

# Evaluation of transanal hemorrhoidal dearterialization: a single surgeon experience

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## Abstract

**Background** There is an increasing, though still limited, amount of evidence describing the use of the transanal hemorrhoidal dearterialization (THD) device for the treatment of hemorrhoidal disease. This study assesses postoperative outcomes from a single surgeon experience with the THD device.

**Methods** From January 2009 to December 2011, 108 THD procedures were performed. With Doppler guidance, the THD device makes possible precise ligation of the branches of the superior hemorrhoidal artery. Patients were seen postoperatively at 3 weeks and 6 months. They underwent physical examination to determine whether there was recurrence of hemorrhoidal prolapse. They were asked to describe any bleeding, to rate pain using the visual analog scale, and to rate their level of satisfaction on a scale of 1–5 (with 5 = highly satisfied). A phone interview was used for follow-up at 1 year to determine the rate of recurrent prolapse.

**Results** Of the 108 patients who underwent THD, two were lost to follow-up and excluded. All of the remaining 106 patients completed follow-up at 3 weeks and 6 months. At 3 weeks, 92 % of patients had no pain and

88 % were highly satisfied with the procedure at 3 weeks. This increased to 92 % satisfaction at 1 year. Prolapse recurrence was 7.5 % at 6 months and 10.3 % at 1 year. Bleeding was the most common complication, but did not require re-intervention or transfusion.

**Conclusions** THD is a same-day procedure for the treatment of hemorrhoidal disease that is safe and effective, and offers the potential for immediate return to normal activity.

**Keywords** Transanal hemorrhoidal dearterialization · Doppler-guided hemorrhoidal artery ligation · THD · DGHAL · Hemorrhoids

## Introduction

Hemorrhoids are highly vascularized tissue located in the submucosa of the anal canal that helps in maintaining fecal continence. When hemorrhoids are associated with bleeding, prolapse, or pruritus, this is considered hemorrhoidal disease (HD). The prevalence of HD is reported to be 4–10 %, making it the most common disorder of the anal canal [1]. HD is usually treated conservatively for 6–8 weeks. However, about 10 % of patients will ultimately require surgical intervention [2]. Milligan–Morgan (open) or Ferguson (closed) hemorrhoidectomy is considered the gold standard for the surgical treatment of hemorrhoids [3, 4]. However, these procedures are associated with significant postoperative complications including pain, sepsis, anal stenosis, bleeding and incontinence [5]. In an effort to decrease postoperative pain, two new techniques have been proposed in the last two decades: stapled hemorrhoidopexy (SH) and Doppler-guided hemorrhoidal artery ligation (DGHAL). Both techniques result in less postoperative pain, a shorter hospital stay, and greater

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patient satisfaction [6–13]. Numerous case reports have exposed some of the potential risks with SH including bleeding, large bowel obstruction, retroperitoneal sepsis, rectovaginal fistula, and rectal perforation [14–18]. DGHAL was first described by Morinaga in 1995 [19]. It has been shown to be safe and effective in the treatment of hemorrhoids and to be associated with a small learning curve [8, 20]. Since its introduction, numerous devices have been developed. Transanal hemorrhoidal dearterialization is sometimes used interchangeably with DGHAL; however, there is a specific THD device. This device (THD S.p.A., Correggio, Italy) consists of an anoscope with Doppler probe and light source for precise ligation of the hemorrhoidal branches of the superior hemorrhoidal artery. The THD device has a removable centerpiece which facilitates mucopexy. Through ligation, arterial inflow is decreased allowing the prolapsed hemorrhoid to shrink. Ligation with mucopexy has been shown to decrease the rate of recurrent prolapse [20–25].

Hemorrhoidal disease has marked differences in epidemiology and clinical presentation which may affect selection for surgical treatment and ultimately treatment results. Perception of pain, patient's expectations, and satisfaction are also highly dependent on the patients' population and the healthcare settings. In this regard, most of the studies on THD were carried out by academic centers in Europe. The aim of this study was to assess the postoperative outcome of a consecutive series of patients operated on in the USA by a single surgeon using the THD device.

