Original Article

Doppler-guided hemorrhoidal artery ligation with mucopexy versus stapled hemorrhoidopexy in the management of grades 3 and 4 prolapsed hemorrhoids: A prospective randomized clinical study

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ABSTRACT

Background: Hemorrhoids are a common anorectal condition causing disability and discomfort in symptomatic patients. Several less invasive techniques including stapled hemorrhoidectomy (SH) and Doppler-guided hemorrhoidal artery ligation (DHL) with mucopexy have been introduced. In our study, we aim to compare these two techniques.

Patients and Methods: We included patients with symptomatic grade 3 or 4 prolapsed piles, aged from 18 to 70 years, who underwent either SH or DHL with mucopexy at the General Surgery Department, Ain Shams University hospitals. We excluded patients with previous anal surgery, hemorrhoids accompanied by other anal conditions such as fissure, fistula, or anal stenosis, impaired anal sphincter function or fecal incontinence, recurrent or complicated hemorrhoids. Patients with debilitating disease or American Society of Anesthesiologists III or IV were also excluded.

Results: From July 2021 to July 2023, 40 patients were prospectively included in our study. Twenty patients had DHL with mucopexy with a mean age of 35.3±8.8, while 20 patients underwent SH operation with a mean age 34.8±7.3. Both techniques were comparable with no significant difference between them regarding any of the postoperative anal symptoms, except pain, during 1, 3, 6, 12, and 18 months of follow-up. Longo (SH) operation has significantly higher early postoperative pain, using the visual analog scale score, compared with DHL (1 month, *P=0.03*, 3 months, *P=0.02*, and 6 months, *P=0.04*), but no significant difference in late postoperative pain visual analog scale scores.

Conclusion: Both techniques are effective in the management of grade 3 or 4 hemorrhoidal disease, but DHL technique has less postoperative pain.

Key Words: Doppler-guided hemorrhoidal artery ligation with mucopexy, prolapsed hemorrhoids, stapled hemorrhoidopexy.

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INTRODUCTION

Hemorrhoidal disease is a common anorectal disease-causing disability and discomfort in symptomatic patients. Hemorrhoidal disease is higher in parous females, smokers, old age, hypertensive, and obese patients. Hereditary and increasing intra-abdominal pressure factors are predisposing factors to hemorrhoidal disease[1].

The choice of treatment modality largely depends on the degree of prolapse, patient's preference, and the surgeon's experience. Early grades of hemorrhoids are managed based on dietary measures including a high-fiber diet, medical treatment, and modification of risk factors. If symptoms persist, surgical intervention is proposed for symptomatic late grades of hemorrhoids[2].

Several surgical techniques exist to tackle patient's perception of postoperative pain or incontinence. Although conventional hemorrhoidectomy (Milligan and Morgan) is considered the gold standard, postoperative pain, bleeding, sepsis, or stenosis prolongs patient's recovery and causes patient dissatisfaction. Stapler hemorrhoidopexy is an alternative treatment of hemorrhoids by resecting the rectal mucosa in a cylindrical manner above the dentate line using a stapler. SH, proposed by Longo in 1998, has less postoperative pain compared with conventional hemorrhoidectomy[3].

Doppler-guided transanal hemorrhoid dearterialization (DHL), proposed by Morinaga and colleagues, is associated with less postoperative pain compared with conventional hemorrhoidectomy. DHL is an effective alternative to SH and Milligan and Morgan hemorrhoidectomy with no safety concerns. Mucopexy was added to the DHL at the same sitting for the long-standing prolapsed hemorrhoids[4–6].

Both SH and DHL involve interruption of blood supply of hemorrhoids either by resection or ligation. Both procedures result in less postoperative pain, shorter hospital stay thereby improving patient satisfaction and quality of life. The aim of this study is to compare SH

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to DHL in patients with grade 3 or 4 hemorrhoids at our institution for 18 months postoperatively.

