DISEASES OF THE COLON & RECTUM

ORIGINAL CONTRIBUTION

Doppler-Guided Hemorrhoidal Artery Ligation for the Treatment of Symptomatic Hemorrhoids: Early and Three-Year Follow-up Results in 100 Consecutive Patients

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PURPOSE: Doppler-guided ligation of the hemorrhoidal arteries was described as an alternative to hemorrhoidectomy. The authors report their experience with this procedure.

METHODS: From 2002 to 2004, 100 consecutive patients underwent hemorrhoidal artery ligation procedure for symptomatic hemorrhoids and were reviewed at one month and at three years.

RESULTS: There were 54 females. Seventy-eight patients had Grade III hemorrhoids. Eighteen patients had previously been treated for the disease. The mean operative time was 28 minutes. On average, 8.4 ligatures were placed. Seventy-nine patients were discharged the same day. Six patients presented with early complication: isolated pain in one, pain and bleeding in three, isolated bleeding in one, and obstructed defecation in one. Late complications occurred in six patients: anal pain in one, fissure in two, and thrombosis of residual hemorrhoids in three. Twelve patients presented with a recurrence at a mean delay of 12.6 months, which was treated by repeat hemorrhoidal artery ligation (n=1), hemorrhoidopexy (n=7), and hemorrhoidectomy (n=4).

CONCLUSIONS: Hemorrhoidal artery ligation procedure is safe, easy to perform, and should be considered as an alternative for the treatment of symptomatic hemorrhoids, even with a recurrence rate of 12 percent, which can be treated by the same technique or another.

KEY WORDS: Hemorrhoids; Rectal bleeding; Prolapse; Surgical management; Hemorrhoidal artery ligation.

Hemorrhoids affect between 4 and 36 percent of the population.[1,2] The pathogenesis of this disease remains controversial but might be a conjunction of the two theories often discussed: the mechanical explanation in which the muscular fibroplastic supportive tissue of the hemorrhoidal plexus degenerates and the vascular explanation in which the arteriovenous shunts open, leading to dilation of the hemorrhoidal venous plexus. Based on this, several operative techniques have been used to correct or remove the sliding hemorrhoids.[3] A Japanese surgeon recently introduced a new technique for the treatment of symptomatic hemorrhoids, the Doppler-guided hemorrhoidal artery ligation (HAL), based on the identification and ligation of the terminal branches of the superior rectal arteries through a proctoscope equipped with a Doppler transducer.[4] The authors report the early and long-term results (3 years) of the first 100 patients treated following this technique.

PATIENTS AND METHODS

From January 2002 to May 2004, 100 consecutive patients, including the first one, underwent the HAL procedure for symptomatic hemorrhoids. Exclusion was pronounced before operation in case of Grade I hemorrhoids, uncertain diagnosis, thrombosis, or associated infected anal fissure, younger than aged 18 years, and pregnancy. All patients were reviewed at one month and at three years.

Technique

A specific proctoscope (HAL-Doppler, AMI Dufour Medical™, Maurepas, France) coupled with a Doppler transducer is inserted into the rectum to locate the branches of the rectal arteries. A lateral ligation window is located above the Doppler transducer, and the proctoscope is equipped with a light source to allow easy insertion of sutures through the window at the correct depth under direct vision. Specially designed needle

Presented at the meeting of the European Society of Coloproctology, Portomaso, Malta, September 26 to 29, 2007.

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holder and knot pusher are used for inserting the 8-shaped sutures and tying the knots.

The patient is placed in the lithotomy position. In case of local anesthesia, 30 ml of ropivacaine 7.5 mg are infiltrated in the perianal tissues. In case of spinal anesthesia, Marcaine and Sufentanyl are injected in the peridural area. Antibioprophylaxis is ensured by 500 mg of metronidazole.

