A prospective and comparative study between stapled hemorrhoidopexy and hemorrhoidal artery ligation with mucopexy

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Summary

Aim: The aim of this study was to compare the efficacy between stapled hemorrhoidopexy (Longo technique) and transanal hemorrhoidal artery ligation with mucopexy (THDm) in the treatment of hemorrhoidal disease.

Patients and methods: From June 2009 to January 2011, 81 patients having grade II or III hemorrhoidal disease underwent prospective evaluation followed by surgery at two centers (27 Longo and 54 THDm). Symptoms (bleeding, tenesmus, prolapse, fecal incontinence, pain) and the satisfaction score were compared on the first post-operative day and at 1, 6, 12, and 24 months thereafter. The follow-up was 24 months.

Results: There was no difference in mean length of stay. One complication (recto-vaginal fistula) was observed after Longo. The prolapse score was significantly lower after THDm than after Longo on the first post-operative day (P < 0.0015). Bleeding score after THDm was significantly lower on the first post-operative day (P = 0.04), but higher thereafter (P = 0.03 and P = 0.04). Tenesmus score after THDm was significantly lower for the first three months (P < 0.06 and 0.001). On the first post-operative day and at one month, the visual analog pain score was significantly lower after THDm than that after Longo (P < 0.0003 et P < 0.01). On the first post-operative day and at one month, the satisfaction score was higher after THDm than after Longo (P < 0.001).

Conclusion: THDm was safe and effective. Short-term outcomes after THDm were better than after Longo but long-term results seemed to be similar.

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Introduction

Hemorrhoidal disease is a common pathology whose incidence is variably reported in the literature [1,2]. Initial treatment of grades I, II, and III is mainly based on dietary and hygienic measures (high-fiber diet, regularization of bowel movements). If symptoms persist, many instrumental and surgical treatments have been described but there is no general consensus for optimal treatment. The multiplicity of treatment modalities is partly due to the fact that indications for treatment are based on the patient’s subjective perception of symptoms, while the choice of treatment modality depends on the grade of hemorrhoidal disease (degree of prolapse) and the surgeon’s experience [3,4].

For grades I, II, and III, several surgical techniques can be proposed including different techniques of operative hemorrhoidectomy (Milligan and Morgan, Ferguson) and the anopexy technique of Longo. The Longo technique was developed with the aim of minimizing post-operative pain and risk of recurrence while treating the major hemorrhoidal symptoms of bleeding and prolapse [5–7]. However, its long-term recurrence rate seems higher than that of conventional hemorrhoidectomy techniques with a higher reported incidence of serious complications [8–13]. Doppler ultrasound-guided transanal ligation of the hemorrhoidal arteries with mucopexy was initially described in 1995 by Morinaga et al. (without mucopexy) as an alternative to conventional hemorrhoidectomy and anopexy. It has proven to be effective for the treatment of grades I, II, and III hemorrhoidal disease [14–18]. The addition of mucopexy seems to improve its effectiveness, especially for advanced grades.

The aim of this study was to show the effectiveness of transanal hemorrhoidal artery ligation under Doppler control (THD) with mucopexy (m) for the treatment of grades II and III hemorrhoidal disease and to compare its results with the Longo anopexy technique.

Patients and methods

Patients

Patients at two centers (Carcassonne Hospital Center and Nîmes University Hospital Center) were prospectively included from June 2009 to January 2011. Clinical data were prospectively collected by questionnaire.

Inclusion criteria: age 18–75 years, patient suffering from symptomatic hemorrhoidal disease involving at least two hemorrhoidal groups (grade II or III), or persistent hemorrhoidal disease after surgery.

Exclusion criteria: grade I or IV hemorrhoidal disease, acute ongoing complication of hemorrhoidal disease, congenital or acquired anal stenosis, chronic anal fissure or associated perianal suppurative, inflammatory bowel disease, history of colorectal cancer, past history of rectal and/or sigmoid resection, rectal prolapse, portal hypertension, systemic impairment of hemostasis, neurological disease causing direct or indirect impairment of rectal or anal sphincter motility, psychiatric condition making post-operative follow-up impossible, ongoing pregnancy or breastfeeding, adults under guardianship, patients who do not speak French, or who refuse or are unfit for the post-operative monitoring proposed by the study.