PATIENTS AND METHODS:

Study population and setting

From January 2021 to January 2023, this prospective randomized clinical study was conducted at the General Surgery Department, Ain Shams University hospitals. All American Society of Anesthesiologists scores I and II patients, aged 18–70 years, with symptomatic grade 3 or 4 prolapsed piles were included. We excluded patients with previous anal surgery, hemorrhoids accompanied by other anal conditions such as fissure, fistula, or anal stenosis, impaired anal sphincter function or fecal incontinence, recurrent or complicated hemorrhoids. Patients with debilitating disease or American Society of Anesthesiologists III or IV were also excluded.

Ethical consideration

Included patients consented to participate in this study. All patients' data remained confidential. Patients who refused to join this study were not included without affecting their medical care including postoperative follow-up.

Preoperative consideration

Patients included were assessed preoperatively by careful history taking and examination assessing hemorrhoid symptoms and patient's general condition. Preoperative laboratory investigations including complete blood count, liver and kidney function tests, virology, and international normalized ratio were done. All patients were assessed preoperatively for anal sphincter function by clinical examination.

Sampling and randomization

In all, 40 patients were allocated to either DHL with mucopexy or stappled hemorrhoidopexy with a 1 : 1 ratio using simple random sampling.

(1) Group 1: 20 patients were subjected to Doppler-guided hemorrhoidal artery ligation (DHL) with mucopexy.

(2) Group 2: 20 patients were subjected to SH.

Patients who presented to the surgery clinic at Ain Shams University hospitals, fit eligibility criteria, and agreed to participate were enrolled.

Operative technique

Doppler-guided hemorrhoidal artery ligation with mucopexy

A specifically designed anoscope with an incorporated side-sensing Doppler is used for this procedure. Patient is positioned in lithotomy position and then hemorrhoidal arteries, located at 3, 7, and 11 o'clock, are identified 4 cm above the dentate line by a Doppler ultrasound transducer. Dearterialization of these arteries is accomplished by suture ligation using interrupted absorbable Vicryl 2.0 figure-of-eight stitches. Mucopexy was added to the DHL at the same sitting for the long-standing prolapsed hemorrhoidal cushions by a running suture with 3–5 stitches from the level of artery ligation to the upper edge of the internal hemorrhoids (Figs 1–5).

Fig. 1: Preoperative piles. Patient is positioned in lithotomy position for Doppler-guided hemorrhoidal artery ligation.

Fig. 2: Specifically designed anoscope with incorporated side-sensing Doppler.

Fig. 3: Dearterialization of these arteries is accomplished by suture ligation using interrupted absorbable Vicryl 2.0.

