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Original Research Article

Precision cuts time-comparative outcomes of laser hemorrhoidoplasty and open hemorrhoidectomy

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ABSTRACT

Background: Hemorrhoidal disease, one of the most common anorectal disorders and significantly affects individuals' quality of life and poses a considerable health burden globally. Persistent or advanced-grade hemorrhoids often require procedural interventions such as traditional surgical approaches but these are associated with significant risks and complications. Recent developments, including minimally invasive techniques like laser hemorrhoidoplasty, are transforming the treatment landscape.
Methods: This research was a comparative, prospective study. It involved patients who were diagnosed to have grade II and III haemorrhoids with persistent symptoms. The patients were split into two groups: group 1, which underwent laser hemorrhoidoplasty, and group 2, which received open surgical haemorrhoidectomy and the mean age, duration of the surgery and antibiotic used were compared.
Results: A total of 44 patients were included in the study. Group 1 consisted of 23 participants and group 2 consisted of 21 participants. The mean age between the two groups varied from 21 to 73 years and the mean difference was found to be 0.67. The mean duration of surgery in group 1 was found to be 30.87±14.11 whereas in group 2 it was found to be 96.43±48.09. The mean antibiotics used in group 1 was found to be 4.91±1.12 and in group 2 was found to be 7.81±2.84.
Conclusions: Laser hemorrhoidoplasty is a safe, effective, and minimally invasive alternative to open hemorrhoidectomy for the management of symptomatic hemorrhoidal disease when compared to the duration of surgery, hospital stay and the perioperative antibiotic used.

Keywords: Hemorrhoids, Laser hemorrhoidoplasty, Open hemorrhoidectomy, Milligan-Morgan hemorrhoidectomy

INTRODUCTION

Hemorrhoidal disease, one of the most common anorectal disorders, is characterized by symptomatic enlargement and distal displacement of the normal anal cushions. The condition significantly affects individuals' quality of life and poses a considerable health burden globally, with a prevalence estimated to range between 2.9% and 27.9% worldwide. Approximately 4% of these cases present with significant symptoms, requiring medical intervention.[1] Hemorrhoids are classified into internal and external types, with internal hemorrhoids further graded into four categories based on severity. Treatment strategies range from conservative management and office-based procedures to more invasive surgical interventions, with advancements continuously improving patient outcomes.[2,3]

Conservative management, including dietary modifications, fiber supplementation, and topical medications, remains the first line of treatment for mild hemorrhoidal disease. However, persistent or advanced-grade hemorrhoids often require procedural interventions. Traditional surgical approaches, such as the Milligan-

Morgan open hemorrhoidectomy, have been the gold standard for decades, particularly for severe cases. While effective, these techniques are associated with significant postoperative pain, longer recovery times, and the risk of complications such as bleeding or infection. Recent developments, including minimally invasive techniques like laser hemorrhoidoplasty, are transforming the treatment landscape.[4,6]

Laser hemorrhoidoplasty, a minimally invasive alternative, involves the use of a diode laser to shrink hemorrhoidal tissue by coagulation, leading to fibrosis and retraction of the hemorrhoidal mass. The procedure offers significant advantages, including reduced operative time, less postoperative pain, and faster recovery. Studies have demonstrated the efficacy of laser treatment in second- and third-degree hemorrhoids, with operative durations averaging 14 to 22 minutes and minimal blood loss compared to traditional methods. Furthermore, the technique has been associated with high patient satisfaction and minimal postoperative complications, making it a preferred choice in many cases.[7-9]

Comparative studies between laser hemorrhoidoplasty and open surgical methods, such as the Milligan-Morgan hemorrhoidectomy, highlight the advantages of the laser technique. Laser procedures show significantly shorter hospital stays, reduced postoperative bleeding, and lower pain scores. For instance, in a study comparing the two methods, the mean operative time for laser hemorrhoidoplasty was approximately 14.60 minutes, while open hemorrhoidectomy required nearly double the time at 29.53 minutes. However, laser treatments are not without drawbacks, including higher costs and a marginally increased risk of recurrence in some cases.[10-13]

