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Research Article

Comparative Study of Rubber Band Ligation and Injection Sclerotherapy for 2nd Degree Haemorrhoids

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ABSTRACT
Objective: To compare the outcome of rubber band ligation versus injection sclerotherapy in cases of second degree haemorrhoids.
Study Design: Randomized Controlled trial.
Study Place and Period: Surgery Department, Chaudhary Muhammad Akram Teaching and Research Hospital, from October 2025 to March 2026.
Methodology: Total sample of 60 cases; 30 in each group. Individuals were divided random1y in two equal groups. In first group, rubber band ligation was done. In second group, sclerotherapy injection was applied. All the individuals were evaluated for pain and per rectal bleeding within 24 hours of surgery. Data was analyzed with SPSS.
Results: The mean age of individuals in group-1 and group-2 was 40.7 ± 13.20 years (20 to 67 years) and 41.7 ± 11.72 years (23 to 64 years). In group-1, there were 20 (66.7%) male and 10 (33.3%) female and in group-2, 13 (43.3%) male and 17 (56.7%). Out 0f 60 cases, 5(8.33%) cases had complained for pain and 11(18.33%) cases had bleeding and no cases had complained for bleeding and pain. There were significant relationship between these two groups P < 0.05.
Conclusion: Rubber band ligation is observed as a better opportunity in relieving hemorrhoids than sclerotherapy injection for management of second degree hemorrhoids.

Keywords: Rubber Band Ligation, Injection Sclerotherapy, 2nd Degree Haemorrhoids, Pain, Bleeding.

INTRODUCTION

In surgical practice, hemorrhoids are a frequent anorectal problem that can be treated in a number of ways.[1] Hemorrhoids fall into four categories: first-degree hemorrhoids just bleed, second-degree hemorrhoids prolapse but are spontaneously reduced, third-degree hemorrhoids prolapse without spontaneous reduction and are manually reduced, and fourth-degree hemorrhoids prolapse permanently.[2, 3] Treatment options for hemorrhoids range from simple dietary modifications to surgical hemorrhoidectomy. The motivation could be financial, embarrassment, pain apprehension, or a desire to stay out of the hospital. Other out-patient treatment methods, including as sclerotherapy injection, rubber band ligation, cryotherapy, infrared coagulation (which is quite costly), and bipolar coagulation, are available when traditional hemorrhoid therapy fails.[4]

Rubber band ligation and injection sclerotherapy are two common non-operative methods with minimal recurrence rates. By causing inflammation and fibrosis, the infused sclerosant removes the vascularity of hemorrhoids, resolving the hemorrhoids to the surrounding tissues and preventing prolapse. Rubber band ligation results in ischemia by encircling the superfluous hemorrhoidal mucosa with a constricting band. The tissue marshes, a tiny ulcer that heals and resolves the residual mucosal lining to the fundamental wall of the anal canal, are caused by ischemia mucosa necrosis.[5, 6]

The most popular, significant, and economical technique for treating internal hemorrhoids is rubber band ligation. A number of methods

have been developed mainly to increase the procedure's efficiency and safety. The method can be applied without an endoscope by employing a forceps ligator or suction elastic band, or it can be utilized with an endoscope with forward-view or retro-flexion.[7] Endoscopic rubber band ligation considerably outperformed endoscopic injection sclerotherapy in treating anal protrusion, however it was associated with a higher pain score.[8]

The purpose of this trial was to compare the results of injectable sclerotherapy with rubber band ligation for second-degree hemorrhoids. Research has demonstrated that rubber band ligation is more successful in lowering bleeding and pain following surgery. However, the few studies that have been done in the past have produced contradictory findings. In order to obtain current and trustworthy evidence that might be applied to the local people, we carried out this trial. This would enhance our procedure and assist us in obtaining local magnitude, which we would utilize in the future to apply rubber band ligation for hemorrhoidectomy in the local populace in order to improve the procedure's outcome. Additionally, by enhancing the results following hemorrhoidectomy, this would lessen the hospital's burden.

METHODOLOGY

This Randomized Controlled study was conducted in the Department of Surgery, Chaudhary Muhammad Akram Teaching and Research Hospital, from October 2025 to March 2026, following clearance of the hospital ethical review board. An 80% power of study, a 5% significance level, and bleeding per rectum—that is, 22.2% with injectable sclerotherapy and 0% with rubber band ligation for hemorrhoids—are used to determine the total sample of 60 cases, with 30 in each group.[9] The people were enrolled using non-probability consecutive sampling approaches.

