Endoscopic hemorrhoidal ligation of symptomatic internal hemorrhoids

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Background: This study assessed the efficacy of endoscopic hemorrhoidal ligation for treatment of patients with symptoms caused by internal hemorrhoids.

Methods: A total of 576 consecutive patients with symptoms caused by internal hemorrhoids were enrolled in the study. Symptoms were rectal bleeding (239 patients) and prolapse (337 patients). The severity of the hemorrhoids was classified by using the grading system of Goligher.

Results: All patients were treated by the same operator. Mean follow-up was 17.5 months (range 8 to 24 months). The mean number of band ligations per session was 2.86. The mean number of treatment sessions was 1.24. At least one grade reduction in the severity of the hemorrhoids was achieved in most patients (93.58%). Moreover, rectal bleeding was controlled in 228 patients (95.4%), and rectal prolapse was reduced in 310 patients (91.99%). After treatment, 85 patients experienced anal pain, 37 had mild bleeding, 4 developed external hemorrhoidal thrombosis, and one had a peri-anal abscess. The latter 5 patients were treated surgically and recovered uneventfully.

Conclusions: Endoscopic hemorrhoidal ligation is a simple, safe, and effective treatment for patients with symptoms caused by internal hemorrhoids. (Gastrointest Endosc 2003;58:871-4.)

A wide variety of methods have been used over many decades for treatment of hemorrhoids. Injection sclerotherapy, infrared and laser photocoagulation, cryosurgery, direct application of electrical current, and rubber band ligation all lead to ablation of hemorrhoids unresponsive to conservative management.1 Internal hemorrhoids can be graded into 4 stages by using the system of Goligher: grade 1, hemorrhoids with bleeding; grade 2, hemorrhoids with bleeding and protrusion, with spontaneous reduction; grade 3, hemorrhoids with bleeding and protrusion that require manual reduction; grade 4, hemorrhoids with prolapse that cannot be replaced.2 First introduced in the United States in 1951, rubber band ligation has become the mainstay of treatment for bleeding and prolapsing internal hemorrhoids.3,4 Rubber band ligation is now a well-established, safe, and effective technique.5 It has been shown to be substantially better than medication alone in terms of outcome and is not associated with significant morbidity.6 Conventional band ligation is performed with rigid anoscopic devices with limited maneuverability and a narrow field of view, and no ability to document treatment photographically.7 These deficiencies can be overcome by using a videoendoscopic system that provides a detailed image of the operative field as well as photographic capability.8 This study assessed the safety and efficacy of rubber band ligation by using a videoendoscopy system for treatment of patients with symptoms caused by internal hemorrhoids.

PATIENTS AND METHODS

A total of 576 consecutive patients with grade 2 to 4 internal hemorrhoids, presenting with rectal bleeding and/or prolapse unresponsive to medication, were treated with one or more sessions of endoscopic hemorrhoidal ligation from November 2000 to March 2002. Rectal bleeding was the chief complaint of 239 patients: 197 had bleeding combined with rectal prolapse; 41, anemia cause by chronic hemorrhoidal bleeding; 173, intermittent dripping of blood from the anal area; and 25 had noted blood intermittently on toilet tissue. Rectal prolapse requiring manual reduction was the major complaint of 337 patients, 311 of whom also had intermittent mild rectal bleeding. All patients underwent flexible sigmoidoscopy or colonoscopy to exclude other causes of bleeding per rectum. Patients were excluded if a polyp(s) or cancer was found at colonoscopy. All patients gave informed consent for the ligation procedure. The study protocol was approved by the
institutional review board of medical ethics and the human clinical trial committee of our hospital. Patients were not asked to discontinue the use of aspirin or other non-steroid anti-inflammatory medication before the procedures. After the endoscopic examination, patients were treated if grade 2 or larger internal hemorrhoids were present. As with esophageal variceal ligation, a transparent plastic endoscopic ligation cap (Sumitomo Co., Tokyo, Japan) was attached to the top of a diagnostic upper endoscope (GIF-XQ230; Olympus Optical Co., Ltd., Tokyo, Japan). The dentate line then was identified, and ligation was performed 2 to 5 mm above the dentate line (Fig. 1). The hemorrhoid was suctioned into the cap with the tip of the endoscope in the anal canal, and a single elastic band was released. If further ligation was required, another rubber band was placed on the cap. Recto-anal retroverted endoscopic views before and after ligation of internal hemorrhoids are shown in Figures 2 and 3. All ligations were performed in the outpatient setting.

