Doppler Guided Recto-Anal Repair -- A Combination of Haemorrhoidal Artery Ligation and Transanal Rectal Mucopexy for a Minimally Invasive Treatment of Haemorrhoidal Disease (All Grades)

Scheyer M, Antonietti E, Rollinger G, Arnold S
Department of General Surgery, State Hospital, A-6700 Bludenz, Vorarlberg, Austria
Running Title: Doppler Guided Recto-Anal Repair
Keywords: Haemorrhoid, Doppler, Minimally Invasive
Address for correspondence: Prof. Dr. med. Matthias Scheyer
Abteilung für Allgemeinchirurgie, Landeskrankenhaus Bludenz Spitalgasse 13
A-6700 Bludenz, Vorarlberg, Austria
T +43 (0)5522-603 T +43 (0)5522-603 200
E-mail: matthias.scheyer@bkz.at

Abstract
Haemorrhoidal disease is one of the most common diseases of the anal region, and 10% of patients require surgical intervention. We have performed haemorrhoidal artery ligation (HAL) at our department since 2000 and have further refined this technique through the introduction of Doppler guided recto-anal repair (RAR), a combination of HAL and transanal rectal mucopexy (TRM).

From January 2000 to July 2006, we performed HAL in 623 patients. Our results show a good success rate for haemorrhoidal treatment with high patient comfort in patients with grade II, grade III, and grade IV haemorrhoids. A recurring prolapse rate of 13% in grade III patients and a far too high rate of almost 60% in grade IV patients were, however, not satisfactory. Based on our own experience and references in the literature we developed RAR, a combination of Doppler guided HAL and TRM. A proctoscope, specially designed for this purpose, enables a standardised application of HAL and the use of continuous sutures for narrowing the prolapus. While Doppler guided HAL leads to a reduction of the blood flow and shrinkage of haemorrhoidal cushions, TRM results in a lifting of the prolapse. On the whole, this technique allows for the restoration of the normal anatomy through minimally invasive surgery with substantially reduced patient pain.

We report our first 72 Doppler guided RAR procedures. Our results show that this new minimally invasive procedure for the treatment of haemorrhoids of all grades achieves high patient satisfaction and a success rate of over 90%.

Introduction
Haemorrhoidal disease is multifactorial and one of the most common diseases in the civilised world. (1, 2).

Epidemiologic studies show that approximately 60% of people over the age of 50 have already suffered from haemorrhoids and stated either a genetic predisposition, bowel dysfunction, nutritional factors, or pregnancy as the most significant causes. In our civilisation, haemorrhoidal disease is one of the most common diseases with a prevalence of up to 4.4%. (3)

Surgical intervention is necessary in order to treat 5-10% of patients with existing symptoms. Depending on the grade of the disease, the spectrum of treatment options includes conservative therapies, medication for grade I patients, minimally invasive procedures, such as infrared coagulation, sclerotherapy, laser therapy, and cryotherapy, as well as invasive therapies, such as Milligan-Morgan haemorrhoidectomy. This procedure can still be considered the gold standard of invasive therapies; in contrast, stapled haemorrhoidectomy is not undisputed. HAL is a new, minimally invasive surgical technique within the spectrum of therapeutic procedures. It was first mentioned in 1995 in an article by Morinaga in the American Journal of Gastroenterology and has since...
found wide acceptance. (4)

We have used the HAL proctoscope developed by Morina since January 2000, and our initial results were first published in Chirurg (5) in 2002 and in the American Journal of Surgery (6) in 2006. HALS is used to locate the affected vessels in the haemorrhoidal cushions in order to influence the ratio of blood flow and drainage in the haemorrhoidal cushions. Selectiveligation of arteries results in a reduction of blood flow and causes the haemorrhoidal cushions to shrink. Caecotomisation shrinkage simultaneously causes the haemorrhoidal cushions to be lifted into the anal canal. Based on our experience, we adapted and further refined Morina’s proctoscope in order to better comply with sterilisation and technology standards.

