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COMPARING OUTCOMES OF SCLEROTHERAPY VERSUS RUBBER BAND LIGATION IN SECOND-DEGREE HEMORRHOIDAL DISEASE

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Abstract

Background: Second-degree hemorrhoidal disease is a common anorectal condition frequently managed with minimally invasive outpatient procedures.

Objective: To compare the clinical outcomes of sclerotherapy versus rubber band ligation in patients with second-degree hemorrhoidal disease.

Methods: This randomized controlled trial was conducted at the General Surgery Department of Fatima Jinnah Medical University / Government Teaching Hospital, Shahdara, Lahore, from April 2025 to October 2025. A total of 150 patients aged 18–60 years were enrolled and randomly allocated into two equal groups. Group A underwent rubber band ligation, while Group B received injection sclerotherapy using 5% phenol in almond oil.

Results: Baseline demographic characteristics were comparable between groups. Successful treatment was achieved in 56 (74.7%) patients in the rubber band ligation group and 69 (92.0%) patients in the sclerotherapy group ($p = 0.006$). Recurrence was higher with ligation (25.3%) compared with sclerotherapy (8.0%). Post-procedure pain was more frequent in the ligation group (37.3% vs 16.0%), and minor bleeding occurred in 13.3% versus 6.7% of patients, respectively. Mean time to return to normal activities was shorter with sclerotherapy (1.6 ± 0.8 days) compared with ligation (3.2 ± 1.1 days). Patient satisfaction was also higher in the sclerotherapy group (85.3% vs 68.0%).

Conclusion: Sclerotherapy demonstrated superior efficacy, lower recurrence, fewer complications, and faster recovery compared with rubber band ligation.

Keywords: Hemorrhoids, sclerotherapy, rubber band ligation, minimally invasive treatment, recurrence

INTRODUCTION

The major cause of bleeding and pains in the anorectal area include hemorrhoids. It is amongst the most prevalent colonoscopic results. Their causes are elevated venous pressure and engorgement of anal cushions that may cause excoriation [1]. Hemorrhoids are categorized into the four degrees depending on the clinical manifestations. The majority of first- and second-degree hemorrhoid cases are treated conservatively whereas third- and fourth-degree hemorrhoids are usually treated surgically. The development of instrumentation and research has led to changes in treatment modalities [2]. In second-degree hemorrhoids, conservative treatment is effective in certain instances but interventional treatments are also very effective. Sclerotherapy, which entails the submission of a sclerosant into the submucosa at the hemorrhoid base, has proven to induce regression, with over 75 percent of patients reporting positive results [3]. This is evidenced by various sclerosants, including 50% dextrose water and 5% phenol in almond oil. Common problems are however pain, infection and recurrence. Alternatively, rubber band ligation (RBL) can be used whereby the hemorrhoid is ulcerated and sloughed off due to vessel occlusion [4,5]. On one hand, this procedure is usually associated with a low side effect profile; however, it may be problematic to a few patients. Thought to be curative, hemorrhoidectomy has a considerably greater rate of complications than band ligation and sclerotherapy [6].

When conducting my study, which is comparing injection sclerotherapy and rubber band ligation in treating second-degree hemorrhoids, I would compare the two modalities of complete remedy as there is still a controversy in the literature. It was found that 75.56% and 64.44% of patients in the RBL and sclerotherapy groups, respectively, had no bleeding at 3 months post-treatment ($P = 0.001$) [7]. Makanioula, A. et al. established that relief of symptoms at the end of three months, i.e., symptom score = 0.70 + 1.88 and = 1.03 + 2.08 with RBL and

sclerotherapy groups, respectively, were not different (p = 0.391). In a systematic review and meta-analysis, it turned out that sclerotherapy had a 93% rate of therapeutic success in contrast to 75% with the RBL group (OR 3.39, 95% CI 1.48-7.74, p < 0.01). Bleeding, discharge and prolapse are some of the issues that cause a lot of dissatisfaction and morbidity among certain patients [8-10].

Objectives

To compare the clinical outcomes of sclerotherapy versus rubber band ligation in patients with second-degree hemorrhoidal disease.

