Original article

doi:10.1111/codi.12574

# Transanal dearterialization with targeted mucopexy is effective for advanced haemorrhoids

**P. Giordano, I. Tomasi, A. Pascariello, E. Mills and S. Elahi**

Department of Colorectal Surgery, Barts Health, London, UK

Received 21 May 2013; accepted 2 October 2013; Accepted Article online 27 January 2014

## Abstract

**Aim** Transanal haemorrhoidal dearterialization (THD) has become well established for the treatment of haemorrhoids. In this study we describe a technical modification of this technique, targeted mucopexy (THD TM), and report the results for advanced haemorrhoids.

**Method** The study included a prospective evaluation of patients with Grade IV (fourth-degree) haemorrhoids operated on with the THD TM technique. This consisted of an initial dearterialization when the haemorrhoidal arteries were transfixed and a second phase of mucopexy, using a different needle from that usually used in the original technique.

**Results** From January 2007 to December 2011, 31 consecutive patients with Grade IV haemorrhoids were operated on using the THD TM technique. Postoperative pain was reported by 22 (70%) patients on day 1 and 19 (61%) on day 7, while nine (30%) did not experience any pain at all. Severe pain was reported by only nine (16%) patients. At a mean follow-up of 32 months, two (6.4%) patients required a further intervention for on-going symptoms.

**Conclusion** Transanal haemorrhoidal dearterialization TM is effective for advanced haemorrhoids.

**Keywords** Haemorrhoids, transanal haemorrhoidal dearterialization, targeted mucopexy, haemorrhoidal artery ligation

**What does this paper add to the literature**

This paper describes a technical modification of the original transanal haemorrhoidal dearterialization technique introduced by the senior author and reports the results achieved with it in patients with Grade IV haemorrhoids. We believe the modification has allowed a significant improvement in the outcome, especially when dealing with advanced haemorrhoids.

## Introduction

Transanal haemorrhoidal dearterialization (THD) has been increasingly used in recent years for the treatment of haemorrhoids [1]. The technique has been recognized by the National Institute for Health and Care Excellence (NICE) as a safe and effective alternative to conventional haemorrhoidectomy or stapled haemorrhoidopexy [2]. In initial reports, THD was mostly used for early stage disease [3,4], but with time the indications have expanded to include more advanced stages in which prolapse predominates [5,6,7]. The aim of this study was to describe a technical modification of THD which includes targeted mucopexy (THD TM), using a different needle from that recommended for the original operation, and to report the results of treatment by this new technique.

*Correspondence to*: Mr Pasquale Giordano MD FRCS(Eng) FRCS(Ed), Department of Colorectal Surgery, Barts Health, Whipps Cross Hospital, Whipps Cross Road, Leytonstone, London E11 1NR, UK.
E-mail: pasquale.giordano@bartshealth.nhs.uk

## Method

### Patients

A prospective evaluation of all patients with Grade IV haemorrhoids having THD TM was conducted. They were entered in a specifically designed database and data about patient demographics and relevant history were recorded. Grade IV haemorrhoids were defined as those with constant prolapse, regardless of whether they were reducible or not. The severity of haemorrhoidal symptoms was scored using a specifically designed questionnaire assessing five different parameters each scoring 0–4, with 0 indicating no symptoms and 4 daily symptoms or symptoms with every defaecation (Table 1) [6]. A score of 0 corresponds to the complete

**Table 1** Symptomatic questionnaire.

| | Never | At least once per year | At least once per months | At least once per week | With every defaecation |
|---|---|---|---|---|---|
| Bleeding | 0 | 1 | 2 | 3 | 4 |
| Prolapse | 0 | 1 | 2 | 3 | 4 |
| Manual reduction | 0 | 1 | 2 | 3 | 4 |
| Discomfort/ pain/discharge | 0 | 1 | 2 | 3 | 4 |
| Impact on QoL | None (0) | Minimal (1) | Moderate (2) | Severe (3) | Very severe (4) |

QoL, quality of life.

absence of haemorrhoidal symptoms while 20 equates to the worst possible symptoms. Postoperative pain was assessed daily for the first seven postoperative days, using a visual analogue score (VAS) of 0–10 (0 = no pain, 10 = the worst possible pain) with patients asked to record the most severe episode each day. The severity of the pain was defined as mild with a score from 1 to 3, moderate from 4 to 6 and severe from 7 to 10. Patients were reviewed in the outpatient clinic at 3 weeks and 6 and 12 months and at the time of closure of the study. The symptomatic questionnaire was completed at each follow-up.

