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Laser Surgical and Open Hemorrhoidoplasty: A Comparative Analysis

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Abstract Hemorrhoidal illness is widely regarded as the most frequent rectum and large intestine condition, according to studies. According to many researchers, this condition affects 2.9% to 27.9% of the worldwide population, with 4% showing symptoms. Thus, our study compared laser hemorrhoidoplasty(LHP) and open hemorrhoidoplasty(OH). A comprehensive structural model analysis was performed on patients: this covered age and sex distribution, clinical presentation, and clinical and laboratory test data. The patients were then randomly divided into two groups. Post-operative outcomes included pain, bleeding, ROU, hospital stay, and recurrence. The study used the Chi-square test to investigate two nominal variables. We found that four patients (8% OH group) did not fully recover from the condition. At the same time, no recurrences were observed in the LHP group. Therefore, we came to the conclusion that LHP was better than OH. In addition to the above, further studies must be done in this field.

Key Words Laser Hemorrhoidoplasty, Open Hemorrhoidoplasty, Hemorrhoidal illness, Chi-square test, Clinical presentation, Pain, Bleeding, Rou, Hospital stay

1. Introduction

Studies have shown that Hemorrhoidal disease is widely recognized as the most commonly occurring condition that impacts the rectum and large intestine. The estimated global prevalence of this condition ranges from 2.9% to 27.9%, with approximately 4% of cases displaying symptoms [1], [2]. Further studies showed that the age distribution follows a Gaussian distribution, characterized by a peak frequency between 45 and 65 years and a subsequent decrease beyond 65 years [3], [4].

Several studies have presented evidence indicating a higher prevalence of this condition in men as opposed to women [5]. Studies have also shown that the anorectal vascular cushions, which provide support for soft tissue, and the internal anal sphincter, which keeps the anal canal tightly closed, are both important parts of staying dry [6], [7].

Various approaches have been explored, including conservative medical care, nonsurgical treatments, and surgical procedures. Rubber band ligation (RBL), injectable sclerotherapy, cryotherapy, infrared coagulation, laser therapy, and diathermy coagulation are all non-invasive treatment options that can be performed in an outpatient setting, eliminating the requirement for general anesthesia. The most optimal alternative for treating hemorrhoids in grades I-III (grades I-III) is the utilization of nonsurgical treatments [8].

Furthermore, various studies by various researchers at different time periods have concluded that, in cases where conservative measures prove ineffective in managing symptoms, patients may be recommended for surgical intervention by a qualified surgeon. Thus, there are many reasons why surgery might be necessary, such as a large external part, enlarged papillae, an associated fissure, extensive thrombosis, or the return of symptoms after multiple rubber band ligations. There are two techniques commonly utilized in this procedure by many researchers: the open technique, the Milligan-Morgan technique, and the closed technique, the Ferguson technique [9].

Studies concluded that the procedure has received criticism regarding several aspects. These include the discomfort experienced during the postoperative period, the need for extended hospital stays, the requirement for dressing the perianal wound, and the necessity of taking at least two to three weeks off from work [10]. According to a study by the University of Sao Paolo in Brazil, LHP offers several advantages. These include its hemostatic and bactericidal properties, fast healing, minimal impact on neighboring structures,

reduced postoperative complications, and decreased risk of hemorrhage and stenosis [11].

Studies have also shown that hemorrhoidal disease (HD) occurs as a result of distal displacement of the anal cushions, which are essential anatomical structures that play a significant role in maintaining continence. The relationship between HD and constipation, as well as irregular bowel habits, has been a subject of discussion since ages [11]. Despite their prevalence, there is still a lack of understanding regarding the anatomy and pathogenesis of hemorrhoids [12].

Various studies have shown that the principal cause of HD seems to be congestion & and hypertrophy of the internal and cushions. Studies also revealed that the cushions congest because they fail to empty rapidly during the act of defecation, abnormally mobile & trapped by tight anal sphincter [13]. Patients who have previously established portal hypertension have a risk that is 28 % greater risk of getting symptomatic hemorrhoids, according to research that was carried out in 2024.

During pregnancy, there is an increase in the size of the vascular structures found in the pelvis and the perineum. Because of this, it should not be surprising that the perianal and anorectal venous channels become more noticeable and have a greater chance of protruding during the process of defecation [14]. In their past studies, researchers have explained why the normal eversion and rotation of the anorectum were not happening [15].

