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Laser Hemorrhoidoplasty(LHP) Twisting Trend: A Study In a Small-Town Hospital

Reema Ghani¹, Zeeshan Sarwar², Sheryar Khan Niazi¹, Rameez Hassan Khan¹, Asif Qureshi³¹ Brigadier Shafique Trust Hospital Bhakkar- Pakistan² East surgical ward Mayo Hospital Lahore- Pakistan³ Liaquat College of Medicine & Dentistry, Karachi- Pakistan

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Corresponding Author

Dr Reema Ghani
Brigadier Shafique Trust Hospital
Bhakkar- Pakistan
Email:Surgeron.surgerons@gmail.com

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Abstract

Objective: To determine the outcomes of Laser Hemorrhoidoplasty in terms of early post-operative pain, bleeding, postoperative hospital stay, and operative time.

Methodology: The quasi-experimental study was conducted at Brigadier Shafique Trust Hospital. The duration of the study was four months from September 2023 to December 23. A total of 150 patients were enrolled in the study through a probability consecutive sampling method. After complete history, examination, and baseline investigations, patients underwent LHP. The procedure was performed using a radially emitting laser fiber with a 600 µm diameter and a 1470 nm diode continuous wavelength. The average energy delivered to each hemorrhoid was 210 J to 240 J. Mucopexy was done for grade 3 hemorrhoids with prolapse and all grade 4 hemorrhoids. All patients were regularly followed for early postoperative pain at 12 hours, 7 days, 4 weeks, and then at 6 weeks, using a visual analog scale. All the data were collected using a structured questionnaire and analyzed using SPSS V26.

Results: The studied patients had a male preponderance of 65.5% (n=97/150). The mean age of the patients was 45.09 with a standard deviation (SD) of 13.2 (45.09 ± 13.2). Most patients had grade 2 and grade 3 hemorrhoids, 97.6 % (n=107/150). The most common indications for surgery were per rectal bleeding at 76.1 % (110/150) and nodules at 37.4 % (55/150). The primary outcomes were early post-operative pain and bleeding, which were significantly reduced. By the end of week 6, 90% of patients reported no pain (VAS 0-1) and bleeding. Secondary outcomes included an intraoperative time of 34.2 minutes and a postoperative hospital stay of 18 hours. Patients having grade 3 nodules and grade 4 hemorrhoids treated with mucopexy had negligible prolapse in the post-op period.

Conclusion: Laser Hemorrhoidoplasty is a minimally invasive day-care procedure with a short operative time and a shorter hospital stay with significantly reduced early post-op pain and bleeding. It has a definite edge in the management of Grade 3 and 4 hemorrhoids.

Keywords: Hemorrhoids, Hemorrhoidoplasty, Laser, Mucopexy

Introduction

Hemorrhoids are the most common benign disease of the anal canal, although the reported prevalence varies considerably among the general population from 3% to 30%.^{1,2} Besides the medical management, less than 20% of patients with hemorrhoids require surgical intervention.¹ The literature states its prevalence in Pakistan to be 39%, which commonly affects people between the ages of 45 and 65.³ Haemorrhoids are vascular cushions in the anal canal. Anatomically, they can be divided into internal and external hemorrhoids depending on their location relative to the dentate line.⁴

Goligher further graded internal hemorrhoids based on the degree of prolapse, which are classified as follows: Grade 1, bleeding but non-prolapsing, and Grade 2, prolapse on straining but reduces spontaneously. Grade 3: Prolapse, as illustrated in Figure 3, requires manual reduction. Grade 4: Permanent prolapse and irreducible. Among the presenting symptoms, rectal bleeding is the most common.^{5,6}

Management of hemorrhoids has passed through different stages, starting from excisional treatment to non-excisional methods, including chemical hemorrhoidectomy, band ligation, stapler n of haemorrhoidal artery.⁷ Although traditional surgical hemorrhoidectomy stayed the gold standard procedure, but it is associated with post-op complications like severe pain and bleeding, urinary retention, and anal stenosis.⁸ Despite several modifications to the treatment techniques, post-operative pain remains the key concern for both the surgeon and the patient. It is the phobia of post-op pain that results in the late presentation of this benign disease and an increased number of disease days, leading to prolonged hospital stays.⁹

