

## OUTCOME OF PATIENTS WITH HEMORRHOIDAL DISEASE TREATED BY HYBRID DIGITAL HEMORRHOIDAL ARTERY LIGATION WITH LASER HEMORRHOIDOPLASTY

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### ABSTRACT

**Objectives:** The objectives of the study are as follows: (1) To analyze the efficacy of hybrid digital hemorrhoidal artery ligation (HAL) with laser hemorrhoidectomy in terms of post-operative pain as well as time taken to return to daily routine activities. (2) To analyze complications as recurrence rates in studied patients.

**Methods:** This was a prospective study conducted in the Department of General Surgery, GMERS Medical College Navsari, Gujarat, India. Sixty adult patients with haemorrhoids were included in the study on the basis of a predefined inclusion and exclusion criteria. All patients underwent HAL with laser hemorrhoidectomy. Patients were followed up for pain (as assessed by Visual Analog score), per rectal bleeding and whether they have completely returned to their pre-intervention activities. Complications and recurrence rates were also analyzed.

**Results:** There were 38 (63.33%) males and 22 (36.67%) females with male preponderance having an M: F ratio of 1:0.57. The mean age of the studied cases was found to be 43.24±13.98 years. The most common presenting complaint was rectal bleeding which was seen in 54 (90%) patients followed by pain (80%) and pruritis (30%). Prolapse was seen in 12 (20%) patients. The mean duration of post-operative bleeding was 28.36±9.86 h. Mean duration when pain-free bowel movement occurred was found to be 21.86±12.76 h. At 1-month follow-up, pain has been reduced as compared to at the time of presentation and the difference was found to be statistically highly significant ( $p < 0.0001$ ). Mean duration of hospital stay was found to be 2.12±1.14 days. In 3 patients (5%), there was recurrence during follow-up period of 6 months.

**Conclusion:** Hybrid digital HAL with laser hemorrhoidoplasty is a minimally invasive procedure found to have excellent outcome, with respect to reduced post-operative pain and low complication rates.

**Keywords:** Digital hemorrhoidal artery ligation, Hemorrhoidoplasty, Outcome, Recurrence.

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### INTRODUCTION

Hemorrhoids are a prevalent anorectal disorder affecting a significant proportion of the population worldwide [1]. This condition can cause considerable discomfort and adversely impact patients' quality of life. Hemorrhoids result from the pathological enlargement or inflammation of the vascular cushions located in the anal canal. Clinical presentation varies widely, but often includes symptoms such as rectal bleeding, anal itching, pain, and prolapse of hemorrhoidal tissue [2].

Hemorrhoids are classified into two main categories: Internal and external. Internal hemorrhoids originate above the dentate line and are typically painless but may cause bleeding, prolapse, and discomfort. In contrast, external hemorrhoids originate below the dentate line and are associated with pain, itching, and swelling, often causing significant distress to patients. The clinical presentation of hemorrhoids is diverse, with symptoms ranging from mild discomfort to severe pain and bleeding [3].

Given the multifaceted nature of hemorrhoidal disease, various treatment options have emerged over the years, ranging from conservative measures to invasive surgical procedures. The management of hemorrhoidal disease has evolved over time, reflecting advancements in medical technology and an improved understanding of the underlying pathophysiology. The available treatment options for hemorrhoids can be broadly categorized into conservative, minimally invasive, and surgical interventions [4].

Conservative management primarily focuses on symptom relief and lifestyle modifications. This approach includes dietary changes

to increase fiber intake, maintain adequate hydration, and avoid straining during bowel movements. Over-the-counter, topical agents and oral medications can also provide relief from itching and pain associated with hemorrhoids. While conservative measures are useful for mild cases, they may not be sufficient for patients with more severe symptoms. In recent years, minimally invasive techniques have gained popularity for the management of hemorrhoidal disease. These procedures aim to reduce symptoms, minimize discomfort, and enable a quicker return to daily activities. Common minimally invasive options include rubber band ligation, sclerotherapy, and infrared coagulation. While these procedures are generally well-tolerated, they may have limitations in terms of efficacy and durability, particularly for more advanced hemorrhoidal disease [5].