After lubrication with a xylocaïne gel, the anal canal is gently dilated to allow insertion of the proctoscope, so that the transducer is approximately 2 cm above the dentate line. It is slowly rotated to localize the rectal arterial branches on the entire circumference. A figure-of-eight suture is placed around each perceived artery through the window of the proctoscope by using a 0 Vicryl suture (Ethicon) mounted on a 5/8-circle, 26-mm needle. Correct ligation of an artery is associated with disappearance of the Doppler sounds distal to the knot.

Systematic pain relief was prescribed as a prophylaxis to the patients with ketoprofen 2×100 mg per day and paracetamol 3×1,000 mg per day for a period of two days starting the operative day. Paraffin oil was given to 38 patients with constipation for two to seven days.

RESULTS

The HAL procedure was performed on 100 consecutive patients of mean age 45±13.7 (median, 44 (range, 21–76)) years. There were 46 males and 54 females. One patient had Grade II hemorrhoids, 78 had Grade III hemorrhoids, and 21 had Grade IV prolapsed hemorrhoids. Symptoms leading to the operation were bleeding in 87 cases and pain in 77 cases. Fifty-eight patients presented with skin tags that never were the main complaint. From the patients presenting with bleeding, 60 reported at least one episode of soiling or mucous discharge during the past year. None had symptoms that suggested fecal incontinence. Eighteen patients had been treated previously for the disease in the past (12 sclerosis and/or rubber band ligations, 4 stapled anopexies, and 2 hemorrhoidectomies).

The procedure was conducted under pudendal block (n=47), spinal anesthesia (n=47), or general anesthesia (n=6), mainly following patients' preference. The mean operative time was 28±6.1 (median, 28 (range, 20–42)) minutes. On average, 8.4±2.4 ligatures (median, 8 (range 4–14)) were placed. Seventy-nine patients were discharged the same day of the operation and were authorized to have normal activities. Nineteen patients had simultaneous procedure: fissurectomy in 7 patients and skin tags resection in 12 cases. Thirteen patients were discharged on postoperative Day 1 and eight patients on postoperative Day 2, mainly for social reasons (n=15) or because of an associated procedure (n=8).

Six patients (6 percent) developed early postoperative complications: a 24-year-old man required prolonged analgesia for a total of four days, despite this he asked for discharge on the same day of operation. Three patients requested to be, and were, reviewed at Days 9, 10, and 15 for sudden pain and bleeding: they all had an acute typical fissure that was successfully managed with conservative measures. One patient asked to be reviewed at Day 11 for bleeding, but no abnormality was seen on examination. She presented with an anal fissure at the 11th postoperative month. The last patient complained from dyschezia that lasted six days and required no particular treatment; she had had 12 ligatures during HAL procedure for Grade IV hemorrhoids.

Late complications occurred in six patients (6 percent) and included an episode of anal pain at one year in a 21-year-old woman whose examination the week later revealed no abnormality, an anal fissure in two patients at, respectively, 8 and 11 months, and a thrombosis of residual hemorrhoids in three patients at, respectively, 4, 7, and 17 months, which was treated by thrombectomy in two and hemorrhoidectomy of the complicated hemorrhoid in one: these patients were three women aged 32, 39, and 43 years, who were treated by Doppler-guided HAL for Grade III hemorrhoids and had ten ligatures each. One had had a skin tag resection at the same time.

All patients were reviewed at three years of follow-up. Skin tags were present in 25 cases, although we expected 46 patients to have these residual lesions (because skin tags were preoperatively noticed in 58 patients and only 12 of them had had resection of the lesions). Twelve patients asked for skin tags resection, mainly for cosmetic reasons, which was performed under local anesthesia in all cases. Recurrence of hemorrhoids was the main late complication, occurring in 12 patients (6 males; mean age, 48 (range, 31–8) years). These patients had had a mean number of 8.8 (range, 4–14) ligatures. Seven patients who presented with recurrence had third-degree hemorrhoids and five had fourth-degree hemorrhoids. Recurrence occurred at a mean delay of 12.6±9.6 (median, 7.5 (range, 4–31)) months and was treated by repeat Doppler-guided HAL in one case, stapled hemorrhoidopexy in seven cases, and hemorrhoidectomy in four cases.