Choice of technique

During the study period, all includeable patients who presented with grade II or III hemorrhoidal disease accepted either one or the other of the proposed techniques, i.e., 88% of patients undergoing hemorrhoidal surgery for a hemorrhoidal problem in each center. The patients’ primary expressed desire to avoid all post-operative pain led them to refuse Milligan-Morgan hemorrhoidectomy and justified the choice of either the Longo or the THDm procedure.

At each center, a single surgical technique was performed by one surgeon who was experienced in the technique. THDm was performed at the Nîmes University Hospital Center (CHU), while Longo anopexy was performed at the Carcassonne Hospital Center (CH). During the pre-operative consultation, all the techniques were presented to the patient, detailing the advantages and disadvantages of each technique and leaving the choice to the patient (as is required by the law of 4 March 2002 on patients’ rights and the quality of the health system).

All fully-informed patients chose the preferred surgical technique of the referral center where pre-operative consultation took place. Their choice of technique was based on the expertise of the center and the explanation of the surgeon’s experience with the technique performed at his center. No patient who met inclusion criteria refused to undergo surgery by the technique in use at the center where they consulted, placing their confidence in the surgeon’s expertise. This study was reviewed and approved by the Committee on Ethics of the institutions in June 2009.

Evaluation criteria

Symptoms

Symptom evaluation. Symptom evaluation was carried out using a standard form. The symptoms assessed were frequency of bleeding, tenesmus, hemorrhoidal prolapse, and incontinence: 0 = never, 1 = less than once/month, 2 = less than once/week, 3 = more once/week, 4 = one or more times daily.

Satisfaction. Satisfaction was evaluated according to the following score: 0 = not at all satisfied, 1 = dissatisfied, 2 = moderately satisfied, 3 = satisfied, 4 = very satisfied.

Pain assessment. Pain assessment was performed using a visual analog score (VAS score of 0 to 10). The score was developed by the authors to help quantify the qualitative aspects of symptoms.

Evaluation dates were: at the pre-operative consultation, at hospital discharge, at one month after surgery, and thereafter at 3–6, 12–18, and 24 months aiming to eventually record an evaluation score for each symptom at each point in time.

The overall score was calculated at each date as the sum of scores for bleeding, tenesmus, prolapse, and incontinence (0 to 12).

Recurrence

Patients who underwent further surgery for reappearance of symptoms after a period of improvement and with a score equal to or higher than their pre-operative score were considered to have recurrence.

Surgical techniques

Technique of THD

The procedure relies on an anoscope specifically designed to permit echo-Doppler examination (PS02-THD, THD Lab™,
Correggio, Italy). With the patient in the lithotomy position, six hemorrhoidal arteries are identified by echo-Doppler at a level at least 4 cm above the dentate line; dearterialization is accomplished by suture ligation with interrupted Vicryl 2.0 stitches. This is followed by performance of a sutured mucopexy from the level of these ligatures to the upper edge of the internal hemorrhoids.

Longo anopexy
After insertion of the anoscope, a purse-string suture of 2–0 prolene is placed circumferentially in the mucosa and submucosa 2–3 cm above the dentate line. A circular staple designed for prolapsing hemorrhoids (PPH 03, Ethicon Endo-Surgery TM, Ohio, USA) is introduced with the anvil above the purse-string suture, which is then tightened down around the central post of the stapler. The PPH 03 stapler is then closed and fired resecting the tissue while placing a double circular row of staples. The doughnut of resected tissue is checked to ensure complete circumferential resection.

Statistical methodology
An initial descriptive analysis was performed. Quantitative variables were expressed as mean values. Qualitative variables were expressed by number and percentage (n, %).

Comparison of quantitative variables among the different groups was performed by Student’s t-test. When the conditions of validity of these tests (normal distribution, equal variances) were not verified, non-parametric tests (Wilcoxon test or Kruskal-Wallis test for multiple classes) were used.

The relationship between two variables was tested by the Chi² test or Fisher’s exact test when the conditions of application of Chi² (theoretical numbers = 5) were not met.