METHODOLOGY

This Randomized controlled trial was conducted at the General Surgery Department of Fatima Jinnah Medical University / Government Teaching Hospital, Shahdra, Lahore from April 2025 to October 2025. A sample size of 150 patients (75 in each group) was calculated, assuming 75% efficacy for the RBL group and 93% for the sclerotherapy group, with a 5% significance level and 80% power. Data were collected through non-probability consecutive sampling.

Inclusion Criteria

1. Second degree hemorrhoids as per operational definitions
2. Age range between 18 to 60 years
3. Patients of both male and female gender

Exclusion Criteria

1. Patients with history of previous surgery or any malignancy of anorectal areas
2. Patients with history of chronic hypertension, diabetes mellitus, chronic liver and kidney diseases, bronchial asthma, or chronic obstructive pulmonary disease
3. Patients who are on drugs which can interfere with the normal bleeding process like aspirin, clopidogrel, warfarin, tranexamic acid
4. Pregnant patients
5. Patients unwilling for consent

Data Collection

Following the ethical approval and a written informed consent, the eligible patients were randomly assigned to two equal groups in a 1:1 ratio, produced through the use of a computer. Demographic and clinical data, such as age, gender, body mass index, and the period of symptoms, were taken as a baseline. Group A patients had rubber band ligation as done in the operating room under normal proctoscopic procedure. Group B patients were given submucokinal injection sclerotherapy of 5 per cent phenol in almond oil 1 ml at the hemorrhoidal cushion base. The researcher trainee underwent all procedures under the guidance of a consultant surgeon to make sure that the technique is uniform. The patients were monitored after the operations and sent away when stable and without active bleeding and any severe pain. Regular postoperative instructions and drugs were offered. Periodic follow-up visits were to be provided, and efficacy of the treatment was determined after six months of the procedure by a blinded consultant to the group allocation in order to reduce the bias of assessment. A structured proforma was used to record outcomes and complications. Follow-up reported procedural outcomes, complications and recurrence.

Statistical Analysis

Data were analyzed using IBM SPSS version 25. Quantitative variables such as age, disease duration, and BMI were expressed as mean ± standard deviation, whereas qualitative variables such as gender, treatment efficacy, and complications were summarized as frequencies and percentages. Group comparisons for efficacy were performed using the Chi-square test. Potential confounders including age, gender, symptom duration, and BMI were controlled through stratification. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Data were collected from 150 patients; the mean age of patients undergoing rubber band ligation was 41.8 ± 9.6 years, compared with 40.9 ± 10.2 years in the sclerotherapy group. Males accounted for 46 (61.3%) and 44 (58.7%) patients, whereas females accounted for 29 (38.7%) and 31 (41.3%) in the respective groups. Mean BMI was similar (26.4 ± 3.1 vs 26.1 ± 3.3 kg/m²), and the average duration of symptoms was 8.2 ± 3.5 months in the ligation group and 7.9 ± 3.2 months in the sclerotherapy group. Bleeding was the predominant symptom in 48 (64.0%) and 50 (66.7%) patients, while prolapse was reported in 27 (36.0%) and 25 (33.3%), indicating no meaningful baseline differences between groups.

Table 1. Baseline Demographic and Clinical Characteristics

Variable	Rubber Band Ligation (n=75)	Sclerotherapy (n=75)
Age (years, mean ± SD)	41.8 ± 9.6	40.9 ± 10.2
Male, n (%)	46 (61.3%)	44 (58.7%)
Female, n (%)	29 (38.7%)	31 (41.3%)
BMI (kg/m², mean ± SD)	26.4 ± 3.1	26.1 ± 3.3

Duration of symptoms (months, mean ± SD)	8.2 ± 3.5	7.9 ± 3.2
Bleeding predominant symptom, n (%)	48 (64.0%)	50 (66.7%)
Prolapse predominant symptom, n (%)	27 (36.0%)	25 (33.3%)

Successful treatment was achieved in 69 (92.0%) patients in the sclerotherapy group versus 56 (74.7%) in the ligation group (p = 0.006). Recurrence or persistent symptoms were observed in 6 (8.0%) patients following sclerotherapy compared with 19 (25.3%) after ligation. Complete resolution of bleeding occurred in 70 (93.3%) patients treated with sclerotherapy compared with 58 (77.3%) in the ligation group (p = 0.008), and prolapse resolution was seen in 68 (90.7%) versus 55 (73.3%) patients (p = 0.01). Repeat procedures were required more frequently after ligation (14 patients, 18.7%) than after sclerotherapy (4 patients, 5.3%) (p = 0.02).