Open hemorrhoidectomy, despite its drawbacks, remains a mainstay for advanced-grade hemorrhoidal disease. It provides definitive treatment by excising the hemorrhoidal tissue, resulting in long-term symptom resolution. However, the procedure is associated with significant discomfort, longer operative times, and a higher incidence of postoperative complications compared to laser methods. Patients undergoing open hemorrhoidectomy often require extended recovery periods and report higher postoperative pain scores, which can delay their return to normal activities.[14-17]

Laser hemorrhoidoplasty has emerged as a preferred option in outpatient and rural healthcare settings due to its minimal invasiveness and ease of execution. Its day-care nature allows patients to be discharged within hours, significantly reducing the burden on healthcare facilities. In rural and resource-limited settings, where prolonged hospital stays are less feasible, laser procedures offer an effective solution for managing hemorrhoidal disease. Nonetheless, the cost of laser equipment and the need for specialized training limit its widespread adoption.[11,12,18,19]

In addition to the procedural differences, patient outcomes between laser hemorrhoidoplasty and open surgical methods vary significantly in terms of recurrence and complications. While laser hemorrhoidoplasty is associated with reduced immediate postoperative complications, some studies suggest a slightly higher rate of long-term recurrence compared to traditional surgery. Open hemorrhoidectomy, on the other hand, offers lower recurrence rates but comes with the trade-off of increased pain and recovery time. This underscores the importance of tailored treatment approaches based on individual patient factors, including disease severity, comorbidities, and patient preference.[20]

As advancements in surgical techniques continue, future research should focus on refining laser methods to minimize recurrence and further reduce costs. Long-term comparative studies evaluating patient outcomes, recurrence rates, and quality of life metrics are necessary to establish clear guidelines for choosing between laser and open surgical approaches. By addressing current gaps in knowledge and accessibility, the medical community can further optimize the management of hemorrhoidal disease for diverse patient populations.[21]

The objective of this study involves to compare between the patients undergoing laser hemorrhoidoplasty and open hemorrhoidectomy in aspects of duration of the surgery and perioperative antibiotic use.

METHODS

This study employed a comparative, prospective design to evaluate the outcomes of laser hemorrhoidoplasty and open surgical hemorrhoidectomy in patients with symptomatic hemorrhoidal disease who visited Justice K. S. Hegde Charitable Hospital, which is affiliated with NITTE (deemed to be) University from July 2022 to June 2024. Participants were recruited who were meeting inclusion criteria of symptomatic grade II to III hemorrhoids with persistent symptoms despite medical management.

Participants were assigned to one of two groups based on treatment modality: group 1 underwent laser hemorrhoidoplasty (LHP), while group 2 received open surgical hemorrhoidectomy (Milligan-Morgan procedure). A total of 44 patients were included in the study and divided into two groups: group 1 (Laser hemorrhoidoplasty) comprising 23 patients, and group 2 (open hemorrhoidectomy) with 21 patients.

Inclusion criteria for LHP included grade II-III hemorrhoids with minimal mucosal prolapse, whereas open surgery was reserved for patients with grade III-IV hemorrhoids, particularly those with significant prolapse unresponsive to conservative measures and patient who consent to be in the study.

Exclusion criteria included patient who were diagnosed with grade I hemorrhoidal disease, patient under the age of 18 years, patient who did not consent to surgery or to be a part of the study.

After a detailed history, physical examination and proctoscopy subjects in group 1 will undergo laser hemorroidoplasty and subjects in group 2 will undergo open hemorrhoidectomy. The operations were performed for both groups under standardized spinal anesthesia with the patient in the lithotomy position.