Furthermore, its etiology includes various factors such as sex, in which studies have proved that approximately 60% of hospitalized patients with the condition are men, and hemorrhoids are more common in men than in women. Although hemorrhoids are more common in women, their prevalence is comparable in men. High estrogen receptor levels, similar to those in normal breast tissue, are seen in hemorrhoids, which may account for the symptoms of hemorrhoids during pregnancy and the correlation between hemorrhoids and the menstrual cycle [16]–[18].

Moreover, studies have shown that prevalence increases with age until the seventh decade when it begins to slightly fall [19]. Studies have shown that individuals belonging to higher socioeconomic groups tend to exhibit a higher prevalence of reported cases of hemorrhoids. Individuals engaged in physically demanding work or occupations that involve extended periods of sitting or standing have been purported to exhibit a higher incidence of hemorrhoids [20].

Studies have shown that the prevalence of hemorrhoids has not decreased due to the increase in average fiber consumption. Data inconsistency suggests that additional dietary factors may be involved. Hemorrhoidal illness is not linked to smoking, drinking alcohol, drinking too much coffee, being overweight, or engaging in certain activities [21].

Further, studies have also shown that it is not uncommon to observe a positive family history of hemorrhoids; however, it is important to consider the potential bias that may arise if individuals with hemorrhoids possess a heightened awareness of their parents' anal health [22]. Studies have proved that although individuals with hemorrhoids often experience symptoms such as increased constipation, reduced stool frequency, and heightened straining, they maintain a regular bowel frequency. Moreover, it is worth noting that hemorrhoids might potentially contribute to a feeling of constipation, either due to discomfort, obstruction, or an unidentified functional anomaly. However, exerting force during defecation may have significance [23].

In a study, researchers observed a substantial increase in the duration of toilet use among patients with hemorrhoids. However, their findings did not indicate a significant association between straining and hemorrhoids. The individuals suggested that assuming a seated posture characterized by a relaxed perineum and lacking support for the anal cushions might potentially contribute to the development of hemorrhoids [24]. According to studies, one of H's most important clinical presentations was bleeding. In this respect, one study showed that if the hemoglobin level has not been restored by six months, then efforts must be made to identify an alternative source for anemia. Whereas conservative management studies have concluded that dietary can be looked upon [25].

Hence, in our study, we have evaluated & compared the difference between LPH & OH method in terms of efficacy, cost & post operative complications.

The objective of this paper is to assess and juxtapose Laparoscopic Hysterectomy Procedures (LHP) and Open Hysterectomy (OH), offering a comparative analysis of these two surgical techniques.

2. Materials & Method

Our study is a prospective observational analysis conducted on 100 patients at the outpatient department of General Surgery, KIMS, Karad, starting from November 2017 and October 2019. It included patients who were initially diagnosed with hemorrhoids based on clinical evaluation.

Inclusion Criteria

1) Patients with symptomatic grade 3 & 4 or 1&2 hemorrhoids with failed medical management.
2) Both male & female were included in the study.

Exclusion Criteria

1) Children below the age of 10 years.
2) Patients having simultaneous portal hypertension.
3) Previously operated cases of hemorrhoids.
4) Patients with rectal carcinoma.
5) Patients with anal fissure.
6) Patients with dermatological lesions.
7) Patients with inflammatory bowel disease.

Methodology

The patients underwent analysis using a comprehensive structural model. This included gathering information on age and sex distribution, modes of clinical presentation, and data from various clinical examinations and laboratory tests. The patients were then randomly assigned to two groups. The

postoperative outcomes, such as pain, bleeding, retention of urine (ROU), hospital stay, and recurrence, were recorded. The data was inputted utilizing the MS Excel software, and analysis was performed using IBM SPSS version 21. The study examined the association between two nominal variables through the Chi-square test.

Pre-Operative

A detailed clinical examination with per-rectal examination and proctoscopy, along with pre-operative routine investigations, were done with the pre-anesthetic checkup. A soap-water enema was administered overnight and in the morning on the day of surgery.