LHP has been recently introduced to treat this disease as a day-case procedure with significantly reduced early post-op pain and bleeding. LASER is the acronym for "light amplification by stimulated emission of radiation," described in 1917 by Albert Einstein. Modern laser therapy is of great interest in the field of proctology. In this minimally invasive procedure, the arteriovenous flow of the hemorrhoidal plexus is interrupted through laser coagulation, leading to the destruction of vessels in the submucosa and subsequent fibrosis. As a result haemorrhoidal packet shrinks and sticks to the wall of anal canal preventing its prolapse without any significant post-op bleeding, pain and anal stenosis.⁹ This technique can be effectively performed for grade 2 and grade 3 hemorrhoids with the addition of mucopexy for cases having prolapse.¹⁰ Besides minimal tissue damage and good haemostasis, the duration of surgery and post-op hospital stay is reduced significantly. Overall, it improves the quality of life compared to other non-laser procedures for treating haemorrhoids.¹¹ Thus, LHP has been suggested as an approved and updated intervention for the treatment of hemorrhoids.

The objective of this study was to evaluate the role of LHP in the treatment of grade 2 and grade 3 hemorrhoids with prolapse, in terms of immediate postoperative pain and bleeding, duration of surgery, and postoperative hospital stay, with the addition of mucopexy in cases of prolapsed hemorrhoids.

Methodology

The Ethics Committee approval ECF Ref No: BSTH/540/24 was issued on 8th September 2023. This quasi-experimental study was conducted at Brigadier (R) Shafiq Ahmad Khan Trust Memorial Hospital, Bhakkar, in the Punjab province of Pakistan, from September 2023 to December 2023. A total of 150 participants were enrolled in the study through a non-probability consecutive sampling technique. According to the inclusion criteria, all the adult patients admitted to the study setting for hemorrhoidectomy were eligible participants. All participants in the study were enrolled with proper informed consent, as outlined in the World Medical Association and Helsinki Declaration guidelines. The purpose of the research and the voluntary participation requirements were explained to participants before data collection and the study procedure. Patients having thrombosed hemorrhoids, history of anorectal surgery, faecal-incontinence Grade C and D, history of portal hypertension with rectal varices, bleeding disorders, or platelet count lower than 100,000, and history of previous inflammatory bowel diseases were excluded from participation. All patients included in the study underwent viral screening, vital sign assessment, and proctoscopy, and routine hospital and clinical investigations were conducted before admission and the procedure, in accordance with the study settings' standard operating procedures and clinical guidelines.

All the participants underwent LHP. It was performed in a Lithotomy position under spinal anesthesia. With the help of an Anoscope, the location of the dentate line and haemorrhoidal complex was identified. With a forward-firing laser fiber of 600 µm and a diode at 1470 nm, continuous wavelength energy of 60-70 J was delivered at a distance of 2 cm above the complex without touching the mucosa in a spray fashion, through the devices illustrated in Figure 1. The laser Probe, as illustrated in Figure 2, was inserted 5mm away from the inter-sphincter groove to deliver an energy of about 60-80 J submucosally above the complex. The probe was driven back to point the haemorrhoidal packet for the energy delivery of about 100-120J. The amount of energy delivered depended on the size of the haemorrhoidal complex, as Figure 3 presents a hemorrhoid before the application of LHP. The average energy delivered to each hemorrhoid was 210 J to 240 J, not exceeding 300 J. Mucopexy was done for hemorrhoids with prolapse using a delayed absorbable suture of size 2/0.

Sociodemographic data, pre-operative history, and findings of clinical investigations, details of the oper-

ative procedure, and postoperative follow-up were recorded for each patient. The follow-up was conducted over 6 weeks, with data collection occurring at four intervals. The first data collection was conducted 12 hours after the operative procedure, followed by another data collection on the 7th day.

