Treatment of Grade 2 and 3 Hemorrhoids with Doppler-Guided Hemorrhoidal Artery Ligation

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Key Words

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Abstract

Aim: We evaluated the results of the Doppler-guided hemorrhoidal arterial ligation (DG-HAL) method in the management of symptomatic grade 2 and 3 hemorrhoids. **Patients and Methods:** Between June 2005 and March 2006, 110 consecutive patients with symptomatic grade 2 and 3 hemorrhoids according to the DG-HAL method were treated. All procedures were performed in daycare under spinal anesthesia. The primary objective was the reduction in hemorrhoidal gradation as determined by proctoscopy; the secondary was patient satisfaction. This was measured by interviewing patients over the telephone. **Results:** The average age was 47.6 years. 42 patients had grade 2 hemorrhoids, 68 grade 3. An average of 7.3 ligations were placed. Proctoscopy showed that, after 6 weeks, 97 (88%) patients had a significant improvement in their hemorrhoidal gradation. After an average follow-up of 37 weeks, 93 of the 110 (84.5%) patients were satisfied with the postoperative result. Mortality was 0% and morbidity 3%. **Conclusion:** DG-HAL is a safe and effective treatment in the management of symptomatic grade 2 and 3 hemorrhoids.

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Introduction

Hemorrhoids are a common disease in the western world. The incidence is estimated at 8%, the prevalence at 10%. The male:female ratio is 1:4 [1]. Although many treatment modalities have been described in the literature, there is no golden standard in treatment. The lack of consensus is partially based on the fact that the indication to treat is based on the subjective severity of the symptoms, while the choice of treatment is based on the gradation of the hemorrhoids and local experience [2, 3].

Traditionally, the initial treatment for grade 1, 2 and 3 hemorrhoids is conservative management (fiber-rich diet and better defecation discipline) [1, 4]. If symptoms prevail, there is a wide range of treatment modalities. Injection sclerotherapy is an outpatient procedure that stops the bleeding and has a low rate of complications. However, it is not helpful in treating a prolapse. Its main disadvantage is its low efficaciousness [4, 5]. Infrared coagulation is another outpatient procedure. There are usually few complications, but it is not very effective against prolapse. The results of infrared coagulation on non-prolapsing hemorrhoids appear to be better than with injection sclerotherapy [6]. An outpatient treatment that seems to be more effective for both bleeding and prolapse is rubber banding. Meta-analyses have shown that rubber

Fig. 1. a Disposable proctoscope with the Doppler transducer on the tip. **b** The proctoscope connects to the Doppler device and produces easily recognizable acoustic signals.

banding is more effective in both the short and long term compared to photocoagulation and infrared coagulation. Overall, it appears that between 60 and 80% of patients who have undergone banding are satisfied with the outcome [6–9]. However, this procedure also has disadvantages. One that is often reported is the posttreatment pain. Finally, a form of hemorrhoidectomy (open, closed or stapled) is still used by some as a primary treatment option. Hemorrhoidectomy is associated with more pain and morbidity than rubber banding. This treatment is generally reserved for persistent grade 3 and 4 hemorrhoids [1, 10, 11].

In the past decade, a new method was introduced in which the arterial blood supply of the hemorrhoidal plexus are bound with ligatures. The superior hemorrhoidal plexus is supplied with blood by the superior rectal artery [12]. Hemorrhoids occur when there is an imbalance in the blood flow of this plexus, with either an increased arterial inflow, or a decreased venous drainage. Doppler-guided hemorrhoidal arterial ligation (DG-HAL) was first described in 1995. By combining a proctoscope with a Doppler transducer, it became possible to detect the arterial inflow of the plexus and selectively ligate the vessels. By reducing the inflow, the plexus diminishes and the hemorrhoids shrink [13]. This seems especially effective in grade 2 and 3 hemorrhoids [14].

In this study, we describe the results of the DG-HAL technique in the treatment of grade 2 and 3 hemorrhoids.