1) Surgical Excision Group

Milligan Morgan's H was carried out, the gold standard procedure. A lithotomy position was used for the patient. To create a field block, 20 milliliters (mL) of a 0.5% bupivacaine in 1:200,000 epinephrine solution were infiltrated into the anus. In order to get at the hemorrhoids, a Hill-Ferguson retractor was inserted into the anal canal. Further, to expose the subcutaneous section of the external anal sphincter, the incision was taken around the pile segment well beyond the anal margin. Once the incision reached the anal canal, the internal anal sphincter muscle was carefully isolated from the plane of dissection.

Additionally, a ligated suture using absorbable Vicry l3-0 was placed, and subsequently, the hemorrhoid was excised. Hemostasis was successfully achieved through the use of electrocautery. The wound was thoroughly cleansed, followed by applying povidone-iodine (Betadine) ointment and a small dressing. The average duration of the surgical procedure ranged from approximately 45 to 60 minutes. The patients were discharged within 2-3 days, and appropriate measures were taken to ensure regular follow-up.

2) Laser Hemorrhoidoplasty (LHP) Group

The patient was placed in the lithotomy position. A field block was performed by introducing a solution of approximately 20 mL of 0.5% bupivacaine in 1:200,000 epinephrine into the anus. Certain patients may necessitate the administration of mild sedatives prior to the commencement of the procedure. The anal canal was exposed by utilizing a Hill-Ferguson retractor in order to visualize the hemorrhoids. The pile segment was destroyed utilizing a carbon dioxide laser, which involved directing the laser beam directly toward the surface of the pile. The laser instrument's handle was adjusted until a white membrane encompassed the entire area. The management of internal and external piles followed similar protocols. The wound underwent a cleansing process, followed by applying povidone-iodine (Betadine) ointment and a small dressing. The average time of the surgery was approximately 30 to 40 minutes. Patients were discharged after 1-2 days, and regular follow-up was ensured.

Post-Operative

Standard antibiotic and analgesic dosages were given to the patients. Patients ' pain levels were evaluated within the first 24 hours after surgery using a visual analog scale (VAS). Scores ranged from 0 to 10, where 0 corresponds to "no pain" and 10 to "maximum pain." Other parameters included bleeding, ROU, discharge, days of hospital stay, and recurrence. A standardized form was used to collect this information from all patients. Patients were followed up on 15, 30, and 60 days and evaluated.

3. Result

In Table 1 we found that, mean age of presentation was 41.64±12.29 in the LHP group and 41.36±12.94 in the OH group.

In Table 2 we found that,male patients were 78 (78%) and female were 22 (22%).

In Table 3 we found that, 71% of the patients had symptoms characterized by the presence of bleeding followed by pain with 39% patients, while pruritus with 15% , anemia was found in 39% and constipation in 25% of patients, whereas 43% had symptoms of hard stool and 45% experienced straining during bowel movements.

In Table 4, 5, we found that the pain was lower in the LHP group compared to the OH group during the first 24 hours after surgery. Pain ranged from 1-10 in both groups, with a mean value of 5.16 in the OH group and that of 3.54 in the LHP group, according to the VAS. In the OH group, mild pain (0-3) was represented in 8 patients (16%), moderate pain (4-6) in 32 patients (64%), and severe pain (7-10) in 10 (20%) patients. In the LHP group, mild pain (0-3) was represented in 40 patients (80%), moderate pain (4- 6) in 10 patients (20%), and severe pain (7-10) in 0 patients.

Table 6 "Assessment of Diverse Study Parameters",this systematically presents and evaluates a multitude of relevant parameters within the scope of the research. It is meticulously structured to provide a comprehensive view of these variables, facilitating an in-depth analysis and understanding of their roles and interactions in the context of the study. Instrumental in drawing correlations, identifying trends, and supporting the overall findings of the research through detailed data representation.