The significance level was set at $P \leq 0.05$ for all tests. A $P$-value between 0.05 and 0.10 was considered indicative of a trend. Statistical analysis was performed in the Department of Biostatistics, Epidemiology, Public Health and Medical Information (BESPIM) at the Nîmes CHU using SAS version 9 (SAS Institute, Cary, NC).

Results
From June 2009 to January 2011, 81 patients were prospectively included. Fifty-four patients underwent THDm while 27 underwent Longo anopexy. Twenty-four of the THDm patients and 15 of the Longo anopexy patients had stage II hemorrhoidal disease.

The mean age was 51.2 ± 12.6 years for the THDm group and 47.4 ± 9.7 years for the Longo group. The male/female ratio was 36 women to 45 men (44.4% vs. 55.6%). Five patients in the THDm group and two in the Longo group had previously undergone one or more sessions of non-surgical treatment of their hemorrhoidal disease ($P = 0.6$). The average hospital stay was 2.1 ± 0.5 days in the THDm group and 1.6 ± 0.66 days in the Longo group ($P = 0.06$).

The mean duration of disability for work was 4.35 ± 6.6 days in the THDm group and 18.6 ± 13.7 days in the Longo group ($P < 0.001$).

Symptoms (Tables 1 and 2 and Fig. 1)
The scores for prolapse were significantly improved for both techniques at 24 months ($P < 0.001$). At the time of hospital discharge, hemorrhoidal prolapse was significantly more improved in the THDm group compared to the Longo group.

Scores for bleeding were significantly improved for both techniques at 24 months ($P < 0.001$). At discharge, improvement in hemorrhoidal bleeding scores was statistically significantly better in the THDm group compared to the Longo group but at six months the improvement was less in the THDm group than in the Longo group.

Scores for tenesmus were significantly improved for both techniques at 24 months ($P < 0.001$). Improvement in tenesmus was significantly better in the THDm group compared to the Longo group out to three months.

Scores for anal incontinence scores were no different regardless of the technique at 1 to 24 months.

Local pain scores were significantly improved regardless of the technique at 24 months ($P < 0.001$). Post-operative pain was significantly lower in the THDm group than in the Longo group at discharge and at one month.

Patient satisfaction was significantly higher in the THDm group than in the Longo group, during the first six months.

Recurrences
Five recurrences were reported in the THDm group while one patient had a recurrence in the Longo group. Four patients underwent re-operation, two in the THDm group and two in the Longo group (not significant).

Complications
The peri-operative mortality was zero in both groups. No complications occurred in the THDm group while two complications occurred in the Longo group (non-significant). In one patient undergoing Longo anopexy, the circular stapler failed to fire the staple line while dividing the mucosa and submucosa; this required closure of the transaction with a hand-sewn suture line. The patient’s course has subsequently been satisfactory. A second patient developed a recto-vaginal fistula 15 days after surgery. At one month post-operatively, the patient underwent an attempted closure with biological glue, and at two months, she underwent a mucopasty closure combined with biological glue to close the fistula. Finally, at six months, she underwent a second mucosal flap closure combined with a diverting colostomy; this was successful and the patient colostomy was closed three months later.

Discussion
This prospective study demonstrated the efficacy of transanal hemorrhoidal artery ligation with mucopexy (THDm) by comparing it to Longo anopexy. It confirmed the efficacy and indications of both of these two techniques for hemorrhoidal disease.

In the literature, the success rate of hemorrhoidal artery ligation for hemorrhoidal prolapse varies from 84 to 94% but concurrent mucopexy was not performed in the majority of these studies [15, 16, 19, 20]. In a meta-analysis evaluating the Longo procedure, 88% of patients with mucosal hemorrhoidal prolapse were improved [12]. In our study both techniques were equally effective in correcting hemorrhoidal prolapse when evaluated at one month, but results for THDm deteriorated over the succeeding months.
Table 1  Progressive change of symptom scores (median and extremes) depending on operative technique.