### Technique

All operations were performed as a day case under general anaesthesia by the same surgeon (PG). Each patient was prescribed a phosphate enema immediately before surgery. The procedure was carried out in the lithotomy position using a specifically designed proctoscope (THD slide; THD Lab®, Correggio, Italy) which incorporates a side-sensing Doppler probe and a window beyond this for the insertion of sutures. On inserting the proctoscope into the anal canal the Doppler transducer was used to locate in turn the terminal branches of the haemorrhoidal arteries. Starting from the three o'clock position the proctoscope was slowly withdrawn, bringing the transducer towards the dentate line to avoiding missing those branches penetrating the anorectal wall at a lower level.

Once identified, the haemorrhoidal artery was transfixed with 2/0 Vicryl® mounted on a 5/8 needle in a 'figure-of-eight' form. The level of transfixion depended on the site of the strongest signal. This was repeated with clockwise rotation of the proctoscope through 360°. Once the arteries were transfixed, attention was paid to the sites of greatest prolapse. These were then treated by a targeted mucopexy using the THD slide® which was reinserted to as near as possible to the targeted area of prolapse. From this point using 2/0 Vicryl™ stich mounted on a 4/8 needle a continuous suture was started and continued distally to within 5 mm of the dentate line taking care not to catch the anal epithelium. During this process the slide mechanism of the instrument was progressively opened to allow progression of the suture distally, while keeping the prolapsing mucosa away from the operating field. Once the continuous suture was completed the slide mechanism was removed from the proctoscope keeping the main body of the instrument fully inserted. The two ends of the suture were then tied pushing the knot proximally to achieve optimal plication of the distal rectal wall. Any external component was left undisturbed.

## Results

From January 2007 to December 2011, 31 consecutive patients with Grade IV haemorrhoids were operated on with the modified THD TM technique (Table 2). The mean preoperative symptomatic score was 16.25 ± 2.44 [median 17 (11–20)]. The median number of arteries identified was six (five to eight) while the median number of plications per patient was three in 27 cases and four in three. The median operation time was 32 min (23–47). There were no intra-operative complications. Twenty-five patients were discharged on the day of the operation. Six (16%) male patients experienced urinary retention requiring catheterization and an overnight stay. In four the retention resolved spontaneously within 24 h and the patients were successfully discharged the day after surgery. The other two patients

**Table 2** Demographic data.

| | |
|---|---|
| No. of patients | 31 |
| Age (years) | 53.58 ± 16.88 |
| | Median 58 |
| | Range 18–75 |
| Gender | |
| Female | 10 |
| Male | 21 |

**Table 3** Postoperative pain on day 1.

| | |
|---|---|
| Pain free | 9 (29%) |
| Pain | 22 (71%) |
| Minimal | 15 (68%) |
| Mild | 2 (9%) |
| Severe | 5 (23%) |

were started on alpha-blockers and referred to a urologist.

Some degree of postoperative pain was reported by 22 (71%) patients on day 1 and 19 (61%) on day 7, while nine (30%) had no pain at all. Pain was described as severe by nine (16%) patients (Table 3). Patients with severe pain still reported some discomfort at the end of the first week (mean VAS = 3). No patient reported any pain beyond the end of the third week. Other postoperative complications included tenesmus ($n = 3$), constipation ($n = 4$) and thrombosed haemorrhoid ($n = 1$). The mean duration of follow-up was 32 (6–58) months, with 27 patients available for 12-month assessment. The mean postoperative haemorrhoidal symptom score was $2.48 \pm 4.30$ [median 0 (0–15)]. There was only one case of recurrence which was treated by surgical removal. Another patient with symptoms suggestive of haemorrhoidal recurrence underwent examination under anaesthesia and was found to have a large fibro-epithelial polyp at the site of one of the previous mucosal plications. The polyp was excised and the symptoms completely resolved. A third patient underwent excision of skin tags under local anaesthesia for cosmetic reasons.