In the presented figures, we embark on a comprehensive analysis of various medical metrics. Figure 1, titled "Comparative Analysis of Hospital Stay Duration," delves into the varying lengths of hospital stays across different patient groups, providing a juxtaposition of these durations. Subsequently, Figure 2, "Average Duration of Hospital Stay," shifts the focus to the mean hospitalization period, offering a general perspective on the typical time patients are hospitalized under diverse conditions. Moving forward, Figure 3, "Comparative Analysis of Operating Time Between Two Groups," presents a detailed comparison of the operating times for two distinct groups, highlighting the differences or parallels in surgical durations. Figure 4, "Comparative Assessment of Post-Operative Complications Between Two

Age group (years)	LHP		OH	
	Number of cases	Percent	Number of cases	Percent
16-25	7	14	7	14
26-35	8	16	8	16
36-45	13	26	15	30
46-55	16	32	12	24
56-65	6	12	6	12
66-70	0	0	2	4
Total	50	100	50	100
Maximum	65.0		70.0	
Minimum	18.0		16.0	
Mean Â± SD	41.64Â±12.29		41.36Â±12.94	

Table 1: Age wise distribution

Gender	LHP		OH	
	Number of cases	Percent	Number of cases	Percent
Male	39	78	39	78
Female	11	22	11	22
Total	50	100	50	100

Table 2: Gender wise distribution

Clinical manifestations	Percentage (%)
Bleeding	71
Pain	39
Pruritis	15
Anemia	39
Constipation	25
Hard stools	43
Straining	45

Table 3: Clinical manifestation

Presenting complain	OH group	LHP group
Bleeding	35 (70%)	36 (72%)
Pain	20 (40%)	19 (38%)
Pruritis	8 (16%)	7 (14%)
Anemia	20 (40%)	19 (38%)
Constipation	11 (22%)	14 (28%)
Hard Stools	22 (44%)	21 (42%)
Straining	17 (34%)	28 (56%)

Table 4: Comparison between 2 groups

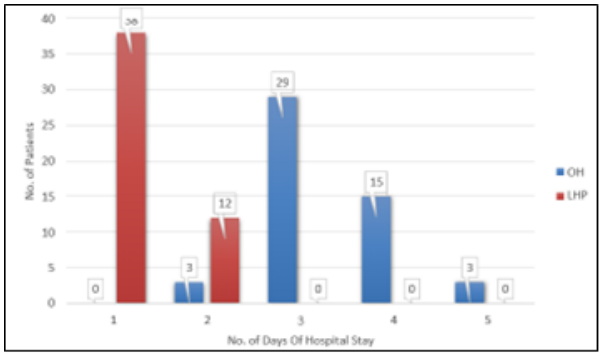

Figure 1: Comparing days of hospital stay

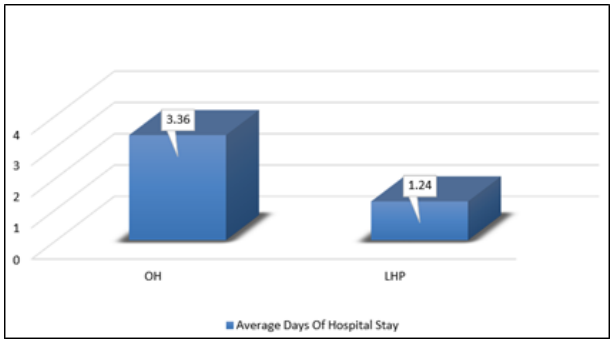

Figure 2: Average days of hospital stay

Groups," examines the range and incidence of post-surgical complications in two patient cohorts, thereby shedding light on the comparative risks and outcomes associated with each group.

We found from the graph presented in Figure 5, that occurrence of ROU was observed more in OH group, 6 patients(12%).Whereas no ROU in LHP group. The p-value was 0.050036, which exceeds the predetermined significance level of 0.05. Therefore, the result is not considered statistically significant.

We found from the graph presented in Figure 6, Post-operative bleeding occurred in three patients in the OH group and none in the LHP group.

We found from the graph presented in Figure 7, 5 patients (10%) patients in OH group complained of serous anal discharge for 2 weeks. 0 patients in the LHP group.

We found from the graph presented in Figure 8,the occurrence of acute thrombosis was exclusively observed in the LHP group, with a total of four patients (8%) experiencing this complication. We were unable to locate any complaints within the OH group.