Safety data were recorded; all adverse events were documented. Patients were seen 1 week later and then monthly, with sigmoidoscopy. If residual hemorrhoids were noted or symptoms persisted, further treatments were conducted monthly. The end point of treatment was to achieve grade 1 hemorrhoids. In all cases, hemorrhoid severity was assessed 6 months after the first ligation session.

RESULTS

The ligation procedure was completed in less than 10 minutes in all cases. A mean of 2.86 bands were placed per session. The mean number of sessions was 1.24 (range 1-5) (Table 1). Mean follow-up was 17.5 months (range 8-24 months).

The clinical grades of the internal hemorrhoids before and at 6 months after therapy are shown in Table 2. A reduction of at least one grade was achieved in most patients (93.58%).

Eighty-five patients had mild anal pain after treatment; pain was relieved by orally administered mefenamic acid. Mild bleeding occurred in 37 patients and was treated by injection of a dilute solution of epinephrine (1:100,000). From 1 to 3 mL in divided doses was injected directly into the wound; this resulted in only mild anal pain. After ligation, external hemorrhoidal thrombosis developed in 4

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**Table 1. Ligation bands per session and treatment sessions per patient**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Treatment sessions</th>
<th>Ligation bands per session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>531 (92)</td>
<td>18 (3)</td>
</tr>
<tr>
<td>2</td>
<td>27 (5)</td>
<td>99 (15)</td>
</tr>
<tr>
<td>3</td>
<td>12 (2)</td>
<td>489 (75)</td>
</tr>
<tr>
<td>4</td>
<td>4 (1)</td>
<td>37 (6)</td>
</tr>
<tr>
<td>5</td>
<td>2 (0)</td>
<td>4 (1)</td>
</tr>
</tbody>
</table>

*Data expressed as no. (%); Total number of treatment sessions is 647.*
patients, and one patient developed a peri-anal abscess. These 5 patients were treated surgically and recovered uneventfully.

Six months after ligation, 11 patients continued to experience anal bleeding during defecation. Thus, bleeding was controlled in 95.4% of patients. Twenty-seven patients continued to have anal prolapse that required reduction. The success rate for control of prolapse was, therefore, 91.99%. All of these 38 patients with persistent symptoms were referred for further surgical therapy. The proportion of the patients who reported satisfaction with the results of treatment was 96.2%. The 1-year recurrence rate was 3.3% (18 patients). Recurrent symptoms included bleeding (12 patients) and rectal prolapse (6 patients).

DISCUSSION

Hemorrhoids are the most prevalent anorectal disorder among adults. Over 90% of patients undergoing sigmoidoscopy or colonoscopy have hemorrhoids of varying degrees. Hemorrhoids are defined as internal and external according to whether they are located above or below the dentate line. Many non-surgical options are available for treatment.

