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Surgery Versus Flexible Endoscopic Rubber Band Ligation for Grade 2 and 3 Internal Hemorrhoids

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ABSTRACT

Surgery has traditionally been the primary treatment for symptomatic internal hemorrhoids. However, office-based interventions such as rubber band ligation (RBL) are increasingly used for Grades 1–3 hemorrhoids. Flexible endoscopic RBL offers a minimally invasive alternative, whereas surgery remains standard for Grade 4. To compare the effectiveness of flexible endoscopic RBL versus surgical hemorrhoidectomy in managing symptomatic Grades 1–3 internal hemorrhoids, focusing on bleeding control, pain, recovery time, and recurrence. A comparative study of 55 patients treated with flexible endoscopic RBL (using Olympus kits) and 55 matched patients undergoing conventional excisional hemorrhoidectomy (open technique). Patients choose their treatment after counseling. Outcomes were assessed over 1 year, with follow-up at 1 week, 3, 6, and 12 months. Pain was measured using a Visual Analog Scale (≥4 defined significant pain). Statistical analysis used a statistical package for the social sciences v26 (t-tests for continuous variables, Chi-square for categorical; $P < 0.05$ significant). Both groups showed comparable efficacy: Bleeding control (95% vs. 93%), mucosal prolapse resolution (96% vs. 97%), and 1-year recurrence (30% vs. 29%). RBL had superior post-procedural outcomes: Lower pain (10% vs. 90%), fewer work absences (5% vs. 95%), and no bed-boundness (0% vs. 100%; all $P < 0.05$). Flexible endoscopic RBL is as effective as surgery for Grades 1–3 hemorrhoids but significantly reduces pain, recovery time, and work absenteeism. RBL should be considered a first-line option for eligible patients.

Index Terms: Rubber Band Ligation, Internal Piles, Hemorrhoidectomy

1. INTRODUCTION

Hemorrhoidal disease is the leading condition affecting the rectum and anal canal, with a global prevalence ranging from 2.9% to 27.9%, where more than 4% of cases are symptomatic [1], [2]. Approximately one-third of these individuals consult physicians for guidance. The age distribution follows a Gaussian curve, peaking between 45 and 65 years and tapering off after 65 years [1]. Men are more commonly affected than women [3]. Hemorrhoids are believed to result from the downward displacement of vascular cushions caused by a disrobing of the supporting suspensory Treitz's muscle [3]. Several factors, such as a low-fiber diet, prolonged straining, constipation, diarrhea, and hard stools, can trigger hemorrhoidal symptoms [3]. Symptoms may include rectal bleeding, prolapse of the hemorrhoidal cushions, pain due to thrombosis, itching-related discomfort, mucus discharge, and fluid incontinence. Internal hemorrhoids are categorized into four degrees based on the extent of prolapse: First-degree (non-prolapsing), second-degree (prolapsing during straining but reducing spontaneously), third-degree (prolapsing during straining and requiring manual reduction), and fourth-degree (permanently prolapsed) [4]. Notably, the severity of symptoms does not

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always align with the degree of hemorrhoids. Treatment options for symptomatic hemorrhoids have evolved over time, encompassing conservative medical management, non-surgical methods, and various surgical techniques, including stapled hemorrhoidopexy. Medical interventions such as recommending a high-fiber diet and bulk-forming agents can effectively prevent constipation and the associated complications of hemorrhoids [5]. In addition, numerous commercial ointments are available for symptomatic relief, although evidence supporting their efficacy is limited [6]. Phlebotonics, such as flavonoids, are also used. Non-surgical treatments include rubber band ligation (RBL), injection sclerotherapy, cryotherapy, infrared coagulation, laser therapy, and diathermy coagulation – all of which can be performed as outpatient procedures without anesthesia. These non-surgical methods are considered the gold standard for managing grade one to three (grade I-III) hemorrhoids [7]. Among all the non-surgical procedures, RBL stands out as the most effective in terms of patient compliance, long-term success, and minimal side effects [7]. RBL is a straightforward, quick, and cost-effective outpatient procedure first introduced by Blaisdell and later refined by Barron [7]. The procedure involves applying rubber bands to an insensitive area just above the dentate line, with up to three bands applied in one session, which can be safely repeated after 4–6 weeks. Various techniques, including endoscopic ligation, are used for band application, but the suction method is the most common. Studies report success rates for RBL ranging from 69% to 94% [8]. RBL has a low complication rate of <2%. Possible complications include vasovagal syncope, anal pain, minor bleeding, chronic ulceration, priapism, difficulty urinating, thrombosis of external hemorrhoids, and, in rare cases, severe complications such as massive bleeding or pelvic sepsis [8]. If conservative measures fail to alleviate symptoms, patients are referred to a surgeon for operative management. Surgical treatment is indicated for cases with significant external components, hypertrophied papillae, associated fissures, extensive thrombosis, or recurring symptoms after repeated RBL.

Post-hemorrhoidectomy pain is the most common challenge associated with surgical interventions. Early complications include urinary retention (20.1%), bleeding (secondary or reactionary) (2.4–6%), and subcutaneous abscesses (0.5%). Long-term complications can include anal fissure (1–2.6%), anal stenosis (1%), incontinence (0.4%), fistula formation (0.5%), and hemorrhoid recurrence [9]–[11]. This study aimed to compare the effectiveness, post-operative outcomes, and recurrence rates of flexible endoscopic RBL versus surgical hemorrhoidectomy in patients with symptomatic Grade 2 and 3 internal hemorrhoids, with a focus on bleeding control, pain, recovery time, and long-term recurrence.