DISCUSSION

Hemorrhoids become symptomatic through bleeding, pain, pruritus, and/or mucus discharge. There is a poor correlation between these symptoms and the appearance of the hemorrhoids. The Goligher classification of the hemorrhoidal prolapse is widely used and is of value to compare series, indicate treatment, and appreciate results. Grade of hemorrhoids does not always correlate with symptoms. Apparently severe-looking hemorrhoids with third-degree or even fourth-degree prolapses (respectively manually reducible prolapse and permanent prolapse) may cause relatively few symptoms. At the opposite, anal

pruritus and discrete bleeding can be associated with first-degree hemorrhoids. The most severe hemorrhoids are seen in paraplegic patients, in whom the two theories are associated: dilation of the hemorrhoidal plexus caused by vasoplegia and hemorrhoidal prolapse because of the lack of tonicity.Milligan and Morgan hemorrhoidectomy is considered as the radical, definitive technique [5] and, *per se*, is regarded as the standard operation against which all other procedures must be compared. The hemorrhoidectomy makes sense physiologically, because it treats the prolapse and the venous plexuses. However, the morbidity rate after hemorrhoidectomy is approximately 10 percent, and the complications are multiple and sometimes severe. Classical complications are pain, bleeding, infection, fissure and delayed healing, stenosis, soiling, and anal incontinence. The most frequent reported complication is pain, which usually necessitates opiates and prolonged hospital stay.[6] Closed hemorrhoidectomy does not provide advantages to the open technique. Less invasive, outpatient procedures, such as injection sclerotherapy, photocoagulation, cryotherapy, and rubber band ligation, often are proposed as first-line treatment because of the low morbidity rate, but recurrence rate is as high as 40 percent and they often are contraindicated in high-degree hemorrhoids.[3] In fact, these techniques seem to be a good answer to the vascular theory alone and suitable to treat patients who have an early stage of the disease, sometimes considered as internal hemorrhoids.[7]

On the basis of the mechanical hypothesis of hemorrhoidal pathogenesis, after which the muscular fibroplastic supportive tissue of the inferior hemorrhoidal plexus degenerates and causes vessels enlargement and prolapse, stapled hemorrhoidopexy has been developed. The so-called Longo's technique was designed to restore normal relationship between anal mucosa and internal sphincter, to reduce the prolapse, and interrupt the vascular supply to the plexuses.[8] In nearly all prospective, randomized trials, stapled hemorrhoidopexy has shown a significant reduction of postoperative pain, a greater reduction in hospital stay, and an earlier return to work.[9–12] However, this technique requires long training and is not recommended in all grades of hemorrhoidal disease (rather contraindicated in fourth-degree hemorrhoids or in thrombosis). Moreover, severe complications have been described in early experience, such as persistent pain, pelvic sepsis, hemorrhage, rectal perforation, rectovaginal and rectourethral fistulas, peritonitis, and incontinence.[13–18] Experienced centers also have reported complications as severe as peritonitis requiring Hartmann's procedure.[19]

Doppler-guided HAL is easy to perform and learn (3 to 5 procedures are required to be confident with the technique) and is a minimally invasive technique that offers a good alternative to all other surgical treatments of symptomatic hemorrhoids. It also is associated with less postoperative pain. The HAL technique is designed to interrupt the arterial blood supply to the anal cushions by using a Doppler probe and pulling up the prolapse by bunching up the mucosa. The connective tissue in the collapsed hemorrhoid regenerates until the resolution of the prolapse.