Nonoperative management is considered for patients with symptoms (anal bleeding or rectal prolapse) and grade 1, 2, and 3 internal hemorrhoids. These include local injection therapy, anal divulsion, elastic band ligation, cryotherapy, infrared coagulation, laser photocoagulation, direct application of electrical current, and bipolar coagulation. Based on the results of a meta-analysis, MacRae and McLeod\(^7\) concluded that rubber band ligation should be recommended for grade 1 to 3 internal hemorrhoids and that patients treated by this method were less likely to require additional therapy than those treated with local injection therapy or infrared coagulation. Ligation is preferred to local injections or cryotherapy in the absence of concomitant anal disease, such as anal fissure, fistula, or papillomas.\(^10,11\)

Rubber band ligation has been used to treat internal hemorrhoids since Blaisdale introduced a ligation device in 1951. This device is used via an anoscope. Hemorrhoidal tissue is grasped with small prongs and an elastic band is applied. The hemorrhoid and its redundant mucosal tissues become thrombosed and slough, usually within 5 to 7 days. One notable advantage of band ligation is the production of submucosal scarring that prevents subsequent development of new hemorrhoidal tissue. Rubber band ligation technically is simple and can be used in the outpatient setting without local anesthesia. The success rate varies between 69% and 97%, depending on the degree of internal hemorrhoids, the ligation technique, and the duration of follow-up.\(^6\)

Serious complications, such as life-threatening massive bleeding\(^12,13\) and sepsis, are extremely rare, but should not be discounted.\(^14,15\) Dickey and Garrett\(^16\) found that hemorrhoidal banding by using videoendoscopic anoscopy and a single-handed ligator compared favorably with traditional hemorrhoid banding by anoscopy. This video endoscopic technique may be preferred in the office setting.

Stiegmann and Goff\(^17\) first proposed elastic band ligation for the treatment of esophageal and gastric varices by using a device attached to the tip of a videoendoscope to deploy the bands. Endoscopic band ligation of esophageal varices now is preferred to sclerotherapy because of equivalent efficacy, ease of use, and relatively fewer complications.\(^18,19\) The application of the same device and technique to eradicate internal hemorrhoids is a logical extension of this established procedure. Trowers et al.\(^8\) reported preliminary experience with endoscopic hemorrhoidal ligation in 1997 in which 95% of internal hemorrhoids were reduced by more than one grade after therapy. Berkelhammer and Moosvi\(^20\) used retroflexed endoscopic band ligation to treat bleeding internal hemorrhoids. Excellent results were achieved in 80% of patients with grade 2 hemorrhoids. In addition, the result with treatment of patients with grade 2 hemorrhoids was more likely to be excellent compared with that for patients with grade 3 hemorrhoids.\(^20\)

The present study used an esophageal variceal ligation device and an upper endoscope for ligation of internal hemorrhoids. This approach is simple, the outcome of treatment was good, and complications were few. A reduction in hemorrhoid grade by at least one was achieved in over 90% of patients. Furthermore, rectal bleeding was controlled for most patients or an improvement in rectal prolapse was noted after therapy. Although external hemorrhoidal thrombosis occurred in 4 patients and a peri-anal abscess developed in another, all of these patients recovered after surgical treatments. Studies have demonstrated that deployment of up to 3 bands per

<table>
<thead>
<tr>
<th>Grade</th>
<th>Before treatment (n = 576)</th>
<th>After treatment (n = 576)</th>
<th>p Value (paired t test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>73 (13)</td>
<td>8 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3</td>
<td>302 (52)</td>
<td>19 (3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2</td>
<td>201 (35)</td>
<td>135 (24)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1</td>
<td>0 (0)</td>
<td>414 (72)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
session is safe.\textsuperscript{21,22} The patients in the present study had from one to 5 bands placed without adverse consequences. The 1-year recurrence rate was only 3.3%, significantly better than that achieved in other published studies (9\%-22\%).\textsuperscript{11,23}

In conclusion, endoscopic hemorrhoid ligation is an important advance in the treatment of patients with symptoms caused by internal hemorrhoids. Endoscopic hemorrhoidal ligation is simple, safe, and effective. Multiple bands can be applied in one session, and further bands can be applied at subsequent sessions if a single session fails to completely eradicate the internal hemorrhoids. The treatment success rate is high, and the long-term recurrence rate is low.

REFERENCES