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Pre-operative</th>
<th>Day of discharge</th>
<th>1st month</th>
<th>3rd month</th>
<th>6th month</th>
<th>12th month</th>
<th>18th month</th>
<th>24th month</th>
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<tbody>
<tr>
<td>Hemorrhoidal prolapse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longo</td>
<td>3 [0; 4]</td>
<td>0 [0; 4]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
</tr>
<tr>
<td>THD</td>
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<td>0 [0; 2]</td>
<td>0 [0; 3]</td>
<td>0 [0; 4]</td>
<td>0 [0; 4]</td>
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</tr>
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<td>P-value</td>
<td>0.8</td>
<td>0.0015</td>
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<td>0.75</td>
<td>0.7</td>
<td>0.4</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longo</td>
<td>3 [0; 4]</td>
<td>0 [0; 4]</td>
<td>0 [0; 2]</td>
<td>0 [0; 3]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
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<tr>
<td>THD</td>
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<td>0 [0; 2]</td>
<td>0 [0; 1]</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
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<tr>
<td>P-value</td>
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<td>0.6</td>
<td>0.08</td>
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<tr>
<td>Longo</td>
<td>2 [0; 4]</td>
<td>2 [0; 4]</td>
<td>1 [0; 4]</td>
<td>0.5 [0; 4]</td>
<td>0 [0; 4]</td>
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<td>THD</td>
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<td>0 [0; 4]</td>
<td>0 [0; 3]</td>
<td>0 [0; 4]</td>
<td>0 [0; 3]</td>
<td>0 [0; 2]</td>
<td>0 [0; 3]</td>
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<tr>
<td>P-value</td>
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<td>0.0001</td>
<td>0.005</td>
<td>0.06</td>
<td>0.14</td>
<td>0.26</td>
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<tr>
<td>Anal incontinence</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Longo</td>
<td>0 [0; 3]</td>
<td>0 [0; 3]</td>
<td>0 [0; 4]</td>
<td>0 [0; 4]</td>
<td>0 [0; 4]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
</tr>
<tr>
<td>THD</td>
<td>0 [0; 4]</td>
<td>0 [0; 0]</td>
<td>0 [0; 3]</td>
<td>0 [0; 2]</td>
<td>0 [0; 2]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
<td>0 [0; 1]</td>
</tr>
<tr>
<td>P-value</td>
<td>0.1</td>
<td>0.17</td>
<td>0.17</td>
<td>0.5</td>
<td>0.5</td>
<td>0.75</td>
<td>0.6</td>
<td>0.6</td>
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<tr>
<td>Pain</td>
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<td></td>
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<tr>
<td>Longo</td>
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<td>3 [0; 10]</td>
<td>0 [0; 9]</td>
<td>0 [0; 7]</td>
<td>0 [0; 5]</td>
<td>0 [0; 2]</td>
<td>0 [0; 2]</td>
<td>0 [0; 2]</td>
</tr>
<tr>
<td>THD</td>
<td>4 [0; 10]</td>
<td>0 [0; 8]</td>
<td>0 [0; 6]</td>
<td>0 [0; 5]</td>
<td>0 [0; 5]</td>
<td>0 [0; 6]</td>
<td>0 [0; 6]</td>
<td>0 [0; 6]</td>
</tr>
<tr>
<td>P-value</td>
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<td>0.0003</td>
<td>0.01</td>
<td>0.4</td>
<td>0.9</td>
<td>0.6</td>
<td>0.4</td>
<td>0.5</td>
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</table>

Table 2  Progressive change of satisfaction score depending on the procedure.

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Pre-operative</th>
<th>Day of discharge</th>
<th>1st month</th>
<th>3rd month</th>
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<th>12th month</th>
<th>18th month</th>
<th>24th month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longo</td>
<td>33%</td>
<td>69%</td>
<td>66%</td>
<td>78%</td>
<td>90%</td>
<td>100%</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td>THD</td>
<td>91%</td>
<td>91%</td>
<td>92%</td>
<td>91%</td>
<td>88%</td>
<td>82%</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>P-value</td>
<td>&lt;0.001</td>
<td>0.0243</td>
<td>0.0158</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. a, b, c, d: progressive change of mean symptom scores depending on operative technique.
Reported series have shown variable effectiveness of hemorrhoidal artery ligation for control of bleeding with 88 to 95% improvement [15–23]. Efficacy has been demonstrated in randomized trials comparing Longo anopexy to Milligan-Morgan (M-M) hemorrhoidectomy, but with widely differing results: between 0 and 33% of patients experienced re-bleeding [12]. This result was related to the presence of grade IV hemorrhoids, which were more prone to recurrence that often resulted in bleeding. In our study, recurrent bleeding was well controlled over the first few months after both THDm and Longo procedures, but results deteriorated in the THDm group after one year of follow-up.

