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A Randomized Study Comparing Conventional Hemorrhoidectomy With Doppler Assisted Hemorrhoidal Artery Ligation

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ABSTRACT

Doppler-guided haemorrhoidal artery ligation is a newer method for treating hemorrhoids. Early and 1-year follow-up results of the procedure are presented and compared with those of closed scissor/cautery assisted hemorrhoidectomy in a prospective randomized study. Patients and methods: Sixty consecutively recruited patients were randomized into two groups: group A (n=50) was treated with standardized closed scissors hemorrhoidectomy and group B (n=50) with Doppler-guided hemorrhoid artery ligation. The follow-up period was 10.4±5.8 months.

Results: The average need for minor analgesics was 12.8±11.5 doses in group A and 2.1±6.9 in group B. Patients in group A spent 60.1±32.0 hours in hospital postoperatively and those in group B 19.8±41.8 hours. Return to normal daily activities took 30±18.5 days in group A and 5.0±2.5 days in group B. Neither the disappearance nor the recurrence of preoperative symptoms (8 vs. 9 patients) differed significantly between the two groups. Conclusion: Both procedures were effective in treating hemorrhoids. The1-year results of Doppler-guided hemorrhoid artery ligation do not differ from those of closed scissors hemorrhoidectomy. Doppler-guided hemorrhoid artery ligation seems to be ideal for 1-day surgery, and it fulfills the requirements of minimally invasive surgery.

KEYWORDS : Hemorrhoidectomy, Conventional Hemorrhoidectomy, Doppler-Guided Hemorrhoid Artery Ligation

Introduction

For better results in heamoriodectomy one should ligated the hemorrhoidal vessels properly to avoid bleeding and recurrence. Hence Doppler-guided haemorrhoidal artery ligation will increase the accuracy of the procedure and with experience can be done as a outpatient department procedure.

Materials and methods

This prospective, longitudinal, randomized study examined 100 consecutive patients (47 men, 53 women; mean age 45.0±5.9 years). Patients were randomized based on the date of the first visit to our outpatient department to either group A, undergoing standardized closed scissors hemorrhoidectomy (29 men, 21 women; mean age 46.7±13.0 years), or group B, undergoing DG-HAL (18 men, 32 women; 47.4±15.0 years). The follow-up period was 11.0±6.8 months in group A and 11.6±3.0 months in group B. Patients were informed about the possible modalities of treating hemorrhoids and about possible complications, and each signed a standard informed consent form.

Clinical data were collected prospectively. Patients underwent careful history taking, clinical examination, rigid sigmoidoscopy, and anoscopy for the diagnosis and staging of the disease. If the hemorrhoidal cushion was found to be enlarged but without any protrusion into the anal canal, we staged the disease as stage I. If there was protrusion into the anal canal but no prolapse through the anal orifice, we staged it as stage II. When we saw prolapse which could be reduced, we classified the disease as stage III. At stage IV of the disease the prolapsed hemorrhoid could no longer be reduced. Other underlying pathologies were excluded by barium enema or colonoscopy where necessary.

The two groups were comparable in sex distribution, patient age, and length of follow-up. There was no statistically demonstrable difference between the two groups in the stages of the disease; group A consisted of 12 patients in stage II, 14 in stage III, and 24 in stage IV hemorrhoids, and group B 1 patient in stage I, 11 in stage II, 15 in stage III, and 23 in stage IV disease. Preoperative complaints were also similarly distributed; in group A there were 26 patients who complained of bleeding, 15 of pain, and 1 of mucus discharge, and in group B 23 who complained of bleeding, 11 of pain, 3 of prolapse, and 1 of discharge. (Some patients had more than one complaint.)

Conventional hemorrhoidectomy was performed under general anesthesia in all but three cases. During the operation we tied the arteries high in the three primary directions. After scissors hemorrhoidectomy the anoderm was reconstructed with running 3/0 absorbable sutures. We left a sponge soaked in lignocaine jelly in the anal canal after the procedure. We performed the first DG-HAL operations under general anesthesia. As we gathered the experience, we changed to local anesthesia. We used 100 mg pethidine, 50 mg promethazine, 0.25 mg atropine as intramuscular injection for premedication prior to the operation, and 1% procaine for local infiltration anesthesia.

The operation was performed in lithotomy position (similarly to the conventional hemorrhoidectomy). The Doppler anoscope was inserted to the rectum and the Doppler head was situated 1–2 cm above the dentate line. We looked for the arteries while rotating the device completely around the rectum. We put "figure-eight" stitches above the Doppler head where we received arterial Doppler signs. We used 2/0 absorbable stitches with a strong 5/8 curved needle. When we completed the first round we withdrew the anoscope 0.5 cm and did a second round to check the accuracy of the procedure. If we received arterial sound, we put new stitches in but always took maximal care to ensure at least 1 cm distance from the dentate line. After finishing the second round we removed the Doppler anoscope and checked the position of the stitches by digital examination.