## Materials and methods

This was a prospective observational study. Institutional Review Board approval was obtained and all patients provided written consent. Between January 2009 and December 2011, a total of 108 consecutive THD procedures were performed for patients with grade II, III, and IV internal hemorrhoids. THD was not offered to patients with both external and internal hemorrhoids. In these patients, LigaSure (Covidien) hemorrhoidectomy was performed. All patients underwent preoperative history and physical examination, and hemorrhoids were graded according to Goligher's classification [26]. Patients were asked about preoperative symptoms including bleeding, pain, incontinence, and pruritus ani. They were also asked about dietary habits and fiber intake, medical therapy used to initially treat the hemorrhoids, and history of prior procedures for hemorrhoids. Preoperatively all patients received 10 mg of oral oxycodone 30 min to 1 h prior to surgery, and just prior to the procedure a perianal injection of 30 ml 0.5 % marcaine with epinephrine. Patients were discharged with a prescription for narcotic pain medication for no more than

a week. Patients were evaluated postoperatively at 3 weeks and 6 months followed by a phone interview at 1 year after surgery. At each follow-up, patients were asked to rate their satisfaction with the surgical procedure on a scale of 1–5, with five signifying highly satisfied. Three weeks after surgery, patients were asked to assess their pain on a visual analog scale (VAS) of 0–10, with 0 representing no pain and 10 representing the worst possible pain. Postoperative complications such as bleeding and recurrence were also noted at each follow-up. All information was recorded and evaluated by the surgeon.

The surgical procedure has been described in detail by Ratto et al. [22]. Briefly, the anoscope was inserted into the anal canal gaining access to the distal rectum. Six branches of the superior hemorrhoidal artery were ligated with Doppler guidance (at the 1, 3, 5, 7, 9, 11 o'clock positions). This was done with a figure of eight 2-0 Vicryl suture. Following ligation, the suture was used in a running fashion distally and tied for mucopexy.

## Results

Of the 108 patients who underwent THD, two patients lost to follow-up were not included in the study results. Of the remaining 106 patients, four (4 %) had grade II, 69 (64 %) had grade III, and 33 (32 %) had grade IV hemorrhoids. Overall, the mean age was 51 ( $\pm 15$  SD) years. Forty-one patients were male (39 %) and 65 patients were female (61 %). Bleeding was the predominant complaint, followed by pain (Table 1). Thirty patients (28 %) had a prior procedure: 62 % had undergone banding, 6 % had prior hemorrhoidectomy, and 32 % had undergone infrared coagulation. In all but five cases (95 %), ligation of all six hemorrhoidal arteries was performed. Ninety-eight patients (92 %) had mucopexy in addition to ligation.

**Table 1** Preoperative symptoms

Symptom	Number of patients (% of 106 patients)
Prolapse	
Grade II	4 (4)
Grade III	69 (64)
Grade IV	33 (32)
Bleeding	63 (59)
Pain	
None	15 (14)
Minimal	34 (32)
Moderate	38 (36)
Severe	19 (18)
Pruritus	34 (32)
Incontinence	13 (12)

Seventy-five patients (71 %) reported some form of bleeding postoperatively. Of these 75 patients, 65 (87 %) experienced bleeding for less than 1 week. No patients required surgical re-intervention or transfusion. Twelve men with benign prostatic hyperplasia had a straight catheterization prior to extubation in the operative theater. There was no urinary retention postoperatively.

All 106 (100 %) patients had follow-up at 3 weeks and 6 months, and 93 (88 %) completed follow-up at 1 year. At 3 weeks, 98 patients (92 %) had no pain, while seven patients (7 %) rated pain as one on the VAS and one patient (1 %) as two. At 3 weeks, 93 patients (88 %) were highly satisfied with the procedure. Prolapse recurrence was noted in eight patients (7.5 %) at 6 months. Of these eight patients, six originally had grade IV hemorrhoids, while the other two had grade III hemorrhoids. At 1 year, 11 patients (10.3 %) reported recurrent prolapse and 98 patients (92 %) were highly satisfied with the procedure. Of the patients with prolapse, two underwent a repeat THD procedure, while the remainder underwent excisional hemorrhoidectomy.