2. METHODS

A cross-sectional comparative study was conducted from January 2021 to March 2024 in Sulaymaniyah, Iraq, across public and private hospitals of 55 patients with symptomatic internal hemorrhoids of Grades 1–3 treated with flexible endoscopic RBL using the rubber band kits of Olympus company containing six rubber bands pre-loaded on plastic cups. The outcome of these patients was compared with another 55 patients, matched for most of their characteristics, and treated with conventional excisional hemorrhoidectomy (open surgical technique). The patients were free to choose one of the two above options after a good explanation of the characteristics, effectiveness, possible adverse events, and recurrence rates of both methods, depending on available literature. The duration of follow-up of both patient groups was 1 year. Patients were assessed at 1 week, 3 months, 6 months, and 12 months post-intervention for bleeding, prolapse, pain, and recurrence through clinical examination. Post-operative pain was evaluated using a Visual Analog Scale (VAS) ranging from 0 (no pain) to 10 (worst imaginable pain). Pain scores were recorded at 6-, 24-, and 48-h post-intervention. Patients reporting a VAS score ≥4 were categorized as having significant pain (10% in RBL vs. 90% in surgery groups, respectively). We used a flexible gastroscope of Olympus type 160 and a rubber band Ligator kit of Olympus type of the same used for banding esophageal varices. Statistical analysis used *Statistical Package for the Social Sciences (SPSS) v26;* continuous variables were analyzed with Student's t-test, and categorical outcomes with Chi-square tests. Significance was set at $P<0.05$.

3. RESULTS

Characteristics of both groups of patients showed no

TABLE 1: Characteristics of both patient groups: band ligation group and surgery group

Characteristics	Band ligation group	Surgery group	*P*-value
Age	38.2±8.5	39.1±9.2	0.62
Sex M/F	30/25	32/23	
Smoking	15/55	17/55	
Obesity (BMI ≥30)	5/55	10/55	
Benign prostatic hyperplasia	1/55	1/55	
Constipation	40/55	41/55	

BMI: Body mass index

statistically significant differences, as shown in Table 1.

Table 2 shows the difference between the two intervention groups regarding the outcome of the intervention, showing no statistically significant difference in intervention outcomes, namely bleeding (95% vs. 93%), symptomatic mucosal protrusion (96% vs. 97%), and 1-year recurrence rate (30% vs. 29%).

Table 3 shows a statistically significant difference between the two intervention groups in favor of band ligation including post-operative pain (10% vs. 90%), work absence (5% vs. 95%), and 1 week bed-boundness (0.00% vs. 100%).

Pain percentages reflect patients with VAS ≥4 (see methods for details).

4. DISCUSSION

There has been growing interest in the use of non-invasive, non-surgical management of symptomatic hemorrhoids as in other conditions in which surgery was the main approach because surgical hemorrhoidectomy typically requires anesthesia (general, spinal, or local), and unlike office-based RBL, it involves tissue excision, which increases post-operative pain and recovery time. Many office-based hemorrhoidal interventions use specific office instruments such as banding by rigid instruments and laser therapy by special probes [1]–[3]. The use of flexible endoscopy to do band ligation for internal piles provides flexibility to see and ligate all the hemorrhoid columns. In addition, the flexible scope can do ligation in the retroflexed and forward approach [12]. We performed this study on two groups of patients, each including 55 patients with symptomatic internal hemorrhoids, to compare their effectiveness and adverse events.

TABLE 2: Difference in outcomes between the two intervention groups

Interventions outcomes	Band ligation(%)	Surgery(%)	*P*-value
Bleeding control	95	93	>0.05
Mucosal protrusion disappearance	96	97	
1-year recurrence	30	29	

TABLE 3: Rate of complication of both groups

Complications	Band ligation(%)	Surgery(%)	*P*-value
Pain	10	90	<0.05
Work absence	5	95	
1-week bed boundness	0.00	100	

There was no statistically significant difference in the patient characteristics of both groups, such as age, sex, smoking status, obesity, prostatic enlargement, and obesity, to negate any effects of the comparison results. The literature review shows the effect of these variables on the incidence of hemorrhoids [1]. There were no statistically significant differences in the effectiveness of both interventions in controlling the symptoms of internal piles of Grades 1–3, such as bleeding, mucosal prolapse, and 1-year recurrence. It shows that both interventions control similarly both bleeding and mucosal prolapse, and interestingly each intervention has the same recurrence rate of around one-quarter to one-third of patients. Other studies and reviews confirm our findings, especially the recurrence rate [1]–[3]. Recurrence rates of hemorrhoids after any intervention are common if the causative or aggravating factors are not controlled, such as constipation, smoking, and prostatic enlargement, which are most of the time difficult to control [5].

There were statistically significant differences between the two interventions regarding post-intervention pain, work absence, and 1-week bed-boundness in favor of band ligation. Other studies confirmed these results, especially pain, which rarely occurs with band ligation as they are painless unless some bands are misfired and ligated columns above the dentate line which is a very painful area [9], [10]. A Cochrane review states that RBL should be preserved for Grade 2 and then surgery if this fails [1].

5. CONCLUSION

Comparing flexible endoscopic RBL and surgery, there was no significant difference in controlling symptomatic Grades 1–3 internal hemorrhoids, namely bleeding, mucosal protrusion, and 1-year recurrence, while there were significant differences in post-interventional pain, work absence, and ambulance being in favor of band ligation.

6. RECOMMENDATIONS

We recommend flexible endoscopic RBL for symptomatic Grades 1–3 included after a good explanation of the available

approved information on the available options for managing them.

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