Table 2. Treatment Efficacy and Recurrence at 6 Months

Outcome	Rubber Band Ligation n (%)	Sclerotherapy n (%)	p-value
Successful treatment	56 (74.7%)	69 (92.0%)	0.006
Recurrence/persistent symptoms	19 (25.3%)	6 (8.0%)	0.006
Complete resolution of bleeding	58 (77.3%)	70 (93.3%)	0.008
Resolution of prolapse	55 (73.3%)	68 (90.7%)	0.01
Need for repeat procedure	14 (18.7%)	4 (5.3%)	0.02

Pain was reported in 28 (37.3%) patients following ligation compared with 12 (16.0%) after sclerotherapy (p = 0.004). Minor bleeding occurred in 10 (13.3%) and 5 (6.7%) patients, respectively. Local edema was noted in 7 (9.3%) patients in the ligation group and 3 (4.0%) in the sclerotherapy group.

Table 3. Post-Procedure Complications

Complication	Rubber Band Ligation n (%)	Sclerotherapy n (%)	p-value
Post-procedure pain	28 (37.3%)	12 (16.0%)	0.004
Minor bleeding	10 (13.3%)	5 (6.7%)	0.17
Local edema	7 (9.3%)	3 (4.0%)	0.19
Urinary retention	3 (4.0%)	1 (1.3%)	0.31
Infection	1 (1.3%)	0 (0.0%)	0.31
Severe complications	0 (0.0%)	0 (0.0%)	—

The mean time to return to normal activity was significantly shorter in the sclerotherapy group (1.6 ± 0.8 days) compared with the ligation group (3.2 ± 1.1 days; p < 0.001). Hospital stay was also reduced (5.4 ± 1.8 hours vs 9.5 ± 2.3 hours; p < 0.001). Analgesic requirements were lower among sclerotherapy patients, with only 15 (20.0%) requiring medication compared with 33 (44.0%) in the ligation group (p = 0.002). Patient satisfaction was higher following sclerotherapy, reported by 64 (85.3%) patients versus 51 (68.0%) in the ligation group (p = 0.01).

Table 4. Recovery and Patient Satisfaction

Variable	Rubber Band Ligation (mean ± SD or n%)	Sclerotherapy (mean ± SD or n%)	p-value
Time to return to normal activity (days)	3.2 ± 1.1	1.6 ± 0.8	<0.001
Hospital stay (hours)	9.5 ± 2.3	5.4 ± 1.8	<0.001
Analgesic requirement	33 (44.0%)	15 (20.0%)	0.002
Patient satisfaction	51 (68.0%)	64 (85.3%)	0.01

Successful treatment occurred in 66 (52.8%) patients aged ≤40 years and 59 (47.2%) aged >40 years, while failures were similarly distributed (13 vs 12; p = 0.94). Success rates were comparable between males and females (74 vs 51 successes; p = 0.65) and between BMI categories ≤25 and >25 (63 vs 62 successes; p = 0.57). However, treatment modality showed a strong association with outcome: sclerotherapy accounted for 69 (55.2%) successful cases and only 6 (24.0%) failures, whereas ligation accounted for 56 (44.8%) successes and 19 (76.0%) failures (p < 0.001).