At intervals of 4 weeks, and finally at the 6th week. Patient follow-up was 100% throughout the study, with no patient being lost. Post-operative follow-up of the surgical site was carried out as illustrated in Figure 4. Post-operative pain was recorded on the VAS with categories of 0-4 as mild, 5-7 moderate, and 8-10 for severe pain. Descriptive statistics, including frequencies and percentages, were computed, as well as mean scores for the VAS. The normality of the data was tested using the Kolmogorov-Smirnov test at an alpha level of 0.1. After normality was confirmed, ANOVA was applied to check for significant differences among pain scores after 24 hours, pain at the seventh day, and after 6 weeks.

Results

Out of 150 patients, 81 were male (54%) and 69 (46%) were female, which shows a male preponderance, as presented in Table 1. The most common presenting symptom was per rectal bleeding, followed by painful defecation, as presented in Table 2.

The total duration of surgery was calculated as a mean time of (22.16±8.7) minutes. The minimum time recorded was 15 minutes, while the maximum time was 40 minutes. The maximum energy used per case didn't exceed 300 J, while the minimum energy used was 200 J. Mucopexy was done in patients having grade 3 and 4 hemorrhoids. Post-op pain assessment at 24 hours, according to VAS, was 53% having mild pain (0-4), 29% of participants had moderate (5-7) pain, and 18% had severe (8-10) pain. Among the studied patients, 5% had complaints of rectal bleeding, and 5.8% had nodular sensations. As far as other complications are concerned, five patients underwent urinary retention, and seven patients had spinal headaches. The anal fissure was observed in n=3, peri-anal abscess n=2, peri-anal fistula n=3, and Anal-enema was reported in n=10 pa-

tients. The minimum stay at the hospital was 8 hours, and the maximum stay was 25 hours, with a mean stay of 12.04 hours (SD ± 3.75 hours). Post-operative complications have been summarized in the pie charts shown in Figures 5 and 6. Breakthrough pain management was needed for only 10% of the patients. Post-operative rectal bleeding was encountered in only 23 patients, while 21 patients had nodular sensation during the first 7 days. Assessment at 6 weeks of follow-up showed that most patients were asymptomatic. Only 7.2% of patients had pain while defecating, though it didn't affect their daily routine activities.

Pain score of the participants significantly reduced over time, with a mean pain score of 3.4 at 24 hours, 3.2 at the seventh day, and 2.0 at the 6th week. The Mauchly's Test of Sphericity value was 0.21, thus >0.05, and the results of the regular ANOVA table were assumed to indicate differences in pain score over time. ANOVA reported P=0.00, which showed significant differences among the pain scores over time. The pairwise comparison showed significant differences (P=0.00) in pain score of 24 hours and 6 months, but there was no significant difference in pain score of 24 hours and one week. Pain scores at six weeks were also found to have a significant difference with pain at 24 hours (P=0.00) and pain at one week (P=0.00). The independent Sample t-test did not show any statistical difference between the male and female genders and perception of pain at three recorded intervals. The Pearson correlation did not show any significant association of age and gender with perception of pain, nor was the hospital stay found to be correlated with pain perception at three intervals.

Discussion

The mean time of surgery was recorded as 22.16 minutes, which is almost eight to nine minutes lower than traditional hemorrhoidectomy procedures with a mean time of 29.7±6.3 minutes. 12 other procedures, like hemorrhoid-artery ligation (HAL) and Milligan-Morgan hemorrhoidectomy (MMH), can take 40 minutes and 45 minutes, respectively, per procedure. 13 Thus, compared to HAL and MM, LHP can reduce the operating time by more than half. According to some

Table 1. Demographic Characteristics of Participants

Gender	Male	Female
	81 (54%)	69 (46%)
AGE	Mean	SD
	46	±13.2
	Minimum	Maximum
	18	80
BMI	Mean	SD
	26.2kg/ m2	± 4.7

Table 2. PresentingSymptoms

Rectal bleeding	n	%
	127/150	84.7
Painful defecation		
	54/150	36
	46	±13.2
	18	80
Nodule sensation		
	68	45%