Inclusion Criteria: Individuals aged from 20 to 70 years, both genders, diagnosed to have 2nd degree hemorrhoids with ASA status I-II were included in the trial. Hemorrhoids were defined as inflammation and swollen veins in lower rectum and presence of any thrombosed external hemorrhoid, which appears as firm, purplish nodule, tender to palpation, bluish swelling in anal canal and per rectal bleed on clinical examination. Individuals diagnosed with grade 2nd hemorrhoids were included for research project.

Exclusion Criteria: Individuals with recurrent disease or redo surgery within 6 months, chronic diabetes, hypertension, anemia, renal dysfunction, deranged clotting profile, and pregnancy were excluded.

Consent was obtained after being informed. Additionally, demographic information was collected, including name, age, gender, BMI, length of symptoms, occupation, and hemorrhoid grade. After that, the lottery method was used to randomly divide each person into two equal groups. Individuals in group A had rubber band ligation surgery, which involved introducing an anoscope and ligator into the rectum until they reached the hemorrhoid. After that, banding was done for blood clots and one or two rubber bands were placed at the base of the hemorrhoid to restrict blood flow. In group B, individuals had surgery with injection sclerotherapy by injecting solution directly into the hemorrhoids. The length of the procedure was recorded. With the help of the researcher, a single surgical team performed all procedures under spinal anesthesia. Individuals were moved to post-surgical wards following the surgery, where they were monitored for 24 hours. Postoperative pain was assessed as present if pain score >4 was present by using visual analogue scale 24 hours of surgery. Meanwhile, individuals were also assessed for postoperative bleeding. Postoperative bleeding was labeled if there was>50ml bleeding from the wound site within 24 hours of surgery that was assessed by using cotton swabs and gauzes by weighing soaked and dry swabs on weight machine, where 1mg=1ml. All the data was recorded via proforma.

SPSS version 21 was used to enter and evaluate all of the data that had been gathered. Numerical factors such as age, BMI, hemorrhoid's duration, and operating time were displayed as mean ± SD. The frequency and percentage of categorical variables such as sex, occupation, hemorrhage, and postoperative discomfort were displayed. The chi-square test was used to compare the two groups' postoperative discomfort and bleeding. A P-value of less than 0.05 was deemed significant. Age, sex, BMI, length of symptoms, occupation, and surgical time were all used to stratify the data. Following stratification, the chi-square test was used in each stratum to compare the two groups' postoperative discomfort and bleeding. A P-value of less than 0.05 was deemed significant.

RESULTS

The mean age of individuals in group-1 and group-2 was 40.7 ± 13.20 years (20 to 67 years) and 41.7 ± 11.72 years (23 to 64 years). In group-1, there were 20 (66.7%) males and 10 (33.3%) females and in group-2, 13 (43.3%) males and 17 (56.7%) females. The mean BMI of individuals in group-1 & 2 was 30.0 ± 1.93 kg/m^2 and 23.4 ± 1.93 kg/m^2. The mean duration of disease in group-1 and group-2 was 5.07 ± 3.01 years and 6.33 ± 5.07 years. According to group1, 9 (30%) students, 2 (6.7%) office workers, 5 (16.7%) housewife, 6 (20%) labourers and 8 (26.7%) house helpers and in group-2,9 (30%) students, 8 (26.7%) office workers, 8 (26.7%) housewife, 1 (3. 3%) labourers and 4(13.3%) house helpers . The mean operative time (min) in group-1 and group-2 was 31.1 ±4.95 min and 30.93 ± 6.88 min. Table-I

In group-1, no one individuals had pain and in group-2 5 (16.7%) individuals had pain. There were significant relationship between these two groups ($p < 0.05$). In group-1, no one individuals had complained for pain and in group-2, 11 (36.7%) individuals had bleeding. There were significant relationship between these two groups ($p < 0.05$). Table-II

