

Original Research Article

Linear Pinched Hemorrhoidectomy: A Retrospective Observational Study (An Innovative, Simplified Hemorrhoidectomy)

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Abstract

Objectives: There was an urgent need to create a simple, reliable hemorrhoidectomy procedure for high-risk cases in our university hospital.

We performed linear pinched hemorrhoidectomy (LPH) and evaluated its effectiveness compared to conventional hemorrhoidectomy (CH).

Methods: We included 215 Goligher grade 3 and 4 hemorrhoid cases in this study. Of these cases, 167 were in the CH group, and 48 patients were in the LPH group.

We retrospectively compared the lengths of hospital stay, operative times, blood loss, and complications.

Results: The age tended to be higher in the LPH group (mean: CH 60 years, LPH 68 years).

In the univariate analysis, LPH had more resections, shorter operative times, and less blood loss. LPH had shorter operative times in the multivariate analysis, less blood loss, and more anticoagulant use.

There were no significant differences between the two groups in terms of complications. Five and two patients in the CH and LPH groups, respectively, had postoperative hemorrhage requiring hemostasis. Only the CH group had three and four cases of anal stenosis and wound edema, respectively.

Conclusions: We studied simplified hemorrhoidectomy using an ultrasonic scalpel and cylindrical proctoscope in a university hospital. We found that it a useful procedure with few complications and was easy for residents to learn. We believe that advances in surgical devices will make it possible to perform safer and simpler hemorrhoidectomy in the future.

Keywords

hemorrhoidectomy, surgical procedure, ultrasonic scalpel

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Introduction

Hemorrhoids are a common surgical diseases, and those classified as Goligher grade 3 and 4 require surgery. The most curative surgical procedure is a hemorrhoidectomy using the Milligan-Morgan method[1]. The American Society of Colon and Rectal Surgeons (ASCRS) guidelines also provide strong evidence for the use of hemorrhoidectomy as a treatment for grades 3 and 4 hemorrhoids[2]. While the effi-

cacy of hemorrhoidectomy is high, its disadvantage is severe postoperative pain. Furthermore, hemorrhoidectomy takes a lot of time to learn due to the complexity of the technique. In recent years, a wide variety of surgical techniques have been reported for the management of hemorrhoids. The typical surgical procedures include stapled hemorrhoidopexy (SH), transanal hemorrhoidal dearterialization (THD), and device-assisted conventional hemorrhoidectomy.

In Japan, proctological surgery, such as that for hemor-

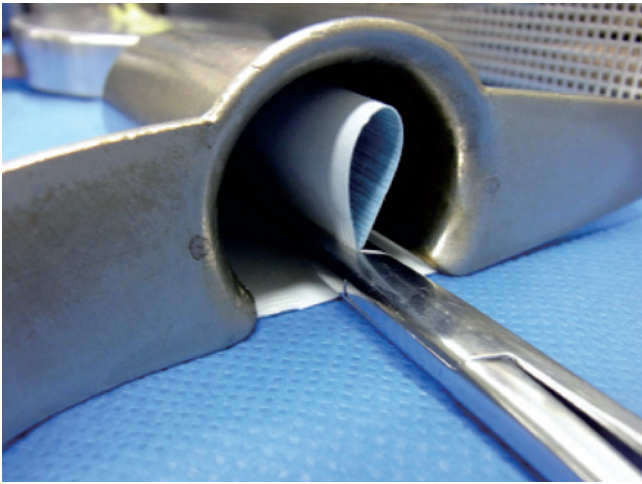


Figure 1. Cylindrical proctoscope and concept of LPH

rhoids, is concentrated in hospitals that specialize in anorectal diseases. As a result, surgery for hemorrhoids is rarely in university or general hospitals. Our institution is one of the few university hospitals in Japan that traditionally treats anorectal diseases.

On the other hand, there are few anal disease cases in university hospitals. In many cases, residents treat anal disease as a part of training. It is difficult for residents to master the complex surgical techniques related to hemorrhoidectomy with a small number of cases. Therefore, we always felt that it was necessary to simplify the hemorrhoid resection.

We implemented linear pinched hemorrhoidectomy (LPH) and evaluated its effectiveness compared to conventional hemorrhoidectomy (CH).

Methods

LPH

Almost all cases were performed in the jackknife position under spinal anesthesia. Patients on antithrombotic therapy were treated in lithotomy position under general anesthesia.