## Discussion

Minimally invasive techniques for the treatment of haemorrhoids aim to minimize the postoperative pain normally associated with conventional haemorrhoidectomy. Some techniques are less painful but they may not be as effective for the more advanced grades of haemorrhoid [8–10]. For this group of patients conventional haemorrhoidectomy is still considered the gold standard [11]. The arterial branches supplying the haemorrhoids can penetrate the rectal wall at different levels from the dentate line [12,13]. THD aims to occlude the distal branches of the superior rectal artery, thus eliminating the main blood supply to the haemorrhoids, and symptoms resolve or improve in about 90% of patients [1]. Recurrence in the case of advanced grade is high, however [10,11], and it soon became clear that to treat advanced haemorrhoidal disease the prolapsing component had to be dealt with as well. Plication of the prolapsing mucosa was therefore introduced as part of THD [14]. The original plication technique used a 2/0 polygliactin suture mounted on a 5/8 needle. When plication of the rectal mucosa was needed the suture used to transfix the artery was then applied to the mucosa and submucosa in the form of a continuous suture distally towards the dentate line. Although this technique has been effective in most cases and has reduced recurrence it has some limitations for more advanced grades of haemorrhoid. First the shape of the 5/8 needle greatly limits the amount of tissue that can be taken. Although this may not be a major problem for small degrees of prolapse, it becomes so when dealing with a large prolapsing component. In this circumstance, a 3/8 needle as used in the technique described here allows the surgeon to control precisely the amount of tissue taken with each bite, which will differ from patient to patient depending on the size of the haemorrhoids and any associated mucosal rectal prolapse.

The course of the arteries along the rectal wall is very variable. In 2004 Aigner *et al.* [12] demonstrated that some of the distal branches of the rectal artery enter the muscularis propria very distally and suggested that these vessels might be responsible for the recurrences observed after THD. More recently Ratto *et al.* [13] have used colour duplex imaging to try to define the anatomy of the haemorrhoidal arteries in patients suffering with haemorrhoidal symptoms. According to their findings, 2.5% of arteries lie in the submucosal layer at 4 cm from the anorectal junction, 67% at 3 cm, 96.6 at 2 cm and 100% at 1 cm. Since the arteries will only be within reach of the transfixing stitch when in the submucosal plane, effective transfixation requires that the stitch be applied close to the dentate line. This will inevitably leave a very short length of mucosa between the stitch and the dentate line, which will not be sufficient to allow effective mucopexy, especially when a large prolapsing component is present. To overcome this problem Ratto *et al.* [15] suggested that the rectal mucosa be marked by diathermy once the arteries have been identified by Doppler imaging, and start the running suture proximally to that point and then use the same suture to overrun the point where the mark has been placed. Our concern with this technique is that the mucosa can be displaced when handling the proctoscope during the plication of the rectal mucosa and therefore the mark may not accurately identify the position of the underlying artery. The technical modification we have described has the advantage that it allows accurate transfixation and ligation of the artery. Furthermore, dividing the procedure into two phases, dearterialization and plication, using different needles, also allows the areas of prominent prolapse to be targeted.

In this consecutive series of 31 patients with Grade IV haemorrhoids we report a recurrence rate of 3%, and further intervention to treat ongoing symptoms was required in only 6% of patients. There is little information of the results of THD for Grade IV haemorrhoids, but initial results without mucopexy reported a recurrence rate of over 50% [9,11]. With the introduction of mucosal plication this has fallen [14,16]. Thus in a multicentre study the recurrence rate of 50% before mucopexy dropped to 11% after it was introduced [14]. Similar results have been reported in a series of 100 patients with Grade IV haemorrhoids operated on with the haemorrhoidal artery ligation (HALO) and rectoanal repair technique, with 9% recurrence at a mean of 34 months [17]. In conclusion, THD with mucopexy is an effective treatment for advanced haemorrhoids and the technical modification (THD TM) can further improve the results.

## Author contributions

Mr Pasquale Giordano contributed substantially to the conception and design of the study and the interpretation of data, and drafted and provided critical revision of the article and gave final approval of the version to be published. Mr Ivan Tomasi contributed to acquisition of data, their analysis and interpretation. Dr Annalisa Pascariello, Dr Edward Mills and Dr Sinha Elhai contributed to acquisition of data.

## References


1 Giordano P, Overton J, Madeddu F, Zaman S, Gravante G. Transanal hemorrhoidal dearterialization: a systematic review. *Dis Colon Rectum* 2009; **52:** 1665–71.