In group A the operation was carried out under spinal anesthesia in 37 patients, in 12 under local anesthesia, and in 1 under general anesthesia. In group B 20 patients underwent the operation under spinal anesthesia and 20 under local anesthesia and 10 under general anesthesia. In the latter cases, 15 had infiltration local anesthesia and 5 surface anesthesia. In group B we used local anesthesia significantly more frequently ($P<0.05$).

In the postoperative period we used on-demand analgesics. The first injection of nonopioid analgesics was given intramuscularly (e.g., 75 mg diclofenac) if the patient required it. If this proved insufficient, we administered opioid (50–100 mg pethidine) intramuscularly. On the

day after the operation and thereafter we used peroral pain killers (e.g., 50 mg tramadol three times daily, 75 mg diclofenac twice daily. We discharged the patients when they felt fit enough to leave, provided that we did not recognize any negative reaction (e.g., fever, urinary retention, nausea) or complication (e.g., postoperative bleeding, perianal abscess).

In the postoperative period we recorded the type of anesthesia, length of postoperative inpatient care, negative reactions, complications, and the need for pain killers especially the need for opioids. We examined the patients in the 6th postoperative week and every 12 weeks thereafter. No patients were completely lost to follow-up, but three in group A and one in group B did not attend the examinations after 12 weeks. These patients were contacted by phone. At follow-up we performed rectal digital examination and asked the patients to strain to observe any prolapsing pile, but did not carry out rigid sigmoidoscopy unless the patient had complaints. On the first occasion we asked the patients if their preoperative symptoms had disappeared, for how long they had to stop their normal daily activity, and how much pain killer they took at home.

The return to "normal daily activity" was defined as the point at which patients returned to their job or patients on pension needed no further help for taking care of themselves. On any further controls we asked specifically for any recurrent symptom and for any late complication (e.g., stricture, fistula, impaired defecation, incontinence).

Statistical analysis

Groups were compared by the $\chi 2$ homogeneity test at 5% probability or by comparison of the 95% confidence interval (95% CI). Results showing normal distribution are given as mean with standard deviation. Statistical significance for these data were assessed with the two-tailed Student's t test for independent samples. Statistical significance of differences was accepted when the P value was less than 0.05.

Results

Early results

We would like to stress that, with the aid of the Doppler anoscope, we found and ligated an average of 6±1.7 vessels.

Table 1 compares the two groups in terms of early results. In group A 9 patients needed opioid analgesics but none in group B; there were 41 patients in group B who did not require pain killer at all but only 7 in group A. Table 1 presents the mean length of postoperative hospitalization,and time taken to return to normal daily activities.

Table.1 Early results of treatment by standardized closed scissors hemorrhoidectomy (Group A) And by Doppler-guided hemorrhoid artery ligation (Group B)

	Group A(n=50)	GroupB (n=50)	P
Need for minor analgesics(doses)	12.8±11.5	2.1±6.9	<0.005
Length of hospital postoperative stay(h)	60.0±32.1	30.2±31.4	<0.0001
Return to normal daily activities(days)	30±18.5	5.0±2.5	<0.0005

Follow-up results

We encountered no stricture formation, incontinence, or evacuation problems in either group. In the 6th postoperative week we assessed the results by the disappearance of the preoperative symptoms and by the regression of prolapsing piles. We found no statistical difference between the two groups based on 95% CI. In group A the symptoms ceased in 42 patients, and 8 patients had further complaints. They were managed conservatively of which 6 improved at 12-week follow up. The other two patients continued to have bleeding, and one of which was diagnosed to have a bleeding diverticulosis and he was put on symptomatic treatment and he was relieved of his symptoms,the other patient underwent three sessions of rubber band ligation.

In group B 41 patients reported being symptom free 6 weeks after the operation and 9 patients still had problems. At 6 week follow up they presented with symptoms of Perianal fullness/pain in these patients we observed prolapse on straining, despite this they had ceased to bleed,and one of the patient had persistent bleeding .They were put on suppositories and asked to take high fibre diet,at 12 week follow up the symptoms were relieved in 6 patients and two of them continued to experience pain,and on examination they were diagnosed to have anal fissures and they were treated with sphincterotomy, and the one patient continued to have bleeding. He underwent a second DG-HAL and was symptom free after the procedure.

In both group A and group B when the patients were followed up at 1 year interval, all the patients were symptom free.Failures and recurrences are presented in detail in Table 2.