Pain	OH group		LHP group	
Mild	8	16%	40	80%
Moderate	32	64%	10	20%
Severe	10	20%	0	0%

Table 5: Comparative Study

Parameters		OH		LHP		Significance
		Frequency	Percent	Frequency	Percent	
Urinary Retention	Yes	6	12	1	2	chi-square value:3.8402. p- value: 0.050036
	No	44	88	49	98	
Bleeding	Yes	3	6	0	0	—
	No	47	94	50	100	
Discharge	Yes	5	10	0	0	—
	No	45	90	50	100	
Acute thrombosis	Yes	0	0	4	8	—
	No	50	100	46	92	
Anal stenosis	Yes	5	10	0	0	—
	No	45	90	50	100	
Resolution	Yes	46	92	50	100	—
	No	4	8	0	0	
Operative Time		37.60 minutes		20.64 minutes		
DOHS	1	0	0	38	76	Chi-square value: 56.0811. p-value: 0.00001
	2	3	6	12	24	
	3	29	58	0	0	
	4	15	30	0	0	
	5	3	6	0	0	
Follow-Up						
Pain	Yes	6	12	1	2	chi-square value:3.8402. p- value: 0.050036
	No	44	88	49	98	
Bleed	Yes	0	0	0	0	—
	No	50	100	50	100	
Itching	Yes	2	4	0	0	—
	No	48	96	50	100	