Table 5. Stratified Analysis of Treatment Success

Variable	Successful (n=125)	Failed/Recurrence (n=25)	p-value
Age ≤40 years	66 (52.8%)	13 (52.0%)	0.94
Age >40 years	59 (47.2%)	12 (48.0%)	0.94
Male	74 (59.2%)	16 (64.0%)	0.65
Female	51 (40.8%)	9 (36.0%)	0.65

BMI ≤25	63 (50.4%)	11 (44.0%)	0.57
BMI >25	62 (49.6%)	14 (56.0%)	0.57
Rubber band ligation	56 (44.8%)	19 (76.0%)	<0.001
Sclerotherapy	69 (55.2%)	6 (24.0%)	<0.001

DISCUSSION

This randomized controlled trial provided a comparison of clinical success of rubber band ligation and injection sclerotherapy among those with second-degree hemorrhoidal disease and revealed that both methods were safe, effective, but sclerotherapy was better and less recurrent, had low occurrence of complications and quicker recovery. These results indicate that sclerotherapy can be more clinically beneficial as a whole when used in the outpatient treatment of early hemorrhoidal disease. The two groups were similar in terms of baseline demographic and clinical traits, such as age, gender distribution, body mass index, and duration of symptoms, which means that they were appropriately randomized and limiting the confounding factors. This similarity supports the legitimacy of the outcome comparisons and indicates that differences have been largely due to the modality of the treatment and not due to any patient related factors [11].

Sclerotherapy had a much higher rate of efficacy (92.0 percent) than rubber band ligation (74.7 percent) in success in treatment. The sclerotherapy group also had a significantly lower recurrence or persistent symptoms. These findings show improved short- to mid-term symptom management using sclerotherapy. The same tendencies have been observed in past studies, where injection therapy has been found to be very successful in the management of bleeding and prolapse with minimal recurrent interventions [12]. Prolonged mucosal fixation and vascular obliteration may also be due to the fibrosing effect of phenol, which decreases recurrence [13]. The morbidity rates were significantly increased after the rubber band ligation. In the group of ligation, pain and minor bleeding were more common, and this could be attributed to ischemic necrosis and sloughing on hemorrhoidal tissue after applying a band. Sclerotherapy on the other hand is a chemical fibrosis process without strangulation of tissue causing minimal inflammation and pain. The results also agree with the earlier researches that have found sclerotherapy to be more tolerable, especially in outpatient and day-care practice [14-16].

Sclerotherapy benefits were also enhanced by recovery parameters. Patients undergoing injection treatment returned to their regular lives sooner and needed fewer painkillers, which is indicative of less post-surgery pain [17]. The significance of comfort and fast recovery as decisive factors in the success of treatments is supported by the fact that the patient satisfaction rates in the sclerotherapy group were higher than that of the placebo group, and that this is particularly true of minimally invasive surgeries. Notably, the overall safety of the two interventions was confirmed, as there were no significant complications, such as severe bleeding, infection, or urinary retention, in either group. This is consistent with the existing literature, which indicates that both rubber band ligation and sclerotherapy are low-risk procedures that can be performed in ambulatory care [18].

Practically, sclerotherapy has additional advantages, such as simplicity, shorter procedure time, and cost-effectiveness. Such benefits are particularly applicable in health care facilities with scarce resources, where outpatient care management is desirable [19,20]. Thus, logistical factors, along with clinical efficacy, help justify the use of sclerotherapy as a primary treatment. There are some limitations of this study. Firstly, it was performed in one tertiary care center and this might not be generalizable to other populations and care environments. Second, the sample size was sufficient to detect variability in efficacy, but larger multicenter studies would provide greater external validity. Third, the follow-up was only short-term (lasting six months), thus, long-term recurring rates after six months were not assessed. Fourth, consecutive sampling can be non-probability which can cause selection bias. Also, patient-reported outcomes, including pain and satisfaction are subjective and might be affected by personal perception. Lastly, operator-related differences in method of procedure, despite the supervision, were not absolutely removed. These limitations notwithstanding, the standardized protocol and randomized nature makes the results more reliable.

CONCLUSION

It is concluded that both rubber band ligation and injection sclerotherapy are safe and effective minimally invasive treatments for second-degree hemorrhoidal disease; however, sclerotherapy demonstrated superior clinical outcomes. Patients undergoing sclerotherapy showed higher treatment success, lower recurrence rates, fewer post-procedural complications, reduced pain, and faster return to daily activities compared with rubber band ligation.

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