As a general rule, antithrombotic therapy continued, and the patients underwent surgery.

LPH used a cylindrical proctoscope (Yokohama Model, Arakawa Manufacturing Company, Osaka, Japan).

This proctoscope has cylinder-shaped with a 30 mm diameter and has a slit and two handles (Figure 1).

We repeatedly pinched and released hemorrhoids with tweezers several times until we could image the area of dissection (Figure 2A).

The resection imaging was very important because excessive resection could lead to postoperative anal stenosis, while under resection could lead to recurrence.

Following the image, the hemorrhoid was pinched directly

with the Lister forceps (Figure 2B).

A Sonosurg (Olympus Medical Systems Corp., Tokyo, Japan) ultrasonic scalpel was used for hemorrhoid resection (Figure 2C). The ultrasonic scalpel tip is 4 mm thick and must be inserted into the forceps' lower edge.

Then we must make about 4 mm space at the forceps and base of hemorrhoid.

An ultrasonic scalpel was inserted into the lower edge of the forceps and the hemorrhoid were resected (Figure 2D, E).

After excision, the wound was closed using an interrupted suture with a 3-0 absorbable thread.

Interrupted suture was used for resident training. The proctologist could choose to use continuous sutures.

While using this proctoscope, the hemorrhoids were sealed with an ultrasonic scalpel for localized resection to prevent anal stenosis.

CHs were performed with scissors and the wound was semi-closed with an interrupted suture with same proctoscope. Electrocautery was used for hemostasis.

We studied cases of Goligher grade 3 and 4 hemorrhoid that were treated at the Toho University Medical Center Omori Hospital, located in Tokyo, Japan, from April 2008 to September 2019.

From May 2008 to December 2014, we adopted the CH.

After January 2015, the new technique LPH has been selected.

Continuous intravenous patient-controlled analgesia (fentanyl 3 $\mu\text{g}/\text{kg}/\text{h}$) was used for 24 h postoperatively. In addition, starting on the first postoperative day, zaltoprofen (80 mg) was administered at 3 tablets per day for 1 week. The amount of analgesia added in the first 48 hours postoperatively was examined and scored (oral non-steroidal anti-inflammatory drugs [NSAIDs]: 1 point; intravenous NSAIDs: 2 points; intravenous opioid: 3 points).

The nurse randomly selected the kind of analgesic according to the patient's condition. Preoperative constipation patients took magnesium oxide as a postoperative laxative at 1500 mg/day. We retrospectively compared length of hospital stay, operative time, blood loss, pain, and complications (bleeding, stenosis, urinary retention, and infection).

Student's and Welch's t-tests were applied for continuous variables of equal and non-equal variances, respectively. Fisher's direct test or the chi-squared test were applied to the nominal variables. Multivariate analysis was performed using logistic regression analysis.

A *p*-value of <0.05 was statistically significant.

EZR (Easy R) was used as the statistical analysis software[3].

We obtain written consent from the patient and all parties involved (e.g., custodians, legal guardians, etc.) for the information, including photographs.