Table 6: Various parameters

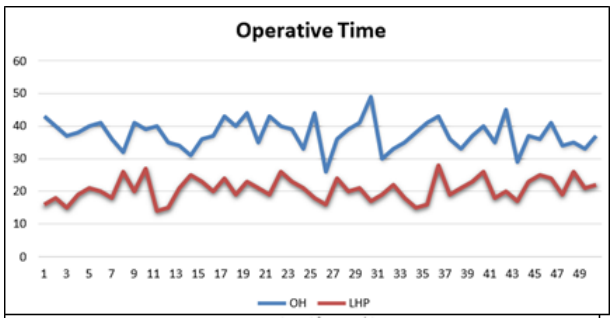

Figure 3: Comparative OT between the 2 groups

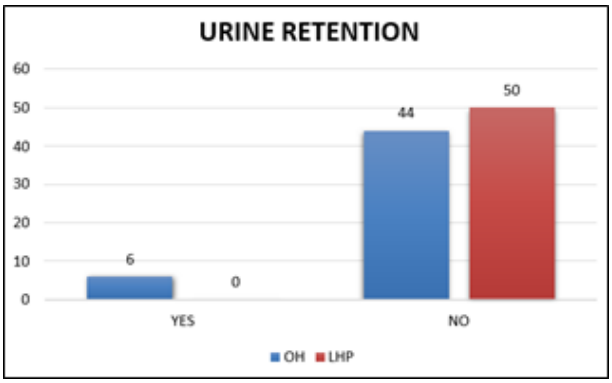

Figure 5: ROU

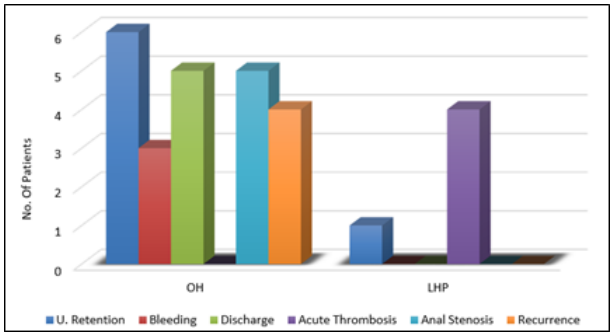

Figure 4: Comparing the various post-operative complications between 2 groups

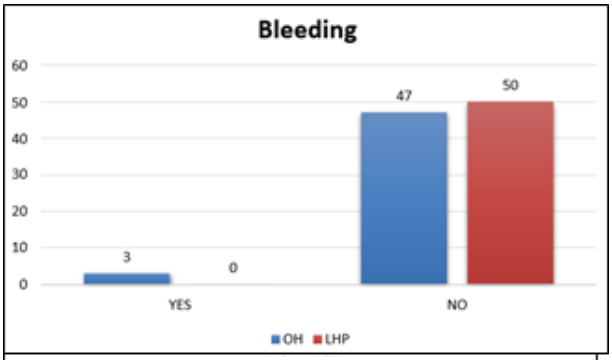

Figure 6: Bleeding

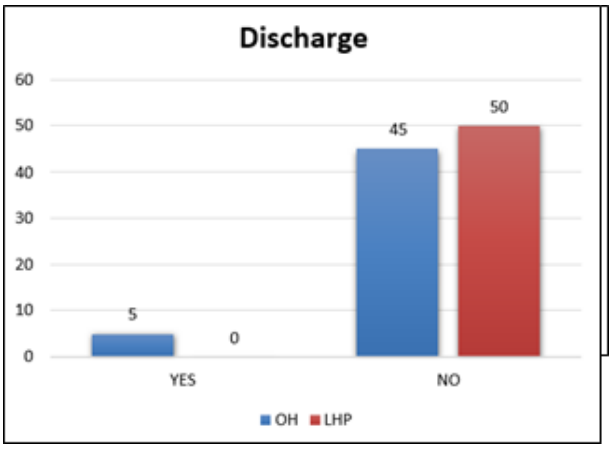

Figure 7: Discharge

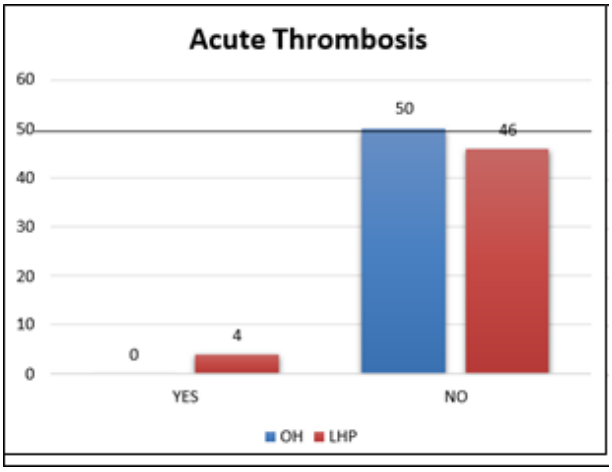

Figure 8: AT

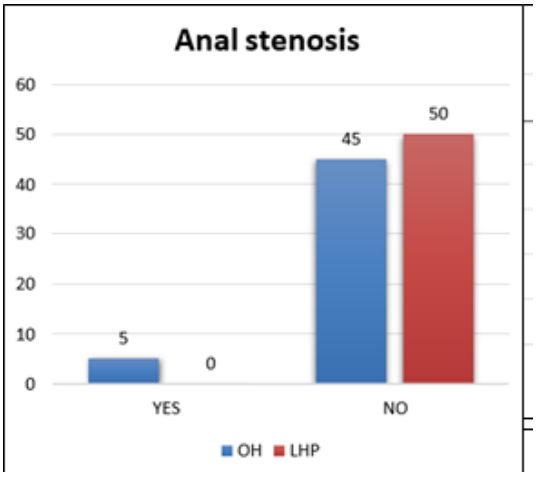

Figure 9: AS

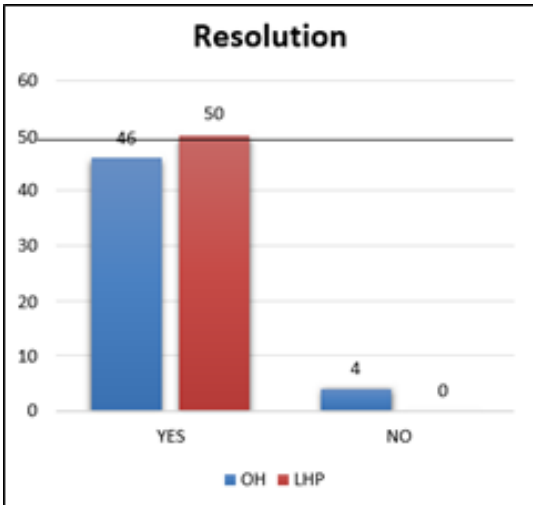

Figure 10: Resolution of lesion(ROL)

We found from the graph presented in Figure 9, in the OH group, anal stenosis was seen as a complication in 5 patients (10%) of the patients. Patients in the LHP group did not have any anal stenosis.

We found from the graph presented in Figure 10, it was observed that a total of four patients, accounting for 8% of the OH group, did not exhibit complete resolution of the condition. No instances of recurrence were observed in the LHP group.