## Discussion

Hemorrhoidal tissue is an important component of fecal continence. Hemorrhoidal disease is common and can significantly affect quality of life. While most hemorrhoidal disease can be managed non-operatively, about 10 % of patients will require surgery. Ideal surgical treatment should allow a rapid return to normal activities, while maintaining normal anal anatomy and minimizing morbidity. Conventional hemorrhoidectomy is the gold standard; however, patients may be unable to return to normal activities for up to 3 weeks after this procedure because of pain. After conventional hemorrhoidectomy, 25 % of patients may experience sphincter dysfunction, 5–15 % postoperative bleeding or infection, and up to 30 % recurrence [6].

THD has been shown to be safe and effective [22]. It allows patients to return to normal activities immediately and to avoid many of the complications associated with SH. In comparison with SH, THD has been associated with less pain [6]. In a study by Festen et al., there was no significant difference in resolution of preoperative symptoms between SH and THD at 6 weeks (SH 83 %, THD 78.3 %,  $p = 0.648$ ) [8]. Avital et al. showed that in comparison with SH, DGHAL was associated with decreased hospital stay, time to first bowel movement, and time to complete functional recovery ( $p = 0.001$ ) [6]. However, patient satisfaction was significantly higher with SH in this study (SH 92 %, DGHAL 82 %,  $p = 0.016$ ). The authors concluded that they still preferred DGHAL to SH due to decreased perioperative morbidity [6].

Although, 75 of our patients (71 %) had some bleeding postoperatively with the majority of them (87 %) experiencing it for less than a week, no patients required re-intervention or transfusion. In a study done by Greenberg et al. following DGHAL, 11 % of patients required re-intervention for bleeding [27]. Felice et al. had one patient who needed a transfusion secondary to postoperative bleeding [28]. While bleeding is a common complication, re-intervention is usually not required.

Most of the patients treated in this study had grade III and IV hemorrhoids. Our 1-year prolapse recurrence rate of 10.3 % is comparable to the 3–25 % recurrence rate reported in the literature [5, 20, 21, 23, 25, 26]. In a review of DGHAL by Giordano et al., the recurrence rate was noted to be 10.8 % at 1 year or more [29]. In our study, two of the patients with recurrence underwent repeat THD and the remainder underwent excisional hemorrhoidectomy.

Distal Doppler-guided dearterialization (DDD) is a newer variation of THD. Using endorectal ultrasound, Ratto et al. showed that the hemorrhoidal arteries were primarily extrarectal at 5–6 cm proximal to the anorectal junction (ARJ) as defined by the puborectalis muscle and submucosal within 2 cm of the ARJ [30]. By performing suture ligation within 2 cm of the ARJ, more consistent dearterialization may be achieved. Mucopexy can still be performed with this technique. Using DDD, Ratto et al. showed that only three out of 100 patients had postoperative bleeding. Eight patients (8 %) had residual prolapse at 3 months, and five of those patients required repeated mucopexy [31]. With mucopexy, as performed in our study, there may have been unintentional ligation of more of the hemorrhoidal arteries than if proximal dearterialization was performed without mucopexy. Incorporation of DDD instead of a more proximal dearterialization may have improved our results especially with regard to postoperative bleeding.

Ninety-eight patients (92 %) were highly satisfied with the procedure at 1-year follow-up. Numerous studies have shown similar results ranging from 84–95 % [5, 20, 27, 30, 32]. Scheyer et al. reported that 71 % of patients were satisfied with DGHAL; however, a higher percentage, 91 %, would request it again and 93 % would recommend it to a friend [33].

The cost-effectiveness with THD is equivocal with other procedures such as SH. At our institution, the price difference between the hemorrhoid stapler and the THD device is \$120, in favor of the stapler. However, in a study done by Infantino et al. [34], the stapler was \$200 more expensive than the THD device. Further studies will need to be conducted to evaluate cost-effectiveness.

Since this is a single surgeon series, results may not be reproducible and there are numerous other limitations to this study, including the small size, lack of recording of

pain medication, and lack of a protocol to assess specific symptoms other than prolapse and patient satisfaction.

## Conclusions

THD is a safe and effective treatment option and should be considered as an alternative to those procedures associated with high morbidity. This same-day procedure offers low morbidity with high potential for immediate return to normal activity. Additionally, 92 % of patients were satisfied with the procedure.

**Conflict of interest** None.

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