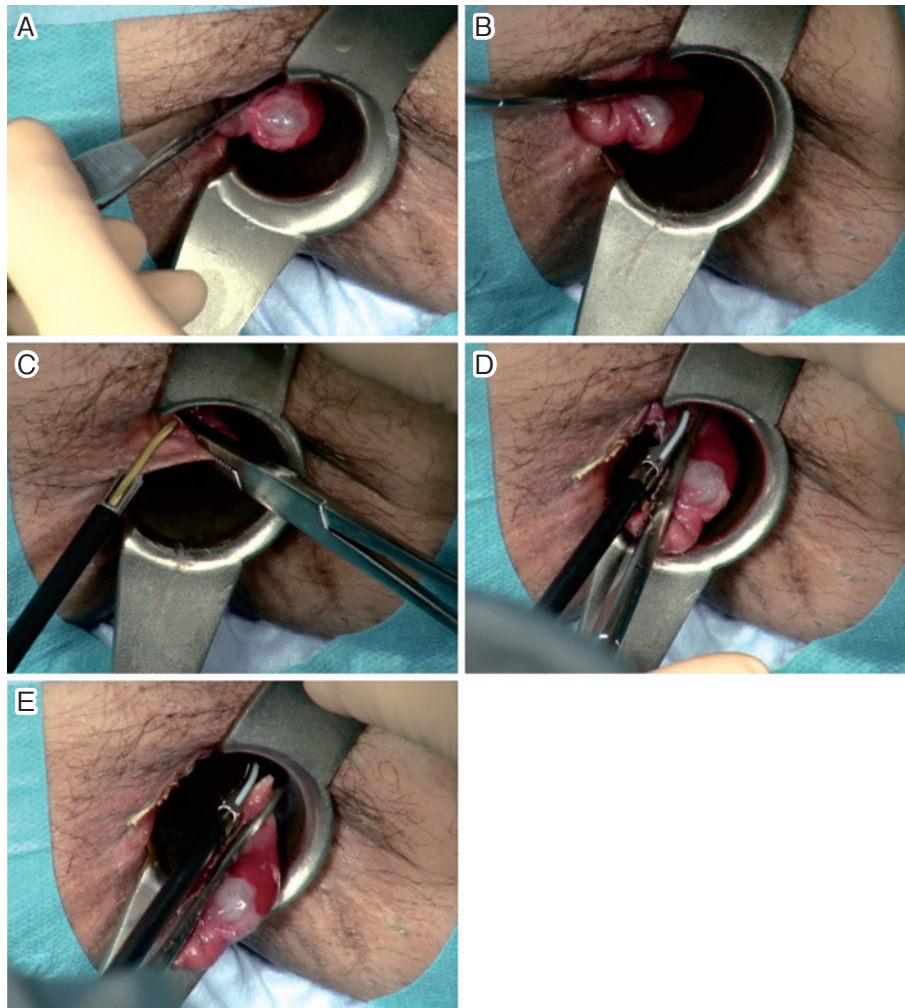


Figure 2. A: The hemorrhoid was pinched longitudinally with tweezers. B: The hemorrhoid was pinched directly with the Lister forceps. C: A Sonosurg was used as an ultrasonic scalpel for the resection of hemorrhoid. D: An ultrasonic scalpel was inserted into the gap and the hemorrhoid was resected along the lower edge of the forceps. E: The resection of the hemorrhoid was completed.

Table 1. The Characteristics of the Patients.

	CH (n = 167)	LPH (n = 48)	P
Average (SD) age (yr.)	60 (\pm 16)	68 (\pm 13)	0.001
Sex ratio (M/F)	96/71	26/22	0.807
PS (ASA) 1/2/3	81/60/26	5/21/22	
Grade			
3	160	47	
4	7	1	
Antiplatelet agent	15 (9%)	6 (12.5%)	0.106
Anticoagulant	23 (13.8%)	20 (41.7%)	<0.001

CH, conventional hemorrhoidectomy; LPH, linear pinched hemorrhoidectomy; SD, standard deviation; yr, years; M, male; F, female; PS, performance status; ASA, American Society of Anesthesiologists classification.

Ethical approval

This clinical study was approved by the ethics committee of the Toho University Medical Center Omori Hospital on February 4, 2020 (reference number M19193).

Results

From April 2008 to September 2019, we performed 215 cases of hemorrhoidectomy. Table 1 shows the patient backgrounds. There were 167 and 48 cases in the CH and LPH groups, respectively. There were no significant differences in gender between the two groups. The age tended to be higher in the LPH group (mean: 60 and 68 years in the CH and LPH groups, respectively; $P = 0.001$, Table 1).

Antithrombotic therapy was administered to 64 of the 215

patients (about 30%). The LPH group was more likely to take anticoagulants due to cardiovascular disease prevalence (P < 0.001). In contrast, there were no significant differences in the antiplatelet therapy use between the two groups (P = 0.106, Table 1).

There were no significant differences between the two groups in terms of complications. Postoperative hemorrhage requiring hemostasis was seen in 5 and 2 patients in the CH and LPH groups, respectively. Only the CH group had three anal stenosis and four wound edemas (Table 2).

In the univariate analysis, LPH had a higher number of

resections (P = 0.004), shorter operative time (P = 0.020), and less blood loss (P = 0.003) (Table 3).

In the multivariate analysis, LPH had shorter operative time for a single resection (P=0.001), less blood loss (P=0.011), and more anticoagulant use(P=0.002) (Table 4).

Discussion

Our study found that, compared to CH, LPH had a shorter operative time and less blood loss. Furthermore, despite the greater number of resected hemorrhoids, LPH had less postoperative anal stenosis due to the limited resection area.