Method

Patients are operated in lithotomy position following pre-surgical preparation either on an outpatient basis or in hospital. The rectum is emptied at least one hour preoperatively. Once the patient has received local anaesthesia and sedation, the sphincter is gently dilated up to a width of two fingers using a generous amount of Xylocain Gel. Subsequently, the HAL proctoscope is inserted. Starting at approximately 3-4 cm above the dentate line, the Doppler transducer is used to locate pulsations. When a pulsation is located, the vessel is single-ligated or double-ligated with a 5/8 needle and Vicryl 2.0, and a knot pusher is used to tie the ligature. All circumferential vessels located by Doppler guidance are ligated in this manner. The proctoscope is then slightly withdrawn, and a second line of circumferential vessels with detectable pulsations is ligated too. Care is taken to avoid the dentate line in order to exclude patient discomfort and pain. After this procedure, the proctoscope is removed completely. Patients are given analgesia in the case of postoperative pain. During the first few days, they receive laxatives for stool regulation, easier defecation, and in order to avoid straining.

Results

We started applying HAL in January 2000 and have performed this in over 600 patients to date. The results concerning the first 308 patients (169 male, 119 female), age range 22-84 years (median age: 50 years) were published in the American Journal of Surgery, as mentioned above.

We applied the following method: grade 1 patients received conservative therapy with Dafilon 500mg (2-3x1 tablet), while grade 3 and grade 4 patients underwent HAL (89 grade II patients, 192 grade III patients, and 27 grade IV patients). The majority of patients complained of bleeding and prolapsing piles (Table 1: Patients symptoms). Contrary to our expectations, we had to apply between 2-16 ligatures in order to sufficiently reduce the pulsations. The median was 6 ligatures with a significant difference according to the different grades. It was also possible to go through a learning curve of approximately 20 surgical interventions, which explains why we had such a relatively high number of ligatures (16 ligatures in grade one III patient). The higher the grade, the more ligatures we had to apply in order to achieve optimal results. We did not observe any intraoperative complications that prompted us to change our technique. All our patients had a 1-week and an 8-week postoperative follow-up by means of proctoscopy. Within this period, 28 of 308 patients (15.2%) received postoperative pain relief therapy with oral analgesics, such as Diclofenac 50mg (3x1 tablets). Average hospitalisation was 1.8 days. Twenty-five patients underwent secondary surgery and were released on the same day, and 167 patients were discharged on the 1st postoperative day 53 on the 2nd, and 28 on the 3rd postoperative day. The remaining 35 patients were treated by HAL in combination with other surgical procedures, which resulted in a longer hospitalisation. The total complication rate was 29%, including postoperative complications. It is noteworthy that none of the patients experienced any significant postoperative complications that affected them considerably. None of the patients required a redo procedure due to complications (Table 2.), with the exception of grade III and grade IV patients with recurrent prolapse.

| Table 2 Postoperative complications |
| No major complications |
| Total/108 | III/89 | III/19 | V/27 |
| Residual prolapses | 48 (15.6%) | 6 (7.0%) | 3 (15.8%) | 1 (3.9%) |
| Bleeding | 15 (16.8%) | 2 (2.2%) | 2 (10.5%) | 1 (3.9%) |
| Thrombosis | 9 (9.9%) | 1 (1.1%) | 1 (5.3%) | 0 |
| Defecation pain | 5 (5.6%) | 1 (1.1%) | 2 (10.5%) | 0 |
| Fissure | 4 (4.4%) | 1 (1.1%) | 1 (5.3%) | 0 |
| Urinary retention | 4 (4.4%) | 0 | 1 (5.3%) | 0 |
| Urinary infection | 2 (2.2%) | 0 | 1 (5.3%) | 0 |
| Stool retention | 1 (1.1%) | 0 | 1 (5.3%) | 0 |
| Fetus | 1 (1.1%) | 0 | 0 | 0 |
| Proctitis | 35 (32.6%) | 0 | 0 | 0 |
| Total Complication Rate | 29.00% | 13.30% | 10.30% | 49.40% |

First long-term results

Our first 133 patients had postoperative follow-ups between 01/2000 and 06/2001 (Table 3.), and 60% of these patients responded to our inquiry and underwent another proctoscopy at our hospital. The patient group included 17% grade II 24% former grade III and 9% former grade IV patients who had undergone HAL once.