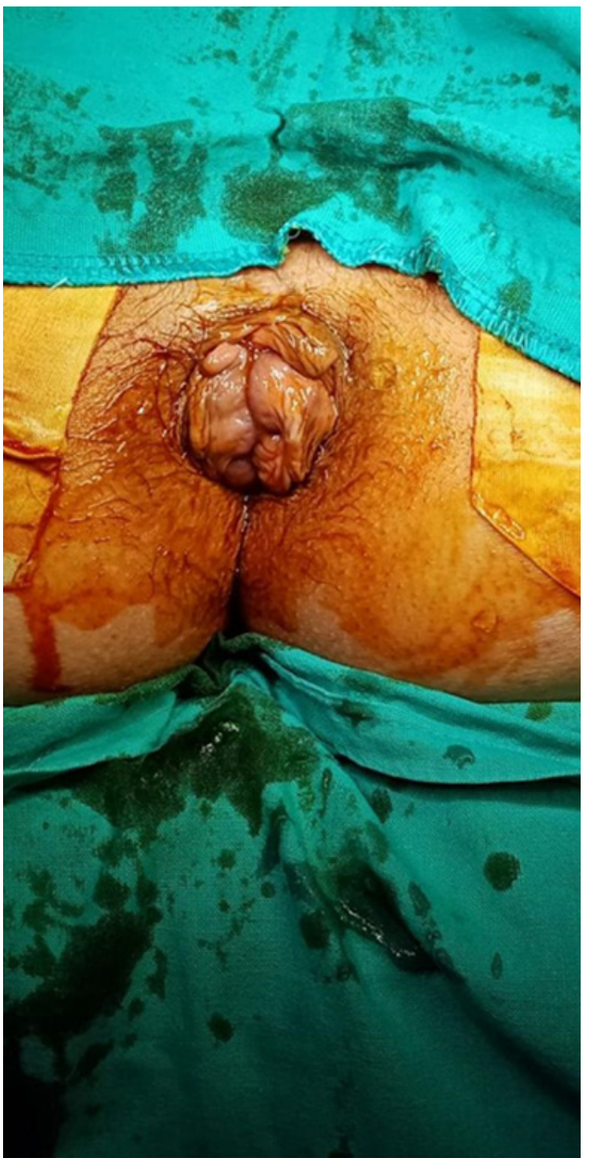

Fig. 4: Dearterialization of these arteries is accomplished by suture ligation using interrupted absorbable Vicryl 2.0.

Fig. 5: immediate post-Doppler-guided hemorrhoidal artery ligation with mucopexy.

Stapled hemorrhoidopexy (Longo)

The patient is positioned in lithotomy position. A transparent anoscope is inserted and fixed to the surrounding skin to facilitate reduction of prolapsed hemorrhoids. Then, a purse-string suture of 2.0 propylene is inserted circumferentially in the mucosa and submucosa of lower rectum about 2 cm above the dentate line. The head (anvil) of the circular stapler is introduced above the purse-string suture which is tied firmly around the central stem of the stapler. Then, the stapler is closed incorporating the prolapsing hemorrhoidal tissue and fired to resect the hemorrhoids circumferentially (doughnut tissue) (Figs 6–9).

Fig. 6: Preoperative piles. Patient is positioned in lithotomy position for stapled hemorrhoidopexy (Longo).

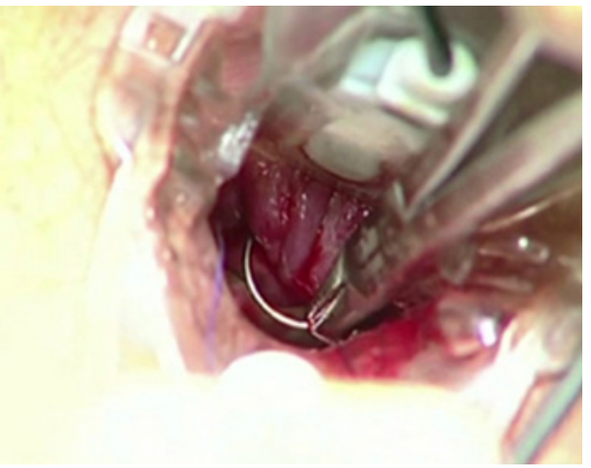

Fig. 7: Transparent anoscope is inserted and fixed to the surrounding skin. A purse-string suture of 2.0 propylene is inserted circumferentially in the mucosa and submucosa of lower rectum about 2 cm above dentate line and stapler is closed incorporating the prolapsing hemorrhoidal tissue.

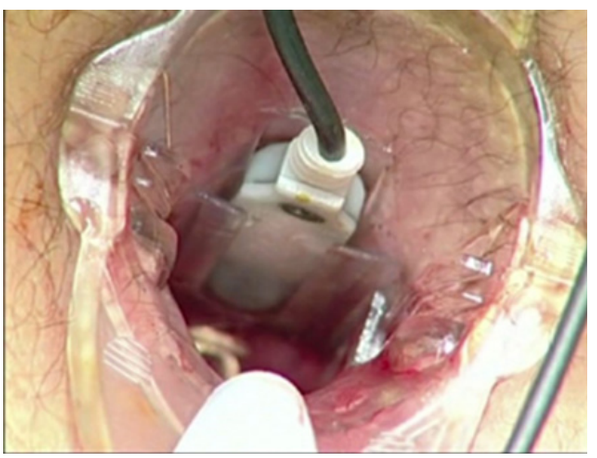

Fig. 8: Stapler fired to resect the hemorrhoids circumferentially (doughnut tissue).