4. Discussion

Age

Our study group encompasses individuals between 16 and 70, representing a wide age distribution. The mean age of presentation in the LHP group was 41.64 ± 12.29, whereas in the OH group, it was 41.36 ± 12.94. According to another study by researchers, it was found that the median age of presentation was 50 years, with a range spanning from 18 to 88 years. The duration of the current study is approximately 40 years [26].

Sex

In our study, 100 patients were included: male patients were 78 (78%) and females were 22. Another study reported that men suffer from hemorrhoids more than women. Approximately 60% of hospitalized patients are men [27].

Bleeding, Pain, Pruritis & Anemia

In our study, we found that 71% of patients complained of bleeding. Whereas in another study, researchers found that [27]. 80.7% of the subjects experienced bleeding. Furthermore, in our study, pain was observed in 39% of the patients, whereas in another study [28], it was found that 56% of the participants experienced pain. Our study also found that pruritus was observed in 15% of the patients. Whereas in another study [29]. It was documented that a prevalence rate of 9.5% was observed for pruritis. The observed discrepancy may be attributed to the presence of concurrent infections among the subjects in our study. In addition, The prevalence of anemia among patients was observed to be 39%.

Constipation, Straining, Hard Stool

In our study, straining was one of the major stool-presenting symptoms, with a prevalence of 45% (n=45) and hard stools at 43%. The two factors above were identified as significant contributors, with constipation being observed in 25% of the sample (n=25). While 59% of his patients had constipation, researchers found in another study [29].

Post-Operative

1) Bleeding

In our study, bleeding was found to be maximal in the OH group, with three patients (6%) presenting with bleeding. The LHP group showed 0% bleeding in the post-operative phase. In another study, researchers found bleeding in 7%, but the bleeding observed in the study group was only minor, and no further intervention was required [28].

2) Pain

In the OH group, 8 patients (16%) reported experiencing mild pain (rated between 0-3 on a pain scale). Moderate pain (rated between 4-6) was reported by 32 patients (64%), while severe pain (rated between 7-10) was reported by 10 patients (20%). Within the LHP group, 40 patients (80%) reported experiencing mild pain, ranging from 0 to 3 on the pain scale. Additionally, 10 patients (20%) reported experiencing moderate pain, ranging from 4 to 6 on the pain scale. No patients within the group reported experiencing severe pain, which falls within the range of 7 to 10 on the pain scale. Whereas studies done in (1960) [28], and in (1959) [29] demonstrated that postoperative pain was observed in all patients, indicating comparable results.

3) ROU

In the current investigation, the percentage of patients who had urinary retention was found to be greatest in the group that had undergone hemorrhoidectomy; this group included six patients and represented 12% of the total. In the LHP group, just one patient had a 2% incidence of urinary retention. The p-value is 0.050036, which is more than 0.05 and indicates that the results are insignificant. While 16.7% of patients post-OH were found to be retained in another study [29].

4) Discharge

Only 5 patients (10%) in the OH group had serous anal discharge for up to 2 weeks, which was the only postoperative complication observed. The other group did not experience it.

5) AS

In our study , it was seen as a complication in the group of patients who had oral hygiene procedures, specifically in five individuals, constituting 10% of the total sample. Patients in the LHP group did not exhibit any instances of anal stenosis.

6) OT

During our study we found it considerably shorter in the LHP group, with a mean of 20.64 minutes compared to 37.6 minutes in the OH group.

7) Days of Hospital Stay

The duration of post-operative hospitalization was shorter in the LHP group, with an average of 1.24 days, compared to 3.36 days in the OH group. The p-value was 0.00001, This indicates,statistically significant difference in hospital stay between the LHP and OH groups. In the group undergoing H, the average length of hospital stay for patients in one study was 11.5 days [28], while average hospital stay of 2.76 days for another study [29].

8) Recurrence

The OH group comprised 4 patients (8%) who did not show complete remission of the disease and had recurrence. All patients in the LHP group exhibited complete resolution.

5. Conclusion

OH has more postoperative complications like pain, bleeding, and anal stenosis as compared to the LHP. Furthermore, operative time was lesser, had fewer complications, fewer hospital stays, and a lower recurrence rate, but it is a costlier procedure compared to the other group. Hence, LHP can be preferred over OH. Further, more studies need to be done to validate our study results.

Conflict of Interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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