Surgical interventions are typically reserved for patients with severe hemorrhoidal disease or those who have failed to respond to conservative and minimally invasive treatments. Traditional surgical approaches include hemorrhoidectomy and stapled hemorrhoidopexy. While effective in symptom relief, these surgeries are associated with significant post-operative pain and a longer recovery period [6].

As the field of colorectal surgery continues to advance, innovative approaches have emerged to address the limitations of traditional hemorrhoid treatments. One such approach is hybrid digitally guided hemorrhoidal artery ligation (HAL) combined with laser hemorrhoidoplasty. This modern technique combines the principles of hemorrhoidal artery ligation, which targets the blood supply to hemorrhoidal cushions, with laser energy for tissue remodeling and reduction of hemorrhoidal prolapse [7].

Hybrid HAL with laser hemorrhoidoplasty offers several potential advantages over traditional surgical methods. First, it is a minimally invasive procedure that can be performed on an outpatient basis, reducing the need for hospitalization and allowing for a quicker return to normal activities [8]. Second, the precise targeting of hemorrhoidal arteries and the application of laser energy enable effective reduction of hemorrhoidal tissue and improvement in blood flow, potentially reducing the risk of recurrence. Moreover, this approach is associated with less post-operative pain compared to traditional hemorrhoidectomy [9].

We conducted this study to analyze the efficacy of hybrid digital HAL with laser hemorrhoidectomy in terms of post-operative pain as well as time taken to return to daily routine activities.

**METHODS**

This was a prospective and observational study conducted in the department of general surgery of a tertiary care medical college in which 60 adult patients with hemorrhoids were included in the study on the basis of a predefined inclusion and exclusion criteria. Informed written consent was obtained from the patients who consented to be part of the study.

Demographic details of all the patients such as age and gender were noted. A detailed history with respect to signs and symptoms as well as duration of the hemorrhoids was asked and noted. Patients were subjected to detailed clinical examination to assess vital parameters and systemic examination. Hemorrhoids were graded as following.

- Grade I: Prolapse beyond the dentate line on straining.
- Grade II: Hemorrhoids prolapse through the anus upon straining, but spontaneously reduce.
- Grade III: Hemorrhoids prolapse through the anus on straining and can only be reduced manually.
- Grade IV: Hemorrhoids have prolapsed through the anus and cannot be reduced.

All baseline blood examination (Hemogram, coagulation profile, HIV I and II, HBsAg, etc.) and biochemical examination (Blood sugar level, liver function tests, renal function test, etc.) were done. IN patients above the age of 50 years 2D Echo and cardiology evaluation were done by a physician. In selected cases, in whom bleeding from sources other than hemorrhoids was suspected, colonoscopy was also done.

**Surgical procedure**

Patients were operated under spinal anesthesia. Patients were placed in lithotomy position and Per rectal examination and proctoscopy was performed to confirm the position of haemorrhoids. The position of hemorrhoidal artery was confirmed by palpation. Finger-guided

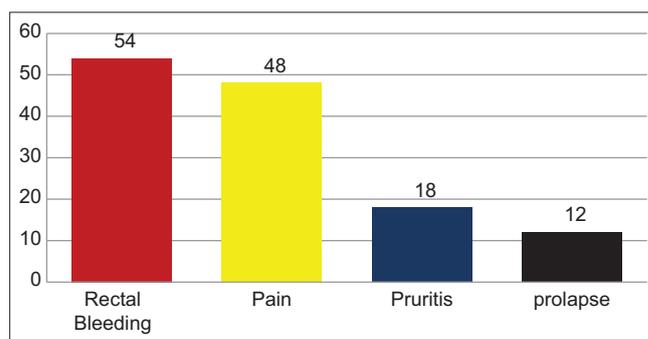
HAL was performed using 2-0 vicryl. Finally, hemorrhoidoplasty was performed by delivering 240 Joules of energy in each piles mass. After surgery, an ice pack was placed which was removed after 8 h. VAS score was noted at 6, 8, 12, and 24 h.