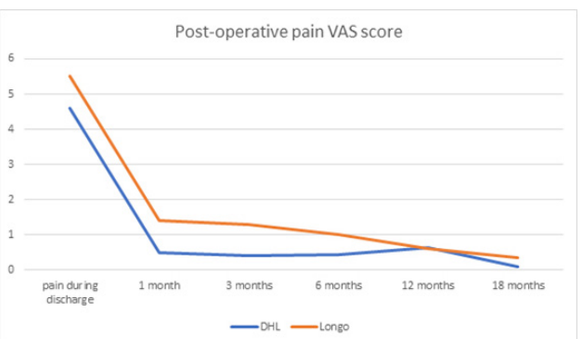

Fig. 9: Immediate postfiring of the stapler, stapled hemorrhoidopexy.

Postoperative treatment and follow-up

Patients were evaluated postoperatively for anal symptoms including pain, bleeding, and constipation. Patients were followed up at the clinic at 1, 3, 6, 12, and 18 months postoperatively for bleeding, recurrence, pain, tenesmus, and incontinence by a questionnaire.

Statistical analysis

Continuous data were expressed in terms of mean and standard deviation or median and interquartile range. Categorical data is expressed in counts and percentage. The collected data will be recorded, tabulated, and coded using Excel 365, Microsoft Corporation (Statistical analysis was done using IBM SPSS statistics for windows, Version 23.0. Armonk, NY: IBM Corp). Then data will be statistically analyzed using the SPSS program, version 24.

RESULTS:

From January 2021 to January 2023, 40 patients were included in our study. Twenty patients had DHL with a mean age of 34.8±7.3, while 20 patients underwent Longo operation with a mean age of 35.3±8.8. Two patients had recurrence of hemorrhoids in the Longo group, while one patient had recurrence in the DHL group. Baseline characteristics of the included patients are shown in (Table 1).

Table 1: Baseline characteristics

Characteristic	DHL	Longo	*P* value
Age	34.8±7.3	35.3±8.8	0.86
Sex			0.5
Male	8	10	
Female	12	10	
Comorbidities			0.9
No comorbidity	15	14	
DM	4	5	
HTN	1	1	
BMI	22.9±1.3	23±2.8	0.78
Degree of hemorrhoids			0.19
Grade ٣	6	10	
Grade ٤	14	10	
Recurrence			0.54
No	19	18	
Yes	1	2	

DHL, Doppler-guided hemorrhoidal artery ligation; DM, diabetes mellitus; HTN, hypertension.

Both techniques were compared regarding operative time, hospital stay, and return to work. DHL has statistically significantly lower operative time compared with SH (23.8±2.8 vs. 28±4, *P=0.0001*). Patients who underwent DHL had significantly less hospital stay (1.25±0.5 vs. 1.95±0.5, *P=0.0001*) and early return to work (8.1±2.6 vs. 20.8±5, *P=0.0001*) (Tables 2–4).

Table 2: Comparison between Doppler-guided hemorrhoidal artery ligation and stapled hemorrhoidectomy regarding operative time

	DHL	Longo	*P* value
Operative time (in min)	23.8±2.8	28±4	0.0001

DHL, Doppler-guided hemorrhoidal artery ligation.

Table 3: Hospital stay

	DHL	Longo	*P* value
Hospital stay (in days)	1.25±0.5	1.95±0.5	0.0001

DHL, Doppler-guided hemorrhoidal artery ligation.

Table 4: Return to work

	DHL	Longo	*P* value
Return to work (in days)	8.1±2.6	20.8±5	0.0001

DHL, Doppler-guided hemorrhoidal artery ligation.

