment of second- or third-degree piles.¹⁴ The necessity for care of haemorrhoids primarily depends on the subjective assessment of the extent of presentations.¹⁵

In laser ablation, the average operating time was 34.23 ± 4.42 minutes, while in milligan ization, it was 54.06 ± 9.79 minutes. These outcomes agreed with those of an earlier investigation.¹⁶

The pain scores during this study were significantly lower in the LH patients as compared to the MM haemorrhoidectomy operation group. The most significant adverse impact that disturbs patients and makes them unwilling to have surgery is pain that follows surgery.¹⁷

This study demonstrated that LH is a safe technique with significantly less discomfort following surgery. Additionally, compared to open surgical haemorrhoidectomy, laser haemorrhoidoplasty requires a significantly shorter operating time, making it a preferable option for symptomatic patients having second- and third-degree piles.

In small research that compared 15 patients having II or III grade haemorrhoids going through intra-haemorrhoidal (endoluminal) treatment with laser with wavelength of 810 nm versus ten participants going through cold open scalpel technique (MM haemorrhoidectomy), Plapler et al. revealed comparable advantages for pain intensity following the procedure. In their investigation, plicoma and burn lesions were the most common complications, including a single instance of treatment failure.¹⁸

According to Plapler et al., there are benefits to CO₂ laser haemorrhoidectomy over traditional surgical methods, especially with regard to postoperative pain.¹⁹ Senagore et al. evaluated the therapeutic results of a typical Ferguson-closed haemorrhoidectomy vs the use of a Nd:YAG laser

and knife resection for those suffering from severe haemorrhoidal illness. Blood loss, operating time, post-operative VAS scores, post-operative utilization of analgesic, healing of the wound, and the time required to return to work did not significantly differ between the two groups in their RCT. In the laser group, they discovered increased levels of wound dehiscence as well as inflammation on the tenth postoperative day.²⁰

The results of trials comparing laser technology with traditional, well-practiced surgical methods must be interpreted cautiously, taking into account the intricate workings of the two study arms. Our patient cohort included individuals with grade II or III haemorrhoids, that are more challenging to treat and resistant to medical intervention.²¹ It is uncommon for grade II haemorrhoid to not respond to non-operative treatment, which includes medication, changes in diet and lifestyle, nevertheless, and this should be acknowledged. Furthermore, some other investigations managed their patients using rubber band ligation, that is a relatively less invasive operation, while our patients received MM haemorrhoidectomy.²¹

Studies with extended follow-up times have also proven the efficacy of laser haemorrhoid therapy. In a cross-sectional investigation, De Nardi et al. utilized a 980-nm diode laser with five impulses of 13- W power, every one lasting 1.2 s with a 0.6-s pause. They discovered that after a 24-month follow-up, all patients' pain had resolved, 96.7% of patients' bleeding had completely stopped, and there had been no major complications.²²

In a different trial, Crea et al. found that managing grade II or III symptomatic haemorrhoids using a 980 nm laser diode—five pulses at a strength of 13 W, each shot lasting 1.2 s with a 0.6 s interval—was painless, safe, and successful. The authors discovered that while no major side effects, including anal canal stenosis, were noted throughout the two-year follow-up, the frequency and severity of symptoms as well as the extent of haemorrhoids reached a "plateau" between three and six months following the laser operation and did not alter much after that.²³



In this study, we compared the total number of regressed haemorrhoidal columns, the resolution of clinical symptoms and signs like bleeding, discomfort, or itching, as well as the need for repeat surgery for symptomatic haemorrhoids or medical care for residual symptoms for twelve months after the procedure. We also found that laser haemorrhoidectomy performed more effectively than surgical haemorrhoidectomy (MM).

According to Smith et al., while laser haemorrhoidectomy provided a better technique for the majority of surgeons, using laser devices is less cost-effective due to their higher maintenance costs.²⁴ However, the usage of laser equipment extends beyond haemorrhoids and includes urological, obstetrical as well as gynecological, and vascular disorders. For these reasons, we believe that purchasing laser equipment is a cost-effective investment. Moreover, surgeons or surgical assistants can learn how to utilize and educate laser technology with ease, as it only requires between three and five proctored cases.

One of the study's shortcomings is that it did not include an extended follow-up (after a year), which could have revealed information on the recurrence rate, the necessity of a different technique, and the effectiveness of performing the same surgery on each patient group. Furthermore, the evaluation of uncommon problems was hampered by the limited patient population.

CONCLUSION

Laser Haemorrhoidoplasty proved more effective than Milligan-Morgan Haemorrhoidectomy with less operative time, less severity of pain, lesser intra-operative and post-operative bleeding. There was also less requirement of analgesic and less recurrence rate in LH group as compared to MH group. Patients undergoing haemorrhoidectomy under LH technique had quicker return to basic activities as compared to MH group. However, incidence of acute thrombosed vein was slightly greater in LH group but the difference was not statistically significant. To further understand the financial implications of laser treatments, future study should evaluate how cost-effective they are in different healthcare settings.