Table 2 summary of failures, recurrences and final outcome

Patient no.	Symptoms at 6week follow up	Symptoms at 12 week follow up	Symptoms at 1 yr follow up	Therapy	Final outcome
Group A					
1	Bleeding	Bleeding, diverticulosis on colonoscopy	-	High fiber diet	Complaint free
2	Bleeding	Bleeding	-	Rubber band ligation	Complaint free
3	Bleeding, Pain	-	-	Suppositories	Complaint free
4	Bleeding	-	-	Suppositories	Complaint free
5	Bleeding	-	-	Suppositories	Complaint free
6	Bleeding	-	-	Suppositories	Complaint free
7	Bleeding, pain	-	-	Suppositories	Complaint free
8	Pain	-	-	Suppositories	Complaint free
Group B					
1	Bleeding, pain	-	-	Suppositories	Complaint free
2	Bleeding, Prolapse	-	-	Suppositories	Complaint free
3	Pain, Bleeding	-	-	Suppositories	Complaint free
4	Bleeding	-	-	Suppositories	Complaint free
5	Bleeding, pain, prolapse	-	-	Suppositories	Complaint free
6	Bleeding	-	-	Suppositories	Complaint free
7	Pain	Pain	-	Fissurectomy	Complaint free
8	Bleeding	Bleeding	-	DG-HAL	Complaint free
9	Pain	Pain	-	Subcutaneous lateral sphincterotomy	Complaint free

Discussion

Patients after DG-HAL operations need significantly less pain killer, their hospital stay is shorter, and they return to their normal daily activity much more quickly. This is not surprising, given that there is no real wound left after the operation. The operative trauma is minimal. This operation can be performed under local (surface) anesthesia, and this further decreases the number of negative postoperative reactions and the length of the postoperative hospital stay [10, 11]. We observed comparable symptomatic recurrence rate in groups A and B. Both procedures had cured problems related to hemorrhoidal disease at an acceptable level at 1-year follow-up.

We saw a marked reduction in the prolapse in both groups. It was not surprising in group A, where the excess tissue was mechanically removed, but it was somewhat unexpected after the DG-HAL procedure. The pathophysiology can be that after successful ligation of the arteries the inflow to the piles drops. While the venous outflow remains intact, the tension within the anal cushions drops. The piles collapse and both the bleeding and the pain cease. The decreasing tension allows regeneration of the connective tissue within the piles which facilitates the shrinkage of the hemorrhoid and eventually leads to the definitive decrease in the prolapse. The whole process supports the "hypertensive cushion" theory [12, 13].

During the DG-HAL procedures we found more arteries than we had expected on the basis of the traditional anatomical concept [10, 11]. The anatomical picture drawn by Miles shows three descending arteries [14]. These are described as the end-branches of the superior rectal artery. The concept of either traditional hemorrhoidectomies (e.g., Parks, Milligan-Morgan, Ferguson) is based on this anatomical view. We found an average of six arteries during the DG-HAL procedure with the aid of the Doppler anoscope. These can be the subdivided end-branches of the superior rectal artery, although it is possible that some other vessels break through the wall of the distal rectum. Not all of these vessels are ligated during conventional hemorrhoidectomy. An intention to deal with all of these vessels (to perform hemorrhoidectomy on both the primary and the secondary piles at the same time) would sacrifice much anoderm and would risk both extensive scaring and sensory insufficiency. In fact we observed a similar situation after Whitehead operations [15, 16].

We experienced no early complications in either group which needed surgical intervention, although we saw a number of negative reactions in the postoperative period. A majority of these occurred in group A (14 vs. 2). As late complications we had three anal fissures in group B, but all of these patients healed on appropriate therapy. If we accept the ischemic origin of anal fissures, the appearance of fissures as a late complication indicates that the DG-HAL procedure effectively decreases the blood flow to the anal canal for months [17].

These results seem to be coherent and supportive of our main observations, namely: the DG-HAL procedure can be carried out under surface anesthesia, the postoperative need for analgesics is minimal, and hospital stay is short. Most of the above complications (fissure, thrombosed external hemorrhoids, prolonged pain) may be related to the altered blood circulation within the mucosa of the anal canal.

In conclusion, both the closed scissors hemorrhoidectomy and the DG-HAL procedure proved effective in treating hemorrhoids in both the short and the long term. The 1-year results of DG-HAL procedure do not differ from those of the closed scissors hemorrhoidectomy. The short hospital stay, the low complication rate, and the minimal postoperative pain make the DG-HAL procedure ideal for 1-day surgery and is in accordance with the requirements of minimally invasive surgery.

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