Figure 1: Laser Machine used for LHP



Figure 3: Grade 3 Hemorrhoids before LHP procedure

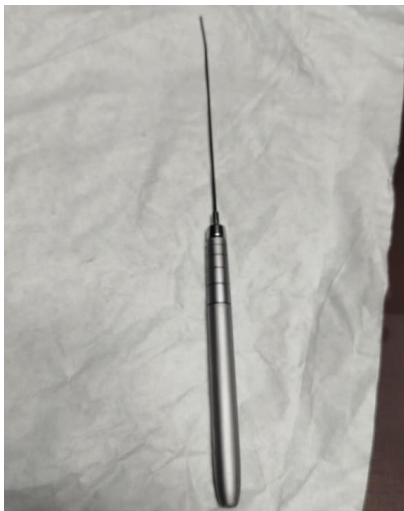


Figure 2: Laser probe used for LHP



Figure 4: Post-operativesurgicalsiteofLHP

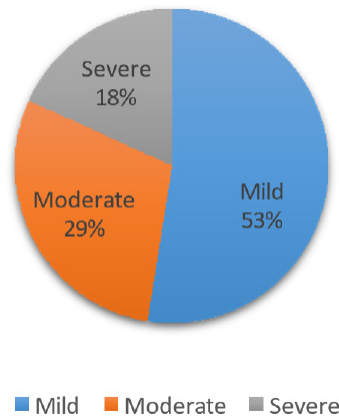


Figure 5: 24-hours post-operative assessment

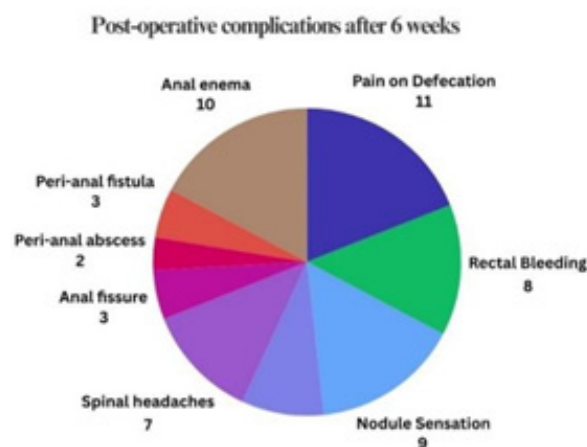


Figure 6: Post-operative complication after 6 weeks

findings, stapler hemorrhoidectomy may take 24 ± 6.2 minutes per procedure, matching the findings of this study, although the operating time for open hemorrhoidectomy has been reported as 46 ± 10 minutes.¹⁴

Immediate and post-operative pain has been the major symptom reported by patients after hemorrhoidectomy. The findings of the current study reported mild pain in 52% of participants at 24 hours post-operative assessment, while 18% had severe and 10% reported mild pain. Open hemorrhoidectomy (OH) has been reported to cause more post-operative pain than closed hemorrhoidectomy (CH) when the pain was assessed after one day and on the seventh day of the procedure.¹⁵ Thus, OH has been further found to cause more severe post-operative pain when compared with bipolar OH, ultrasonic OH, and CH.¹⁵ The post-operative pain experienced in the procedure for prolapse and hemorrhoids (PPH) has also been reported to be lower than experienced in OH, although there was no difference in post-operative Quality of life noted for PPH and LigaSure haemorrhoidectomy.^{15,16} However, compared to all other surgical procedures and techniques, lower post-operative pain has been recorded in LHP than in conventional methods of haemorrhoidec-

tomy.¹⁷ Although postoperative pain has been variedly reported in the literature, and comparative studies have focused mostly on two interventions for comparison, a clear difference in postoperative pain in different procedures cannot be elaborated.¹⁷ Alternatively, systematic reviews have reported that OH procedures and conventional methods of hemorrhoidectomy result in more post-operative pain than LHP. Although this study only reported post-operative pain in LHP participants, it cannot present a comparative analysis of post-operative pain with other surgical techniques. Moreover, anesthesia techniques are also considered significant in the perception of post-operative pain, as a trial reported lower postoperative pain experiences in patients with ischiorectal blocks compared with spinal anaesthesia.¹⁸ Thus, all such determinants should be considered cautiously regarding post-operative pain in hemorrhoidectomy patients.