Table 1. Results of studies performed on Doppler-guided HAL technique

Study	*Year*	*N*	*Stage of hemorrhoids (%)*	*No. of ligatures*	*Hospital stay*	*Complications (%)*	*Recurrence (%)*	*Follow-up (mo)*
Morinaga *et al.*[4]	1995	116	NS	NS	Outpatient	Pain 5 Bleeding 12	3	1
Sohn *et al.*[22]	2001	60	II 33, III 45, IV 22	6	Outpatient	Pain 8 Thrombosis 7 Fissure 2	3	12
Bursics *et al.*[23]	2004	30	II 23, III 33, IV 44	6	Outpatient	Nausea 6	13	12
Felice *et al.*[21]	2005	68	III 100	NS	Outpatient	Pain 3 Thrombosis 3 Bleeding 1.5	6	11
Ramirez *et al.*[24]	2005	32	III 85, IV 15	5	Outpatient	Bleeding 18 Thrombosis 3 Fissure 3	22	12
Scheyer *et al.*[20]	2006	308	II 28, III 62, IV 10	6	2 days	Bleeding 5 Thrombosis 3 Pain 1.5 Fissure 1.5 Stool retention 1	15	18
This series	2007	100	II 1, III 78, IV 21	8	Outpatient 79% 1 day 13% 2 days 8%	Pain 5 Bleeding 4 Fissure 2 Thrombosis 3 Dyschezia 1	12	36

NS = not specified.

Early complications of the Doppler-guided HAL technique are rare and slight, so that patients are able to discharge on the same day as outpatients. In the present series, patients who were discharged on postoperative Day 1 or 2 were because of social reasons or an associated procedure. All stages of the disease can be treated using the procedure: 21 of our patients presented with fourth-degree hemorrhoids and only 5 presented with recurrence.

Grade IV hemorrhoids are different from skin tags. The former contain venous plexuses and are connected to internal hemorrhoids; their removal may be painful and associated with pain. The later do not increase in size during straining because they mainly contain fibrotic tissue; their removal is easy, with little pain and no hemorrhage.

Patients who are candidates to Doppler-guided HAL should be aware that skin tags will persist, although 21 patients from 58 who presented with one or more skin tags (which were of course different from hemorrhoidal prolapses) in the present series interestingly did not have these lesions three years after the procedure. The reason for that is unclear but might be related to a certain degree of edema or inflammation accompanying skin lesions that disappeared after arteries ligation.

Recurrence of hemorrhoids in 12 percent of patients was the main complication in the present series, as it has been observed by Scheyer *et al.*,[20] who published the largest series (15 percent recurrence rate in a series of 308 patients). No predictive factor for recurrence was identified in the present series. The Doppler-guided HAL technique can be repeated with no particular complication because it was performed in one of our patients, in 48 of 308 patients in Scheyer series, and in 2 of 68 patients in Felice *et al.* series.[21]

It is possible at any time after Doppler-guided HAL to switch to another procedure, such as hemorrhoidopexy or hemorrhoidectomy, as we did in respectively 7 and 4 patients from 12 who presented with recurrence.

Our results are similar to others reported in the literature, with a success rate between 78 and 97 percent.[22–24] No severe early or late complications have been reported in these series but the follow-up was rather short (Table 1). We assume that the number of late complications and recurrences might increase with time.

Procedures to cure hemorrhoids abound, because there is no one treatment that fits all patients. Medical treatment is for us always mandatory from Grade I to Grade IV. Grade II hemorrhoids are best treated by instrumental procedures, such as sclerosis or rubber band ligation. Grade III hemorrhoids can be treated by Longo or HAL techniques; in case of bleeding Grade III hemorrhoids, we used to propose the HAL procedure, because we assume that the technique will decrease the anal cushion pressure; when pain and soiling are the main complaints, Longo's technique are for us a suitable operation, because the symptoms may be related to sliding anal mucosa. Grade IV hemorrhoids are best treated by hemorrhoidectomy, but in some Grade IV cases, HAL Doppler procedure can be proposed, provided that the patients are aware of the risk of recurrence.

CONCLUSIONS

The Doppler-guided HAL technique is safe, easy to perform, and should be considered as an effective alternative for the treatment of symptomatic hemorrhoids. Recurrence at three years is approximately 12 percent, but patients can then be treated by redo HAL, hemorrhoidopexy, or hemorrhoidectomy. Longer follow-ups are needed and randomized trials are mandatory to establish the exact role of Doppler-guided HAL in the treatment of hemorrhoids.

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