In 20-45 age, group-1 no cases had pain and total of 3 (15.8%) cases had pain and in group-2, the frequency of pain was higher in the frequency of group-2 as compared to group1, p-value < 0.05. In 46-70 years of age, and in group-1 no one cases had pain and 2 (18.2%) cases had pain in group-2. An insignificant difference was noted in both groups ($p > 0.05$). In male, group-1 no one cases had complained for pain and 2 (15.4%) cases had pain in group-2, the frequency of pain was statistically higher in the group-2 as compared to group-1, p-value > 0.05. In female, group-1 no one cases had complained for pain and 3 (17.6%) cases had pain ($p > 0.05$). In cases with less than 5 years of duration of disease, in group-1 no one cases had complained for pain and only 1 (7.7%) case had pain in group-2, the frequency was insignificant in both groups, p-value > 0.05. Greater than 5 years of duration of disease, in group-1 no one cases had pain and 4 (23.5%) cases had pain and in group-2, the frequency of pain statistically insignificant in both groups ($P > 0.05$). In cases with operative time 20-30 min in group-1 on one cases had pain and only 3 (23.1%) case had pain and in group-2 (p-value > 0.05). According to 31-40 min, in group-1 no cases had complained for pain and total 2 (11.8%) cases had pain in group-2, (p value > 0.05). Table-III

In age group-20-45 years, in group-1 no one cases had pain and 5 (26.3%) case had bleeding in group-2 (p-value < 0.05). In 46-70 years of age, in group-1 no cases had complained for pain and total 6 (54.5%) cases had bleeding and in group-2 (p value< 0.05). In male, in group-1 no cases had pain and 5 (38.5%) case had bleeding and in group-2 (p-value < 0.05). In female, in group-1 no cases had pain and total 6 (35.3%) cases had pain in group-2 ($p < 0.05$). In cases with less than 5 years of duration of disease, in group-1 no cases had complained for pain and only 6 (46.2%) case had bleeding in group-2 (p-value < 0.05). In greater than 5 years of duration of disease, in group-1 no cases had complained for pain and total 5 (29.4%) cases had bleeding in group-2 ($P <0.05$). Stratification with respect to operative time in study groups for bleeding is given in table below. Table-IV

Table-I: Demographics and Clinical Profile of Individuals (N = 60)

	Group-1	**Group-2**
n1	30	30
1Age (years)	40.47 ± 13.20	41.7 ± 11.72
Gender		
Males	20 (66.7%)	13 (43.3%)
Females	10 (33.3%)	17 (56.7%)
BMI (kg/m^2)	30.0 ± 1.93	23.4 ± 1.93
Duration of disease (years)	5.07 ± 3.01	6.33 ± 2.38
Occupation		
Students	9 (30%)	9 (30%)
Offie workers	2 (6.7%)	8 (26.7%)
House Wife	5 (16.7%)	8 (26.7%)
Labourers	6 (20%)	1 (3.3%)
House helpers	8 (26.7%)	4 (13.3%)
Operative time (min)	31.10 ± 4.95	30.93 ± 6.88

Table-II: Comparison of Outcomes in Both Trial Groups

	Group-1	Group-2	Sig.
n	30	30	
Presence of pain	0	5 (16.7%)	0.02
Postoperative bleeding	0	11 (36.7%)	<0.0001

Table-III: Comparison of Postoperative Pain in Both Trial Groups When Controlled For Age and Other Effect Modifiers (N = 60)

Presence of postoperative pain		Study Group		Sig.
		Group-1	Group-2	
Age (years)	20-45	0	3 (15.8%)	0.053
	46-70	0	2 (18.2%)	0.20
Gender	Male	0	2 (15.4%)	0.07
	Female	0	3 (17.6%)	0.15
Duration of disease (years)	<5years	0	1 (7.7%)	0.245
	≥5years	0	4 (23.5%)	0.06
Operative Time (min)	20-30	0	3 (23.1%)	0.06
	31-40	0	2 (11.8%)	0.145

Table-IV: Comparison of Postoperative Bleeding In Both Trial Groups When Controlled For Age and Other Effect Modifiers (N = 60)

Presence of postoperative pain		Study Group		P value
		Group-1	Group-2	
Age (years)	20-45	0	5 (26.3%)	0.01
	46-70	0	6 (54.5%)	0.01
Gender	Male	0	5 (38.5%)	0.003
	Female	0	6 (35.3%)	0.03
Duration of disease (years)	<5 years	0	6 (46.2%)	0.002
	>5 years	0	5 (29.4%)	0.032
Operative Time (min)	20-30	0	4 (30%)	0.03
	31-40	0	7 (41.2%)	0.003