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REFERENCES

- Naderan, M., Shoar, S., Nazari, M., Elsayed, A., Mahmoodzadeh, H., & Khorgami, Z. A Randomized Controlled Trial Comparing Laser Intra-Haemorrhoidal Coagulation and Milligan–Morgan Haemorrhoidectomy. *Journal of Investigative Surgery*. 2016; 30(5): 325–331. doi:10.1080/08941939.2016.1248304
- Lohsiriwat V. Treatment of haemorrhoids: a coloproctologist's view. *World J Gastroenterol*. 2015;21:9245–9252.
- Bullard KM, Rothenberger DA. Colon, rectum, and anus. In: *Schwartz's Principles of Surgery*, Vol. II, 8th ed. Andersen DK, Billiar TR, Dunn DL, Hunter JG, Pollock RE, eds. New York, NY: McGraw-Hill; 2010:1101–1103.
- Nagdy MA. Comparative study between Milligan Morgan Haemorrhoidectomy and Laser Ablation for the Management of third and fourth Degree of haemorrhoids. *Al-Azhar International Medical Journal [Internet]*. 2022 Mar 1;3(3):49–58. Available from: https://aimjournals.ekb.eg/article_226847.html
- Chung YC, Hou YC, Pan AC. Endoglin (CD105) expression in the development of haemorrhoids. *Eur J Clin Invest*. 2018;34:107–12.
- Abcarian H, Alexander-Williams J, Christiansen J, et al. Benign anorectal disease: definition, characterization and analysis of treatment. *Am J Gastroenterol*. 1994;89:S182– S193.
- Moult HP, Aubert M, De Parades V. Classical treatment of haemorrhoids. *J Visc Surg*. 2015;152:S3–S9.
- Ozer MT, Yigit T, Uzar AI, et al. A comparison of different haemorrhoidectomy procedures. *Saudi Med J*. 2008;29:1264– 1269.
- Lu M, Shi GY, Wang GQ, et al. Milligan–Morgan haemorrhoidectomy with anal cushion suspension and partial internal sphincter resection for circumferential mixed haemorrhoids. *World J Gastroenterol*. 2013;19:5011– 5015.
- Yeo D, Tan KY. Haemorrhoidectomy – making sense of surgical options. *World J Gastroenterol*. 2014;20:16976– 16983.
- Cerato MM, Cerato NL, Passos P, Treigue A, Damin DC. Surgical treatment of haemorrhoids: a critical appraisal of the current options. *Arq Bras Cir Dig*. 2014; 27:66-70. 10.1590/s0102-67202014000100016
- Anal fissure surgery. (2017). Accessed: April 4, 2024: <https://www.darmsprechstunde.de/en/behandlungsverfahren/en/laser-fissurektomie/>
- Poskus T, Danys D, Makunaite G, et al. Results of the double-blind randomized controlled trial comparing laser haemorrhoidoplasty with sutured mucopexy and excisional haemorrhoidectomy. *Int J Colorectal Dis*. 2020; 35:481-90. 10.1007/s00384-019-03460-6
- Barwell J, Watkins R M, Lloyd-Davies E, Wilkins D C. Life-threatening retroperitoneal sepsis after hemorrhoid injection sclerotherapy: report of a case. *Dis Colon Rectum*. 2021;42(3):421–3.
- Morandi E, Merlini D, Salvaggio A, Foschi D, Trabucchi E. Prospective study of healing time after hemorrhoidectomy: influence of HIV infection, acquired immunodeficiency syndrome, and anal wound infection. *Dis Colon Rectum*. 2019;42(9):1140–4.



16. Faucheron J L, Gangner Y. Doppler-guided hemorrhoidal artery ligation for the treatment of symptomatic hemorrhoids: early and three-year follow-up results in 100 consecutive patients. *Dis Colon Rectum*. 2018;51(6):945–9.
17. Yoon SO, Park SJ, Yun CH, Chung AS. Roles of matrix metalloproteinases in tumor metastasis and angiogenesis. *J Biochem Mol Biol*. 2018;36:128–37.
18. Plapler H, Hage R, Duarte J, et al. A new method for hemorrhoid surgery: intrahemorrhoidal diode laser, does it work? *Photomed Laser Surg*. 2009;27:819–823
19. Plapler H, de FariaNetto AJ, da Silva Pedro MS. 350 ambulatory hemorrhoidectomies using a scanner coupled to a CO2 laser. *J Clin Laser Med Surg*. 2000;18:259–262.
20. Senagore A, Mazier WP, Luchtefeld MA, et al. Treatment of advanced hemorrhoidal disease: a prospective, randomized comparison of cold scalpel vs. contact Nd:YAG laser. *Dis Colon Rectum*. 1993;36:1042–1049.
21. Giamundo P, Salfi R, Geraci M, et al. The hemorrhoid laser procedure technique vs. rubber band ligation: a randomized trial comparing 2 mini-invasive treatments for second- and third-degree hemorrhoids. *Dis Colon Rectum*. 2011;54:693–698.
22. De Nardi P, Tamburini AM, Gazzetta PG, et al. Hemorrhoid laser procedure for second-and third-degree hemorrhoids: results from a multicenter prospective study. *Tech Coloproctol*. 2016;20:455–459.
23. Crea N, Pata G, Lippa M, et al. Hemorrhoidal laser procedure: short-and long-term results from a prospective study. *Am J Surg*. 2014;208:21–25.
24. Smith LE. Anal hemorrhoids. *Neth J Med*. 1990;37(Suppl 1):S22–S3

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