On the other hand, the complications and postoperative pain from LPH were like those of CH. Ultimately, LPH was useful as a simplified and innovative procedure of hemorrhoidectomy.

Compared with previous CH reports, LPH was 0% for postoperative stenosis, less than CH (1.4%-3.3%). There was no significant difference in postoperative bleeding between LPH (4.2%) and CH (0%-9.7%). For urinary retention, LPH was 0%, less than CH (3.3%-28.2%)[1,2,8].

The main procedures currently performed for hemorrhoids are CH, SH, and THD.

SH is associated with less postoperative pain and a faster

Table 2. Complications.

	CH (n = 167)	LPH (n = 48)	P
Urinary retention	0	0	1
Wound edema (at 1 wk.)	3	0	1
Anal stenosis (at 6 wks.)	4	0	0.577
Hemorrhage	5	2	0.654
Flatus incontinence (at 6 wks.)	0	0	1
Impaired wound healing (at 6 wks.)	0	0	1
Recurrence (at 6 wks.)	0	0	1

CH, conventional hemorrhoidectomy; LPH, linear pinched hemorrhoidectomy; wk, week (s).

Table 3. Statistical Analysis (Univariate).

	CH	LPH	P
No. of hemorrhoids resected, average (range)	2.32 (1-4)	2.92 (1-8)	0.004
1	37	7	
2	44	10	
3	82	18	
≥4	4	13	
Operative time (SD, min)	90 (42)	75 (34)	0.020
Operative time / n (SD, min)	41 (18)	29 (15)	<0.001
Blood loss (SD, mL)	47 (74)	15 (32)	0.003
Analgesics score (SD, 48hr)	1.71 (2.59)	1.42 (2.08)	0.516
Hospital stay (SD, d)	11.6 (4.8)	12.3 (6.0)	0.395

CH, conventional hemorrhoidectomy; LPH, linear pinched hemorrhoidectomy; no., number; SD, standard deviation; min, minutes; mL, milliliters; hr, hours; d, days.

Table 4. Statistical Analysis (Multivariate).

	CH	LPH	Odds ratio	95%CI	P
Operative time (mean)	90	75	1.02	1.0000-1.030	0.055
Operative time / n (mean)	41	29	0.942	0.9090-0.976	0.001
Blood loss (mean)	47	15	0.975	0.9560-0.994	0.011
Anticoagulant	23	20	1.73	1.7300-11.800	0.002
complication	14	4	0.318	0.9090-0.976	0.241
post operative bleeding	5	2	1.36	0.1050-17.600	0.815

CH, conventional hemorrhoidectomy; LPH, linear pinched hemorrhoidectomy; CI, confidence interval; n, number.

Table 5. Characteristics of Procedure.

procedure	technique	recurrence	bleeding	delay bleeding	Hospital stays	pain	complication
LPH	easy	low	small	sometime	long	strong	simple
CH	difficult	low	large	sometime	long	strong	simple
THD	easy	high	small	rare	short	weak	simple
PPH	medium	high	small	few	short	weak	complex

LPH, linear pinched hemorrhoidectomy; CH, conventional hemorrhoidectomy

THD, transanal hemorrhoidal dearterialization; PPH, procedure for prolapse and hemorrhoid

return to society. However, serious complications, such as peritonitis and rectal perforation, may occur, and the postoperative recurrence and incontinence rates are high[4-6].

In the eTHoS study, which randomized and analyzed the results of 777 patients, SH was less painful in the short term than traditional resection surgery, and the rate of surgical complications was similar between the two groups[6].

However, the postoperative quality of life score (EQ-5D-3L) was significantly higher in CH, and the study ultimately recommended CH as the surgery of choice[6].

In comparing CH using a Harmonic Scalpel® and SH, the former was safer, easier, quicker, and less likely to result in a long-term relapse than SH[7].

THD is less invasive, more effective, and has fewer complications, but the problem is that it has a high recurrence rate. Mucopexy may be added if THD has prolapse symptoms.

In a study that contrasted THD and CH, THD was reported to have better long-term outcomes with less pain[8].