Patients and Methods

Our aim was to evaluate the results of the DG-HAL method in the management of symptomatic grade 2 and 3 hemorrhoids. All patients with symptomatic grade 2 and 3 hemorrhoids were eligible for a DG-HAL procedure. The outpatient procedure was performed in daycare under spinal anesthesia. Three hours prior to surgery, the patients received a phosphate enema. We used the DG-HAL system from AMI. Figure 1a shows the disposable proctoscope with the Doppler transducer on the tip. There is an opening slightly distally from the transducer through which the ligature can be placed in the tissue. The proctoscope connects to the Doppler device and produces easily recognizable acoustic signals (fig. 1b). After an arterial signal is detected, it is ligated. After ligation, the absence of an arterial signal on that spot is confirmed with the Doppler transducer. Three full circles with the proctoscope are performed in the rectal canal with the proctoscope and every arterial signal is ligated. The ligations were performed with a vicryl stitch especially made for this procedure (AMI HAL suture, 2/0 vicryl, tapered needle, 5/8 circumference, reinforced needle-thread connection). All patients were evaluated with a proctological examination 6 weeks postoperatively. Further evaluation was performed by telephone. The pre- and postsurgery examinations, as well as the procedure itself, were done by a selected group of doctors with extensive experience in proctology. The primary objective of this study was the postoperative hemorrhoidal graduation. The secondary objective was patient satisfaction.

Statistical Analysis

Analysis was performed with the SPSS Statistical Package version 12.0 (SPSS Inc., Chicago, Ill., USA) and Excel 2000 (Microsoft, Redmond, Wash., USA). Comparison of pre- and postoperative hemorrhoid grading was performed using the Wilcoxon matched pairs rank sum test. $p < 0.05$ was considered significant.

Results

In the period June 2005–March 2006, 110 patients underwent a DG-HAL procedure. The average age was 47.6 years (median 46, range 25–80, interquartile range 18.5). The male:female ratio was 64:46. 42 patients had grade 2 hemorrhoids, 68 had grade 3. Ten patients received a second DG-HAL procedure. An average of 7.3 ligations were placed (median 7, range 1–16). Analysis did not reveal a preferred location for the ligations; they were equally distributed along the circumference of the rectal canal. The average procedure duration was 16 min (range 12–23). A postoperative evaluation was performed by proctoscopy after 6 weeks. 97 (88%) patients had an improvement in their hemorrhoidal gradation, a significant result ($p < 0.001$, Wilcoxon signed ranks test). Postoperatively, 46 patients (42%) no longer had hemorrhoids (grade 0), 42 (38%) had grade 1, 12 (11%) had grade 2, 9 (8%) grade 3, and 1 (1%) had grade 4 hemorrhoids (table 1).

Further follow-up was done by an enquiry by phone. After an average follow-up of 37 weeks (median 35, range

22–58), 93 of the 110 (84.5%) patients were satisfied with the postoperative result. Ten patients underwent a second DG-HAL procedure after 3 months. Nine of these patients were unsatisfied after the first procedure because of persistent prolapse; 1 patient complained of persistent bleeding. After the second procedure, 4 were still unsatis-

Table 1. Gradation of hemorrhoids before and after surgery

	Before surgery				
	0	1	2	3	4
After surgery					
0			22	24	
1			17	25	
2			3	9	
3				9	
4				1	
Improvements are shown in bold.					

Table 2. Results of the patients who underwent a second DG-HAL

Sex	Age	Grade pre- → postoperative	Result after 1st procedure	Result after 2nd procedure
M	37	1st procedure: 2 → 2 2nd procedure: 3 → 1	unsatisfied (persistent prolapse)	satisfied
F	62	1st procedure: 3 → 3 2nd procedure: 3 → 1	unsatisfied (persistent prolapse)	satisfied
F	41	1st procedure: 3 → 3 2nd procedure: 3 → 2	unsatisfied (persistent prolapse)	unsatisfied (persistent prolapse)
M	45	1st procedure: 3 → 3 2nd procedure: 3 → 2	unsatisfied (persistent prolapse)	satisfied
M	80	1st procedure: 3 → 3 2nd procedure: 3 → 3	unsatisfied (persistent prolapse)	unsatisfied (persistent prolapse)
M	56	1st procedure: 3 → 3 2nd procedure: 3 → 1	unsatisfied (persistent prolapse)	satisfied
M	44	1st procedure: 3 → 3 2nd procedure: 3 → 3	unsatisfied (persistent prolapse)	unsatisfied (persistent prolapse)
F	49	1st procedure: 3 → 1 2nd procedure: 2 → 1	unsatisfied (persistent bleeding)	unsatisfied (persistent bleeding)
F	39	1st procedure: 3 → 1 2nd procedure: 2 → 1	unsatisfied (persistent prolapse)	satisfied
M	57	1st procedure: 3 → 2 2nd procedure: 3 → 0	unsatisfied (persistent prolapse)	satisfied