The mean hospital stay in the studied sample was 18 hours and 34 minutes, thus less than a single day. The hospital stay after hemorrhoidectomy can be associated with many determinants, including anesthesia techniques, where the researchers found shorter hospital stays in patients with ischiorectal blocks compared with spinal anesthesia. Furthermore, excisional hemorrhoidectomy has been reported with 12% of cases being readmitted within 30 days of surgery,¹⁹ although in the current study, not a single participant was readmitted within 6 weeks of the study time. The mean time of hospitalization with spinal anesthesia has been reported as 6 hours for 80% of patients and up to 12 hours for the next 20% of patients, which is considerably lower than the mean time of hospital stay of the current study findings.¹⁸ Hospital stay is not reported in most of the studies, thus a systematic review of eight trials reported hospital stays in only three studies and there was no significant difference in hospital stay for the harmonic scalpel and conventional haemorrhoidectomy.²⁰ A clinical trial in Pakistan reported the mean hospital stay for OH 2 ± 0.45 days and 1.20 ± 0.40 days for Trans- Anal Doppler Guided Hemorrhoidoplasty Ligation.⁴ Thus if compared with the mean hospital stay of the current study, patients with LHP need lesser hospital stay than other surgical procedures.

This study has elaborated on the clinical importance of LHP in the surgical treatment of hemorrhoids and has reported lesser post-operative pain, lower post-operative complications, and lower mean hospital stay as compared to other surgical procedures for the management of hemorrhoids from the literature. Current findings add more value to the practice and convenience of LHP in surgical procedures for treating hemorrhoids. As LHP has been found to have fewer post-operative complications of bleeding and Postoperative pain, when compared to LigaSure hemorrhoidectomy, LHP has been reported with greater recurrence.²² Thus, retrospective cohort studies are required to evaluate

the effectiveness of LHP in the long term, although LHP has been effective in reducing the severity of immediate post-operative complications. Moreover, LHP is a convenient procedure that can be easily learned and followed by new surgeons after close observations of a few cases in the presence of experienced and skillful surgeons.

The current study had a few limitations, including the duration of the study, which was six weeks, and was not enough for studying the long-term effects of LHP on patients' condition and post-surgical Quality of life. As previous studies have reported the recurrence of hemorrhoids in some LHP cases, it cannot be evaluated in a short-term study.²¹ It was not possible to conclude in the six weeks whether any case needed readmission or the surgical procedure. However, in the six weeks of the study, no case was readmitted to the hospital with post-operative complications. The study did not mention any co-morbidities in the patients, as several demographic and personal factors may influence the experience of pain in study participants.²²

The current study is helpful for surgeons and health-care professionals involved in the treatment and management of hemorrhoids and adds significant knowledge to the existing literature on LHP. Further research studies should focus on the long-term effects of LHP, focusing on the co-morbidities and individual patient characteristics, as well as socio-demographic factors that may impact the prognosis and patient outcomes.

Conclusion

LHP has proven beneficial for the surgical treatment of hemorrhoids' and in reducing post-operative symptoms, simultaneously mucopexy has been proven to be effective for management of prolapsed hemorrhoids'.

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Authors' Contribution Statement

RG contributed to the conception, design, acquisition, analysis, interpretation of data, drafting of the manuscript, critical review, and final approval of the version to be published. ZS contributed to the design, acquisition, analysis, drafting of the manuscript, and critical review of the manuscript. SKN contributed to the conception, acquisition, analysis, and interpretation of data. RHK contributed to the conception, acquisition, analysis, and interpretation of data. AQ contributed to the analysis, interpretation of data, and drafting of the manuscript. All authors are accountable for their work and ensure the accuracy and integrity of the study.

Conflict of Interest

Authors declared no conflict on interest

Grant Support and Financial Disclosure

None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.