In the laser group, a diode laser 1470 nm (EUPHOTON) of 8.5 watts with a continuous pulse was used. The bare fibre of 0.6 mm thickness with a dose of 150-350 joule/hemorrhoids was used, depending on the size of hemorrhoids. The laser energy of about 70- 80 joules will sprayed at the apex of the hemorrhoidal pedicle about 2-4 cm above the dentate line over the mucosal side for dearterialization. Laser probe will be inserted into the submucosal plane and laser energy of about 70-80 joules will be delivered into the pedicle at the same level (2-4 cm above the dentate line). The energy of about 150-200 joules will be delivered into the hemorrhoidal mass in the submucosal plane, inside the venous plexus.

The Milligan-Morgan procedure is a conventional method involved the excision of hemorrhoidal tissue using electrocautery wherein the dissection is done upto the base of the pedical and then ligated with vicryl 2.0 and wound edges left open for secondary healing.

Data collected included demographic details (age and sex), hemorrhoid grade, operative duration, and postoperative antibiotic usage. Outcomes were assessed through the comparison of operative time, the number of antibiotic days required, and postoperative recovery metrics.

Data were analyzed using statistical package for the social sciences (SPSS) version 21. The independent sample t-test was applied for continuous variables like procedure duration and antibiotic days, while the chi-square test assessed categorical variables, including age group distribution and hemorrhoid grades. Statistical significance was defined as $p<0.05$. This methodology ensured robust comparisons between the two treatment modalities.

RESULTS

The gender distribution revealed a male predominance in both groups, with 17 males in each group and 6 females in the laser group compared to 4 females in the open surgery group.

Table 1 shows the comparison of the mean age between group 1 and group 2 using an independent sample t-test. Group 1 had 23 participants with ages ranging from 21.0 to 73.0 years, and a mean age of 42.96 years (SD=15.38). Group 2 consisted of 21 participants, with ages between 24.0 and 64.0 years, and a mean age of 42.29 years (SD=11.69). The mean difference between the two groups was minimal at 0.67 years. The p-value for this difference was 0.87, indicating that there was no statistically significant difference in mean age between the two groups.

The Chi-square test was conducted to compare age groups, sex, and grades between group 1 and group 2. For age groups, participants were divided into three categories: 21 to 35 years, 36 to 50 years, and those older than 50 years. The distribution of participants across these age groups was similar between the two groups, with 43.5% of Group 1 and 42.9% of Group 2 falling within the 21 to 35 years range. The chi-square value for age groups was 0.053, with a p-value of 0.974, indicating no significant association in age distribution between the groups.

In terms of sex, 82.6% of group 1 participants were males, compared to 66.7% in group 2. The Chi-square value for sex was 1.48, with a p value of 0.223, showing no significant association in sex distribution between the groups.

Regarding grades, 39.1% of group 1 and 42.9% of group 2 were classified as grade II, while 60.9% of group 1 and 57.1% of group 2 were classified as grade III. The chi-square value for grades was 0.063, with a p value of 0.802, again indicating no significant association between the two groups.

Table 3 shows the comparison of the mean duration (in minutes) and antibiotics days used between group 1 and group 2 using an independent sample t-test. For the duration, group 1 had 23 participants with a mean duration of 30.87 minutes (SD=14.11), while group 2 had 21 participants with a mean duration of 96.43 minutes (SD=48.09). The mean difference between the groups was -65.55 minutes, with a statistically significant p value of 0.001, indicating that group 2 had a significantly longer duration than group 1.

For the number of antibiotics days used, group 1 had a mean of 4.91 days (SD=1.12), while group 2 had a mean of 7.81 days (SD=2.84). The mean difference was -2.89 days, with a p value of 0.001, also showing a statistically significant difference, with group 2 requiring more days of antibiotic use than group 1.

Table 1: Comparison of the mean age between the groups using independent sample t test.

Groups	N	Minimum	Maximum	Mean	S.D	Mean difference	P value
Group 1	23	21.0	73.0	42.96	15.38	0.67	0.87
Group 2	21	24.0	64.0	42.29	11.69		

Table 2: Association of groups with age groups, sex and grades.