Asking about a tendency towards bleeding, 78.7% of patients confirmed that they no longer experienced any bleeding. Irregular bleeding that occurred once a week was reported by 10% of patients, while regular bleeding was reported by 11%. We did not observe any recurring prolapse in 73.7% of patients, although this also includes patients with prolapsing grade III and grade IV nodules. There were rare cases of prolapse in 11.2% of patients, and 15% of patients reported repeatedly recurring prolapsing piles. Including other symptoms, we achieved a symptom-free success rate of 79.4% during a period of 18 months. In a patient inquiry, 91.2% of patients confirmed they would again ask for this type of surgery if they experienced the same problems. Over 93% of patients would highly recommend this surgical technique to a friend. The stress induced by the procedure was considered to be practically non-existent or only minor by 90% of patients. Concerning the technique, 86% of patients stated they were satisfied or highly satisfied, respectively. These results have also been confirmed in the literature published on HAL to date.

The development from HAL to RAR according to Scheyer

We have performed HAL at our department in 600 patients to date and have not observed any major complications. As prolapse recurrence, however, had continued to remain relatively frequent (17% and 51%, respectively) in grade III and grade IV patients, we consequently reassessed our surgical technique and came across the surgical technique known as anoscopic, which is described in varying ways in the literature. (10,
The HAL proctoscope was adapted to apply anorectal travel in a standardized procedure. This enabled us to perform both HAL and mucosectomy according to the anorectal technique, while avoiding the dentate line. For this purpose, the proctoscope was provided with a slotted window, which is primarily closed during HAL. A protecting cylinder is turned on and gradually opens the slotted window from proximal to distal and thus enables the surgeon to place a continuous longitudinal suture in the lower third of the rectum, a procedure that we have called “transanal rectal mucosectomy” (TRM). This continuous suture can be placed repeatedly according to the extent and number of prolapsing piles (Figure 1. Diagram 1).

First results after RAR according to Scheyer

During the past two years we have performed 548 RAR, a combination of HAL and TRM, in 72 patients. All of them primarily underwent conventional HAL with 3–12 ligations. In addition, we placed continuous sutures to the prolapses as described above. Our patient group of 72 included 53 grade III patients with prolapse (according to the classification by Collighan) and 19 grade IV cases with circumferential prolapse. Corresponding to our results using HAL, we performed 5–8 haemorrhoidal artery ligations on average.

The number of mucoperiosteal sheets varied between 1 mucoperiosteal sheet in 41 patients, 2 such sheets in 12 patients, 3 in 14 patients, 4 in 4 patients, and 5 in 1 patient. The distribution from several sutures to a single mucoperiosteal sheet is the result of a learning curve, which explains the relatively high number of mucoperiosteal sutures in some of the 72 patients.

Results:

During the first 3.5 days, 20 patients (27.8%) required analgesics to relieve pain. Postoperative complications occurred in 64 patients (9.1% of all patients). Considering a mucosal procedure, or change the technique.

In our patient group, the combination of HAL and TRM according to D-G RAR has therefore resulted in a distinct improvement of short-term results in grade III and grade IV patients. After RAR, 93% of grade II, grade III, and grade IV patients did not show any symptoms of haemorrhoidal bleeding or prolapse. Our results confirm our opinion that D-G RAR, the combination of HAL and TRM, is a highly promising, minimally invasive procedure for treating haemorrhoidal disease of all grades with a concomitant low complication rate and absence of any major intraoperative or postoperative complications. RAR is a surgical treatment option for patients with haemorrhoidal disease and is, furthermore, almost painless, requires only a short hospital stay, involves low costs, and is easy to learn.

Nevertheless, we should also point out that RAR, in particular, is a new surgical technique, which has provided us with initial experiences to date. Our experiences have, however, been confirmed by other centres, which have formed an international study group to present scientifically valid evidence concerning this surgical technique.