fied (3 because of prolapse and 1 because of bleeding). Eight of the 9 patients who underwent a second procedure for persistent prolapse were grade 3 patients (table 2). No significant correlation was found between the post-treatment result and the number of ligations placed, nor was a significant correlation found with the surgeon who performed the procedure or with operating time.

All patients were treated in daycare; none of them needed to stay overnight. Seven patients complained of pain that prolonged longer than 2 days; no one had pain longer than 7 days. The pain was treated with ibuprofen (400 mg NSAID b.i.d.). Mortality was 0% and morbidity 3% (1× urinary retention, 1× anal fissure, 1× bleeding in a patient with inadequate dosage of anticoagulant therapy (INR >9)).

Discussion

In a meta-analysis of 18 prospective randomized trials, rubber banding was found to be the most effective of the in-office procedures. It is associated with a lower recurrence rate, but more overall pain than sclerotherapy or infrared coagulation. In the studies described, an average of 13% of patients complained of postprocedural pain after rubber banding (range 0–60%) [7]. The re-treatment rate for rubber banding varies widely. A systematic review revealed an overall 40% re-treatment rate for rubber banding (range 17–86%) [2, 15].

The surgical procedures for the treatment of hemorrhoids seem to be more effective, with reported re-treatment rates of 0–20% [2, 7]. Unfortunately, the postprocedural pain for surgical hemorrhoidectomy is a major disadvantage. Patients report significantly more pain after surgical hemorrhoidectomy compared to rubber banding [7].

DG-HAL is a relatively new treatment modality. Although the procedure has been performed under local anesthesia using xylocaine gel, we opted for spinal anes-

thesia [13]. This allows plenty of time to carefully detect and ligate all arterial signals without any patient discomfort. The procedure itself is easy to learn and takes only 15 min to perform. In our study, 88% of the patients had an improvement in hemorrhoidal gradation and 85% were satisfied with the result of the treatment. Although the follow-up period was relatively short, these results confirm those of other studies. Scheyer et al. [14] reported that 80% of their patients were free from pain and bleeding after a median 18 months of follow-up. However, about 40% were reported to have recurrent hemorrhoidal piles. Greenberg et al. [16] report 89% asymptomatic patients and an 11% re-treatment rate after 1 year follow-up. A randomized trial comparing hemorrhoidectomy and DG-HAL found no difference between recurrence rates in preoperative symptoms at 1 year follow-up [17].

The standard treatment for grade 2 and 3 hemorrhoids at our institution used to be rubber banding. In our experience, more than three rubber bands placed in one session gives discomfort to the patient. The relation between discomfort and number of bands placed has been both confirmed and denied in previous studies [18, 19]. In our study, only 6% of the patients complain of pain after the procedure.

In our study, 88% of patients had posttreatment improvement and patient satisfaction was 85%. Furthermore, there were no complications or side effects due to the spinal anesthesia reported. The re-treatment rate was 9%, and a scant 6% of patients reported posttreatment pain. These results made us decide to use DG-HAL as the treatment of choice for symptomatic grade 2 and 3 hemorrhoids. In 2006 we began a randomized clinical trial to compare DG-HAL with rubber banding. Unfortunately, due to positive media coverage of DG-HAL, we were not able to obtain any informed consent for rubber banding. The trial has now stopped. We continue to follow our patient cohort and hope to report about the long-term follow-up in the future.

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