Patients were prescribed non-steroidal anti-inflammatory medicines and were instructed to take it twice daily for 3 days and after that depending on the severity of pain. Oral antibiotics were continued for 5 days after the procedure. In addition, patients were advised to avoid straining and laxatives were given for 15 days. The procedure of sitz bath was explained to patients and they were advised it to take it daily for 2 weeks. Patients were advised to come up for follow-up at day 7, day 14, and after 1 month. During each follow-up visit, patients were followed up for pain (as assessed by Visual Analog score), per rectal bleeding and whether they have completely returned to their pre-intervention activities. Patients were telephonically followed up every month till 6 months about recurrence if any.

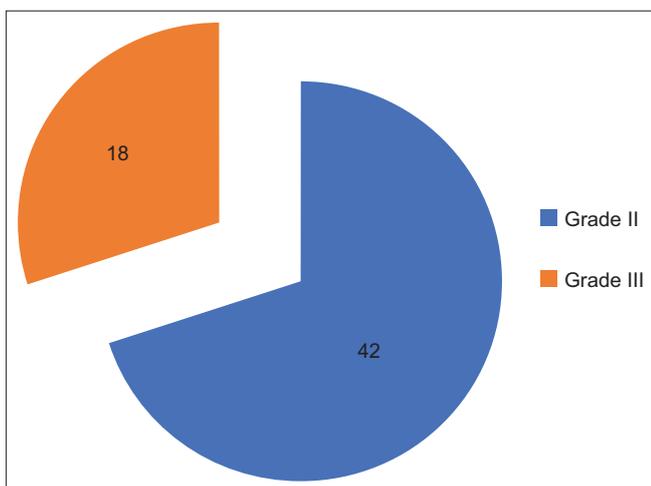
Statistical analysis was done using SPSS version 21.0 software. Quantitative data were presented as mean and standard deviation. Qualitative data were presented with incidence and percentage tables. For quantitative data, unpaired t-test was applied and for qualitative data, Chi-square test was used. p<0.05 was taken as statistically significant.

**Table 1: Gender distribution among the studied groups**

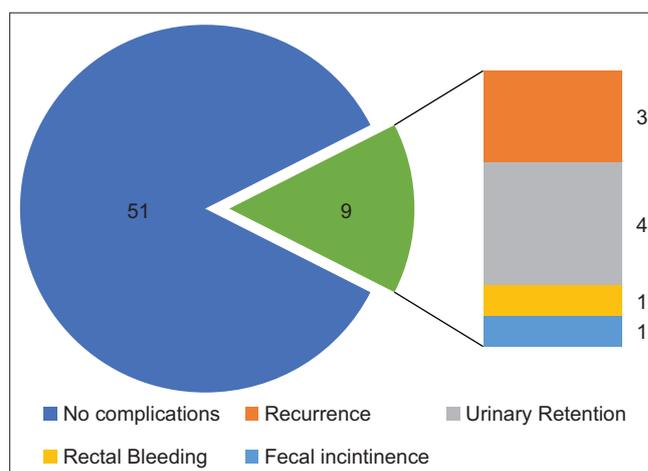
Gender	Number of patients (%)
Male	38 (63.33)
Female	22 (36.67)
Total	60 (100)



**Fig. 2: Presenting complaints in studied cases**



**Fig. 1: Distribution of patients according to grade of hemorrhoids**



**Fig. 3: Complications in the studied cases**

**Inclusion criteria**

The following criteria were included in the study:

1. Patients having Grade II and Grade III hemorrhoids.
2. Those who gave written informed consent to be part of the study.
3. Age above 18 years.
4. Symptomatic patients not responding to conservative management.

**Exclusion criteria**

The following criteria were excluded from the study:

1. Those who refused consent
2. Age <18 years
3. Patients having Grade I and Grade IV hemorrhoids
4. Patients with bleeding disorders, thrombocytopenia, and clotting disorders
5. Pregnant patients
6. History of perianal surgeries in the past.

**RESULTS**

Out of the total 60 studied cases, there were 38 (63.33%) males and 22 (36.67%) females. There was a male preponderance with an M:F ratio of 1:0.57 (Table 1).