2 NICE Interventional Procedure Guidance 342, N2155 12 May 10. http://www.nice.org.uk/nicemedia/live/12236/48673/48673.pdf

3 Morinaga K, Hasuda K, Ikeda T. A novel therapy for internal hemorrhoids: ligation of the hemorrhoidal artery with a newly devised instrument (Moricorn) in conjunction with a Doppler flowmeter. *Am J Gastroenterol* 1995; **90:** 610–3.

4 Sohn N, Aronoff JS, Cohen FS, Weinstein MA. Transanal hemorrhoidal dearterialization is an alternative to operative hemorrhoidectomy. *Am J Surg* 2001; **182:** 515–9.

5 Denoya PI, Fakhoury M, Chang K, Fakhoury J, Bergamaschi R. Dearterialisation with mucopexy vs. Haemorrhoidectomy for Grade III or IV Haemorrhoids: short-term results of a double-blind randomised controlled trial. *Colorectal Dis* 2013; **15:** 1281–8.

6 Giordano P, Nastro P, Davies A, Gravante G. Prospective evaluation of stapled haemorrhoidopexy versus transanal haemorrhoidal dearterialisation for stage II and III haemorrhoids: three-year outcomes. *Tech Coloproctol* 2011; **15:** 67–73.

7 Infantino A, Altomare DF, Bottini C *et al.* Prospective randomized multicentre study comparing stapler haemorrhoidopexy with Doppler-guided transanal haemorrhoid dearterialization for third-degree haemorrhoids. *Colorectal Dis* 2012; **14:** 205–11.

8 Giordano P, Gravante G, Sorge R, Ovens L, Nastro P. Long-term outcomes of stapled hemorrhoidopexy vs conventional hemorrhoidectomy: a meta-analysis of randomized controlled trials. *Arch Surg* 2009; **144:** 266–72.

9 Ortiz H, Marzo J, Armenda'riz P, De Miguel M. Stapled hemorrhoidopexy vs. diathermy excision for fourth-degree hemorrhoids: a randomized, clinical trial and review of the literature. *Dis Colon Rectum* 2005; **48:** 809–15.

10 Scheyer M, Antonietti E, Rollinger G, Mall H, Arnold S. Doppler-guided hemorrhoidal artery ligation. *Am J Surg* 2006; **191:** 89–93.

11 Khafagy W, El Nakeeb A, Fouda E *et al.* Conventional haemorrhoidectomy, stapled haemorrhoidectomy, Doppler guided haemorrhoidectomy artery ligation; post operative pain and anorectal manometric assessment. *Hepatogastroenterology* 2009; **56:** 1010–5.

12 Aigner F, Bodner G, Conrad F, Mbaka G, Kreczy A, Fritsch H. The superior rectal artery and its branching pattern with regard to its clinical influence on ligation techniques for internal hemorrhoids. *Am J Surg* 2004; **187:** 102–8.

13 Ratto C, Parello A, Donisi L, Litta F, Zaccone G, Doglietto GB. Assessment of haemorrhoidal artery network using colour duplex imaging and clinical implications. *Br J Surg* 2012; **99:** 112–8.

14 Dal Monte PP, Tagariello C, Sarago M *et al.* Transanal haemorrhoidal dearterialisation: nonexcisional surgery for the treatment of haemorrhoidal disease. *Tech Coloproctol* 2007; **11:** 333–8.

15 Ratto C, Donisi L, Parello A, Litta F, Zaccone G, De Simone V. Distal Doppler-guided dearterialization' is highly effective in treating haemorrhoids by transanal haemorrhoidal dearterialization. *Colorectal Dis* 2012; **14:** e786–9.

16 Ratto C, Giordano P, Donisi L, Parello A, Litta F, Doglietto GB. Transanal haemorrhoidal dearterialization (THD) for selected fourth-degree haemorrhoids. *Tech Coloproctol* 2011; **15:** 191–7. IF 1.5.

17 Faucheron JL, Poncet G, Voirin D, Badic B, Gangner Y. Doppler-guided hemorrhoidal artery ligation and rectoanal repair (HAL-RAR) for the treatment of grade IV hemorrhoids: long-term results in 100 consecutive patients. *Dis Colon Rectum* 2011; **54:** 226–31.