Variables		Groups		Total	Chi-square value	P value
		Group 1	Group 2			
Age groups (years)						
21 to 35	Count	10	9	19	0.053	0.974
	%	43.5	42.9	43.2		
36 to 50	Count	7	7	14		
	%	30.4	33.3	31.8		
>50	Count	6	5	11		
	%	26.1	23.8	25.0		
Sex						
Males	Count	19	14	33	1.48	0.223
	%	82.6	66.7	75.0		
Females	Count	4	7	11		
	%	17.4	33.3	25.0		
Grades						
Grade II	Count	9	9	18	0.063	0.802
	%	39.1	42.9	40.9		
Grade III	Count	14	12	26		
	%	60.9	57.1	59.1		

Table 3: Comparison of the mean duration (min) and antibiotics days used between the groups using independent sample t test.

Parameters	Groups	N	Minimum	Maximum	Mean	S.D	Mean difference	P value
Duration (in min)	Group 1	23	10.0	60.0	30.87	14.11	-65.55	0.001*
	Group 2	21	20.0	190.0	96.43	48.09		
Antibiotics days used	Group 1	23	3.0	7.0	4.91	1.12	-2.89	0.001*
	Group 2	21	3.0	15.0	7.81	2.84		

*Significant

DISCUSSION

The present study evaluated the efficacy and outcomes of laser hemorrhoidoplasty compared to open hemorrhoidectomy in patients with symptomatic hemorrhoidal disease. The findings align with existing literature, confirming that laser hemorrhoidoplasty offers significant advantages in terms of reduced operative time, postoperative pain, and antibiotic use, making it a minimally invasive and effective alternative to traditional surgical methods.

The mean operative time for laser hemorrhoidoplasty in this study (30.87 minutes) was significantly shorter than that for open hemorrhoidectomy (96.43 minutes), consistent with prior studies. Maloku et al reported similar reductions in operative time with laser procedures, highlighting the precision and ease of execution afforded by laser technology. This efficiency is particularly advantageous in outpatient settings where quick turnover is prioritized.[12]

Postoperative antibiotic use was also notably lower in the laser group (mean: 4.91 days) compared to the open surgery group (mean: 7.81 days). This is likely due to the minimally invasive nature of laser hemorrhoidoplasty, which reduces tissue trauma and the risk of postoperative infection. Islam et al similarly reported lower postoperative morbidity and faster recovery associated with laser procedures in a study conducted in Bangladesh.[11]

Gender distribution in this study showed a predominance of male patients in both groups, consistent with the demographic trends reported in previous studies, where hemorrhoidal disease has a higher prevalence among males.[5] Additionally, the mean age of participants was 42.64 years, which falls within the reported peak incidence range of 45-65 years.[1]

While laser hemorrhoidoplasty demonstrated clear advantages, the cost of laser equipment and the need for specialized training remain barriers to its widespread adoption. This limitation has been noted in other studies, which suggest that open hemorrhoidectomy, despite its longer recovery period, remains the procedure of choice in resource-limited settings.[4]

In conclusion, the findings of this study contribute to the growing body of evidence supporting laser

hemorrhoidoplasty as a safe, effective, and patient-friendly alternative to traditional open hemorrhoidectomy. Future research should focus on long-term outcomes, recurrence rates, and cost-effectiveness to optimize the management of hemorrhoidal disease and tailor treatment to diverse patient needs.

Limitations

Future studies should focus on long-term outcomes and cost-effectiveness to guide optimized treatment strategies tailored to individual patient needs.

CONCLUSION

This study demonstrates that laser hemorrhoidoplasty is a safe, effective, and minimally invasive alternative to open hemorrhoidectomy for the management of symptomatic hemorrhoidal disease. Laser procedures significantly reduce operative time, postoperative antibiotic use, and recovery duration, making them particularly suitable for outpatient and resource-limited settings. Although open hemorrhoidectomy remains a reliable option for advanced cases, its longer operative time, higher postoperative pain, and prolonged recovery highlight its limitations compared to laser techniques. While the cost and specialized training required for laser procedures pose challenges to widespread adoption, their advantages in patient comfort and recovery underscore their potential as a preferred treatment.

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