In this study, the youngest patients were 21 years old and the oldest patient's age was 64 years. The most common affected age group was found to be between 41 and 50 years (38.33%) followed by 61–70 years (23.33%) and 31–40 years (15.00%). The mean age of the studied cases was found to be 43.24±13.98 years (Table 2).

Out of the 60 studied cases, 52 (70 %) patients belonged to Grade II hemorrhoids whereas 18 (30%) patients belonged to Grade III hemorrhoids (Fig. 1).

Presenting complaints of the patients showed that the most common presenting complaint was rectal bleeding which was seen in 54 (90%) patients followed by pain (80%) and pruritis (30%). Prolapse was seen in 12 (20%) patients (Fig. 2).

Mean VAS score of patients at the time of presentation was 6.86±2.14. Postoperatively at 6 h, the mean pain score in studied cases was 4.66±1.72. At 8 h, 12 h, and 24 h, the mean VAS scores were 3.78±1.46, 3.12±1.24, and 1.62±0.86. At 1-month follow-up, almost all patients were pain-free. The mean VAS score at 1 month was 0.64±0.32. At 1-month follow-up, pain has been reduced as compared to at the time

**Table 2: Mean age of the studied cases**

Age (years)	Patients, number of patients (%)
18–30	6 (10.00)
31–40	9 (15.00)
41–50	23 (38.33)
51–60	8 (13.33)
61–70	14 (23.33)
Total	60 (100)
Mean age (years)	43.24±13.98 (21–64)

**Table 3: Mean VAS score in studied cases**

Duration	Mean VAS score
At presentation	6.86±2.14
Postoperative 6 h	4.66±1.72
8 h	3.78±1.46
12 h	3.12±1.24
24 h	1.62±0.86
7 days	1.12±0.64
14 days	0.98±0.46
1 month	0.64±0.32

p<0.0001 (highly significant). VAS: Visual analog scale

of presentation and the difference was found to be statistically highly significant (p<0.0001) (Table 3).

After intervention, majority of the patients (53.33%) required 1–2 doses of rescue analgesia in the form of Iv Diclofenac sodium (50 mg diluted in 10 mL NS). Sixteen (26.67%) patients required 3–4 doses of rescue analgesia and 8 (13.33%) patients required more than four doses of rescue analgesia. The mean analgesic dose requirement was found to be 3.12±1.98 (Table 4).

The analysis of the patients on the basis of post-operative bleeding duration showed that the mean duration of post-operative bleeding was 28.36±9.86 h. First pain-free bowel movement occurred within 24 h in 49 (81.67%) patients and in remaining 11 (18.33%) patients pain-free bowel movements occurred within 48 h of surgery. Mean duration when pain-free bowel movement occurred was found to be 21.86±12.76 h. Mean duration of hospital stay was found to be 2.12±1.14 days (Table 5).

The analysis of patients on the basis of adverse effects showed that out of 60 studied cases, 4 patients (6.67%) developed urinary retention whereas in 3 patients (5%), there was recurrence. One patient (1.67%) had rectal bleeding postoperatively requiring blood transfusion and 1 patient (1.67%) developed transient fecal incontinence (Fig. 3).

**DISCUSSION**

Hybrid digital HAL with laser hemorrhoidoplasty represents an innovative approach in the management of symptomatic hemorrhoids. Our study demonstrated promising clinical outcomes following this procedure. Patients experienced a significant reduction in symptoms such as bleeding, pain, and prolapse. These results are consistent with the existing literature on hemorrhoidal artery ligation and laser hemorrhoidoplasty [10]. The combined approach capitalizes on the benefits of both techniques, providing a comprehensive solution for hemorrhoid management. Noteworthy aspects of this procedure include reduced post-operative pain and early resumption of daily routine activities. This finding aligns with the goal of minimizing patient discomfort and enhancing recovery. By avoiding excisional procedures and utilizing laser energy for tissue remodeling, HAL with laser hemorrhoidoplasty offers patients a less painful and more tolerable post-operative experience [11].