Patients were followed postoperatively at 1, 3, 6, 12, and 18 months, respectively, for postoperative anal symptoms including bleeding, prolapse, tenesmus, incontinence, and pain. Both techniques were comparable with no significant difference between them regarding any of the postoperative anal symptoms, except pain, during 1, 3, 6, 12, and 18 months of follow-up (Figs 10–13).

Regarding postoperative pain, Longo (SH) operation has significantly higher early postoperative pain, using the visual analog scale (VAS) score, compared with DHL (1 month, *P=0.03*, 3 months, *P=0.02*, and 6 months, *P=0.04*), but no significant difference in late postoperative pain VAS scores (Fig. 14).

DISCUSSION

Anorectal and perineal diseases are associated with intense pain, discomfort, and low quality of life for the patient. Grade 3 and 4 hemorrhoids are not an exception. We compared DHL with SH (Longo) techniques regarding patients with grade 3 or 4 hemorrhoidal disease for postoperative anal symptoms, operative time, hospital stay, return to work, and recurrence. In our cohort of 40 patients, DHL was associated with lower operative time, less hospital stays, early return to work, and lower early pain VAS score compared with

SH. However, no significant difference was detected regarding recurrence of hemorrhoids, postoperative anal symptoms, and late postoperative pain VAS scores.

In a prospective study comparing SH to DHL in two centers, Béliard and colleagues evaluated postoperative anal symptoms and patient satisfaction in 81 patients with grade 2 or 3 hemorrhoids. Patients were followed up at 1, 6, 12, and 24 months. DHL had significantly better short-term outcomes than SH in terms of postoperative patient satisfaction and anal symptoms including pain, which was similar to the results obtained in our study. However, compared with our study, Béliard *et al*.[7] showed no difference in the length of hospital stay.

In another prospective multicentric study, 169 patients were randomized to either DHL (n=85) or SH (n=84). Patients were followed up by Infantino and colleagues for a mean period of 17 months (15–20). Early postoperative complications, pain, recurrence, and incontinence were not significantly different between both techniques unlike the results obtained in our study. However, as shown in our study, DHL had significantly shorter hospital stay and less late postoperative complications[8].

Between January 2008 and January 2010, Zampieri and colleagues evaluated quality of life, defecation, and regression of symptoms in 114 patients with grade 3 or 4 hemorrhoidal disease. Sixty patients had SH while 46 patients underwent DHL. In accordance with the results of our study, authors reported no difference in postoperative complications or readmissions, but as detected DHL patients had significantly higher rate of pain resolution at short term (1–6 months) compared with SH. However, no difference was detected by Zampieri *et al*.[9] in operative time, bleeding, or relapse.

Impact of device type used for DHL or SH was assessed by Venara and colleagues. Results, including postoperative complications, recurrence, and reoperation of multicenter LigaLongo RCT after 12 months of follow up were reported. Grade 2 or 3 hemorrhoid patients (n=377) were randomized to either DHL (n=193) or SH (n=184). In the DHL arm, the operation was done by either (THD) (THD, Correggio, Italy) or HAL-RAR (Agency for Medical Innovations GmbH, Feldkirch, Austria); however, in the SH arm, the operation was done by either prolapse and hemorrhoids (PPH)-03 (Ethicon Endo-Surgery, Cincinnati, Ohio, USA) or hemorrhoidopexy and prolapse (HEM) (Covidien Inc.) staplers. In the DHL arm, morbidity was similar between both devices. In the SH, arm, the PPH stapler had significantly higher postoperative morbidity compared with the HEM stapler. There was no difference between devices in terms of recurrence or reoperation[10].

CONCLUSION

Both techniques are effective in the management of grade 3 or 4 hemorrhoidal disease, but the DHL technique has less postoperative pain. However, our study is limited to a small sample size, which might underestimate our findings. Overall, DHL is comparable to SH in terms of efficacy and postoperative complications, but DHL is associated with less postoperative pain due to its less invasive technique compared with SH (Longo).

CONFLICT OF INTEREST

No conflict of interest disclosure.

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