On the other hand, after 1-3 years of follow-up, the recurrence rate of THD is higher than that of CH[9,10]; however, when mucopexy is added to THD, the recurrence rates are comparable. Their levels of postoperative pain and rate of complications have also been reported as similar[11,12]. A comparison of THD with mucopexy and CH using a LigaSure® showed shorter postoperative analgesic use and operative times for CH[13].

As indicated in the ASCRS guidelines, CH is a very effective approach; however, the levels of postoperative pain and complications are a problem[2]. Currently, hemorrhoidectomy using a device reportedly improves postoperative pain. The LigaSure® hemorrhoidectomy resulted in a shorter operative time and less early pain. There was no difference in the complications between the two groups[14].

The Harmonic Scalpel® hemorrhoidectomy had a shorter operative time, less blood loss, and postoperative pain. Therefore, it had a faster return to work time[15-17]. The Harmonic Scalpel® hemorrhoidectomy is less painful than electrocautery hemorrhoidectomy since it does not cause excessive lateral thermal injury[18,19].

A comparative study between LigaSure® and Harmonic Scalpel® hemorrhoidectomy showed the LigaSure® hemor-

rhoidectomy had a shorter operative time and less pain[20,21].

Importantly, SH and THD reported the highest recurrence rates when compared to other types of hemorrhoidectomies[22]. A study of CH, Harmonic Scalpel®, and LigaSure® hemorrhoidectomy, SH, and THD showed that THD and SH had more complications and higher recurrence rates. CH also had reduced hemorrhoidal thrombosis, but the recurrence rate was high. A Harmonic Scalpel® resulted in a higher rate of anal stenosis but a lower recurrence rate[23].

Table 5 shows the characteristics of each procedure.

At our university hospital, many patients with hemorrhoids are at high risk of having comorbidities. Therefore, reliable and simplified surgical techniques are required.

However, the surgical technique for hemorrhoidectomy is complicated and to learn it requires time and numerous cases.

On the other hand, the number of hemorrhoids in university hospitals is small, so there was a need to simplify this complicated technique. Excessive resection of hemorrhoidal tissue can also cause postoperative anal stenosis. In contrast, under-resection of hemorrhoidal tissue causes recurrence. To properly resect the hemorrhoidal tissue without removing too much or too little, practice is required.

The hemorrhoids were sealed and minimally excised with an ultrasonic scalpel.

Also, LPH uses a cylindrical proctoscope to secure the diameter of the anus to remove the hemorrhoid and suture the wound.

As a result, LPH had less postoperative anal stenosis.

For example, if the hemorrhoids are next to each other, CH often results in an en bloc resection. On the other hand, with LPH, segmental resection is possible. In other words, LPH can be used to resect hemorrhoids within the minimum necessary area so that there is little postoperative stenosis despite a large number of resections. Also, LPH makes it easy to image a hemorrhoidectomy simply by pinching it with forceps. Considering the above, LPH is an excellent technique that even residents may learn in a short period.

In addition to the LPH technique, we utilized ultrasonic scalpels to prevent intraoperative and postoperative bleeding, one of the most concerning postoperative complications of

hemorrhoids. In our study, the bleeding complications related to LPH were like those in CH, even though LPH had less blood loss and more patients were using anticoagulants. There was no difference in the postoperative pain between the two groups.

The disadvantage of energy devices is their high cost; therefore, it is desirable to develop an economical device with strong hemostatic power to make LPH an even better technique. In other words, LPH without suturing and with a new device is currently considered the ideal hemorrhoidectomy.

Our study's disadvantage was that it was a single-center, retrospective study with a small number of cases.

Also, the operative times were longer than usual because the residents were performing the operations.

In conclusion, we studied simplified hemorrhoidectomies in a Japanese university hospital.

Our residents found the simplified hemorrhoidectomy technique, using ultrasonic scalpels and a cylinder-type proctoscope, easy to learn. Also, we believe it is a useful technique with few complications.

Advances in devices will make it possible to perform safer and simpler hemorrhoidectomies when suturing is no longer necessary.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

All authors listed in the manuscript meet the ICMJE contribution criteria.

Approval by Institutional Review Board (IRB)

This clinical study was approved by the ethics committee of Toho University Medical Center Omori Hospital on February 4, 2020 (reference number M19193).

Disclaimer

Kimihiko Funahashi is one of the Associate Editors of Journal of the Anus, Rectum and Colon and on the journal's Editorial Board. He was not involved in the editorial evaluation or decision to accept this article for publication at all.

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