The ligation of hemorrhoidal arteries targets the vascular component of hemorrhoids, addressing the root cause of their development. By blocking the blood supply, we can effectively reduce engorgement and symptoms. Laser energy is employed for tissue coagulation, leading to shrinkage of the hemorrhoidal cushions. This controlled tissue reduction

**Table 4: Post-operative analgesic required in studied cases**

Analgesic doses	Number of cases (%)
1–2	32 (53.33)
3–4	16 (26.67)
>4 doses	8 (13.33)
No	4 (6.67)
Total	60 (100.00)
Mean analgesic doses	3.12±1.98

**Table 5: Post-operative bleeding, bowel movement, and mean duration of hospital stay**

Post-operative bleeding and bowel movement	Mean±SD
Duration of post-operative bleeding	28.36±9.86
Mean duration at which 1 <sup>st</sup> pain-free bowel movements occurred	21.86±12.76
Mean hospital stay days	2.12±1.14

SD: Standard deviation

not significantly reduced pain associated with hemorrhoids [12]. In our study, mean VAS score of patients at the time of presentation was  $6.86 \pm 2.14$ . Postoperatively at 6 h, the mean pain score in studied cases was  $4.66 \pm 1.72$ . At 8 h, 12 h, and 24 h, the mean VAS scores were  $3.78 \pm 1.46$ ,  $3.12 \pm 1.24$ , and  $1.62 \pm 0.86$ . Similar effectiveness of hybrid digital HAL with laser hemorrhoidoplasty procedure was also reported by the authors such as Giamundo *et al.* [13] and Plapler *et al.* [14]

Hybrid digital HAL with laser hemorrhoidoplasty is a minimally invasive technique that preserves the anal cushions while addressing the underlying arterial component of hemorrhoids. This approach reduces the risk of complications associated with traditional hemorrhoidectomy, such as anal stenosis and incontinence, and may facilitate a quicker return to normal activities [15]. This procedure also allows for shorter hospital stays compared to traditional procedures. This can result in cost savings for health-care systems and improved patient satisfaction. In our study, the mean stays of the patients following the procedure were found to be  $2.12 \pm 1.14$  days. Similar duration of hospital stay was also reported by the authors such as Tümer *et al.* [16] and Karkalemis *et al.* [17].

One of the drawbacks of this procedure is like any other surgery its operator dependent and not many surgeons are well versed with this procedure. Another important aspect of hybrid digital HAL with laser hemorrhoidoplasty is that while short-term outcomes are promising, long-term data on the efficacy and durability of this procedure are still evolving. Continued follow-up and research are necessary to assess the persistence of symptom relief and the risk of recurrence. In our study, 3 patients (5%) reported recurrence within follow-up period of 6 months. De and Roy conducted a study to assess the feasibility, efficacy, and safety of a hybrid hemorrhoidal artery ligation under digital guidance with laser hemorrhoidoplasty (Hybrid HAL-LHP) in patients with Grade II to III hemorrhoids [18]. In this study, after a mean follow-up of 16.6 months, the authors reported a recurrence rate of 5.33%. Similar recurrence rates were also reported by the authors such as Markaryan *et al.* [19] and Lie *et al.* [20].

#### Limitation of study

One of the important limitations of our study was all of the patients who were included in this study had followed up for 6 months. A longer duration of follow-up may increase the recurrence rates.

#### CONCLUSION

Hybrid digital HAL with laser hemorrhoidoplasty represents a valuable addition to the armamentarium of surgical options for hemorrhoid management. Our study, along with existing literature, highlights the clinical benefits of this hybrid technique, emphasizing its minimally invasive nature, reduced post-operative pain, and low complication rates.

#### AUTHORS CONTRIBUTION

AP- Concept and design of the study, interpreted the results, prepared first draft of manuscript, and critical revision of the manuscript; YP- Statistically analyzed and interpreted, reviewed the literature, and manuscript preparation; VG- Design of the study, statistically analyzed and interpreted, preparation of manuscript, and revision of the manuscript; and VP- Overall coordination of the study.

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