DISCUSSION

In this study total 60 individuals were enrolled. The mean age of the individuals was 41.12+ 12.29 years. There were 33 (55.0%) male and 27 (45.0%) female. In cases with less than 5 years of duration of disease, in group1 only 6 (46.2%) case had bleeding. In greater than 5 years of duration of disease, in group-1 total 5 (39.4%) cases had bleeding and in group-2 no cases had complained for bleeding and pain (P< 0.05).

The hemorrhoids can be treated in a number of ways. Every treatment has risks and complications of its own.[10] For first-degree hemorrhoids, injection sclerotherapy is one of these treatment options. Thus far, this technique has been associated with numerous complications, 82% of which are urological. On the other hand, rubber band ligation is a common treatment for second-degree hemorrhoids, either by itself or in conjunction with injection sclerotherapy.

Bhuiya et al. discovered that the top age limit was greater in all research, ranging from 70 to 80 years, while Ammanagi et al. discovered that 36 to 45 years of age. [11, 12] Male preponderance was 74.88%, according to Qureshi et al. from Karachi. Male predominance in hemorrhoid individuals has been reported by a number of other writers in our population.[13, 14] Western literature, however, revealed a trend of equal or mixed male or female predominance in hemorrhoidal disease.[15-17]

The result of this study indicate that both group Sclerotherapy and rubber band ligation were encouragingly effective in the treatment of 2nd degree hemorrhoids. Out 0f 60 cases, only 5 (8.33%) cases had complained for pain and 11 (18.33%) cases had bleeding in sclerotherapy group and no one individuals had complained for pain and bleeding in rubber band ligation group. In contrast, a 2017 study indicated that 32 (41.1%) individuals in the Sclerotherapy group and 44 (57.9%) individuals in the

Rubber Band Ligation group fully recovered following treatment.[18]

Comparative studies revealed that rubber band ligation was superior to sclerotherapy injection in cases of second-degree hemorrhoids.[19] According to a local study by Majid and colleagues, rubber band ligation is the recommended treatment for second-degree hemorrhoids, with a 76% cure rate.[20]

According to a study by Nasir et al., band ligation for hemorrhoids is not only a simple and non-invasive operation, but it also saves individuals money and has a "controlled area of necrosis" that reduces the risk of postoperative infections. Sclerotherapy, on the other hand, is an intrusive operation. Rubber band ligation is therefore advised as the preferred course of treatment for hemorrhoids in outpatient settings. [18] According to Parveen et al., people with hemorrhoids respond better to rubber band ligation than to sclerotherapy. [21]

In a comparable study, Ammanagi et al. discovered that 42.9% of individuals with injection sclerotherapy experienced postoperative pain, compared to 3.6% of individuals with rubber band ligation. Additionally, bleeding per rectum was observed in 22.2% of individuals with injection sclerotherapy compared to 0% with rubber band ligation. There was a substantial difference ($p<0.05$).[9] However, Jahan discovered in a different trial that rectal bleeding happened in 12% of cases with sclerotherapy compared to 12% with rubber band ligation, and pain was reported in 4% of cases with sclerotherapy compared to 0% with rubber band ligation ($p>0.05$).[22]

The frequency of problems from different operations is shown in another study. When hemorrhoidectomy and rubber band ligation were compared, hemoridectomy had better results. However, compared to rubber band ligation, it was more painful and complicated. In a similar vein, all grades of hemorrhoids responded better to sclerotherapy than to rubber band ligation.[23]

In this trial, we only observed two outcomes i.e. postoperative pain and bleeding. While other complications including bowel movements, constipation would also be taken into consideration. But due to time limitation, we only conducted a small follow-up with few variables. Further trials should be done with larger sample size and more postoperative complications in order to authenticate the results.

CONCLUSION

We concluded that rubber band ligation was found to have less problems, early ambulation, a shorter post-operative stay, and to be more cost-effective than the other surgical technique used to treat hemorrhoids. When treating second-degree hemorrhoids, rubber band ligation is a more successful method with fewer side effects than sclerotherapy injections.

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