The effectiveness of these two techniques in treating prolapse and bleeding is due to the fact that both techniques treat the cause by controlling the blood flow in the hemorrhoidal tissue and mucosal prolapse by mucopexy or anopexy [24]. Our patients who underwent re-operation for recurrence after THDm had formed no cicatricial fibrosis at the site of the sutured mucopexy; the mucosa appeared entirely normal. This is in contrast to the findings after Longo anopexy where there is firm fibrotic scar around the circumference of the staple line.

In our assessments of symptoms, we have deliberately distinguished between tenesmus and pain to obtain a better descriptive relevance. We were able to show superior efficacy of THDm versus Longo anopexy with regard to tenesmus yet the results with regard to pain were equivalent in the medium term. Several previous studies have shown that patients treated with Longo anopexy had less short-term pain than patients treated by conventional hemorrhoidectomy techniques [12,25,26]. Only one study, however, has compared THDm with conventional hemorrhoidectomy; this showed that the THDm group had decreased analgesic requirements [27]. These good results with regard to analgesic consumption for both the THDm and Longo techniques are due to the fact that the entire intervention is performed above the level of the dentate line.

Four prospective randomized studies have been published comparing hemorrhoidal artery ligation (without mucopexy) to the Longo procedure; three of these were the subject of a meta-analysis [28]. The study with the largest patient recruitment was reported by Infantino et al.: the study randomized 172 patients with grade III disease into two groups – hemorrhoidal artery ligation vs. Longo anopexy [24]. The objective of this study was to show a significant difference of 10% in success between the two techniques. Post-operative pain, whether spontaneous or during defecation, was no different between the two groups. The rate of recurrence or persistence of symptoms was 14% in the THD group and 7.1% in the Longo group (P = 0.22). The re-operation rate was 7.1% in the THD group and 11.3% in the Longo group. The authors concluded that both techniques are effective with a similar rate of post-operative pain and recurrence. The meta-analysis incorporated three randomized studies with low numbers of patients, comparing the efficacy of THD (without mucopexy) to the Longo procedure and concluding that both techniques had similar efficacy in the medium term with less early post-operative pain in the THD [28] group. A recent randomized study comparing THDm vs. Longo in patients with grades III and IV hemorrhoidal disease showed that recurrences were more frequent in the THDm group; in the authors’ opinion, this was linked to the inclusion of patients with grade IV disease [29]. Overall, our results were similar to these studies with similar rates of recurrence and patient satisfaction.

With regard to post-surgical work disability, randomized studies comparing the Longo procedure to M-M hemorrhoidectomy showed a statistically significant decrease in work days lost with 6–17 days for the Longo procedure versus 10–54 days for M-M hemorrhoidectomy [12]. In our study, the THDm technique decreased the number of work days lost compared to the Longo procedure, reflecting the low rate of post-operative complications such as pain.

Rare but serious complications (pelvic sepsis, fistula) have been reported after the Longo procedure as was the case in our study [8–11,13,30,31]. One of our patients in the Longo group developed a recto-vaginal fistula, and another experienced a failure of intra-operative stapling. To our knowledge, the only serious complications reported for THD are occasional episodes of bleeding requiring re-operation and transfusions, which was not the case in our study [17,32,33].

This study has demonstrated the effectiveness of THDm when compared to the Longo procedure. But the lack of randomization and the small number of patients may weaken the interest of these results. The biases related to the surgeons’ experience and patient selection may have been diminished by the participation of two centers each expert in the performance of one of these techniques. Prospective randomized trials are needed and could place the THDm procedure in the first line for management of hemorrhoidal disease because its conservative approach in no way inhibits the subsequent performance of other procedures if necessary.

Disclosure of interest

F.B.: specific interventions in the context of training surgeons in the use of THD.

References