

Original Research Article

## Pain at the First Post-hemorrhoidectomy Defecation Is Associated with Stool Form

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### Abstract

**Objectives:** Post-hemorrhoidectomy defecation pain is problematic, and pain associated with the first defecation is particularly important for patients. The present study aimed to investigate whether stool form consistency affected defecation pain after hemorrhoidectomy.

**Methods:** A prospective, cohort, observational study where patients scheduled for hemorrhoidal surgery were analyzed. This study used two patient-reported scales to study parameters based on the first postoperative defecation. The Bristol Stool Form Scale (BSFS) and visual analog scale (VAS) assessed stool consistency and defecation pain. The association between stool consistency and defecation pain intensity was assessed using multiple linear regression analysis. Where there was evidence of non-linearity, we applied a restricted cubic spline with three knots to explore the non-linear association. We performed a non-linear regression analysis to estimate the association.

**Results:** A total of 179 patients were analyzed. The regression model results demonstrated that these scales negatively correlated with statistical significance ( $p = 0.003$ ).

**Conclusions:** This study showed that the softer the stool, the less painful the defecation. Surgeons should attempt to induce a patient to avoid hard stool after surgery.

**Trial registration:** The Ethics Review Committee of the Japan Medical Association approved the study. The study was registered with the Japan Registry of Clinical Trials (jRCT1030190224, <https://jrct.niph.go.jp/latest-detail/jRCT1030190224>).

### Keywords

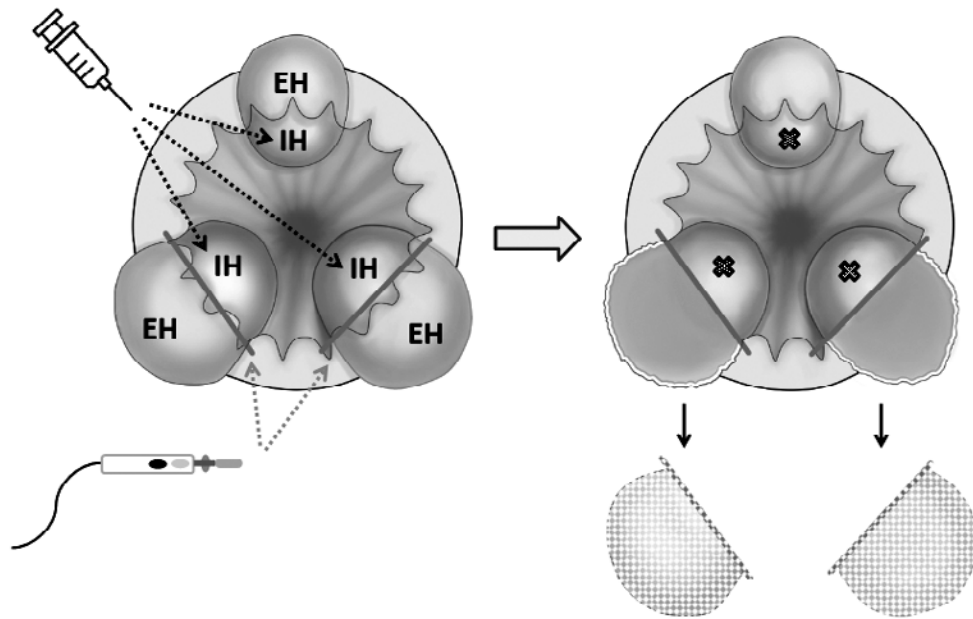
hemorrhoidectomy, postoperative pain, stool form scale, defecation

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### Introduction

Post-hemorrhoidectomy pain has long been a well-known problem [1], and pain associated with the first defecation after surgery may be the most problematic postoperative pain for patients. Only a few studies have focused on pain associated with the first postoperative defecation. One such study stated that defecation pain was less intense after a laxative called lactulose [2]. However, it did not evaluate stool con-

sistency. Therefore, the author performed a pilot study [3] using a measure called the Bristol Stool Form Scale (BSFS) [4] in recent years. Although the pilot study results showed no apparent differences in the intensity of defecation pain among the hard, normal, and soft stool groups, the sample size was small. In the present study, we tested the following hypothesis with enough sample size: stool with a higher consistency applies a greater mechanical force to wounds and produces more intense defecation pain.



**Figure 1.** The schematic shows the limited half hemorrhoidectomy procedure with aluminum potassium sulfate and tannic acid (ALTA) injection sclerotherapy. Gray solid lines indicate the removal of two external hemorrhoids at the dentate line. Black dotted arrows indicate the injection of ALTA solution into three internal hemorrhoids. Gray dotted arrows indicate external hemorrhoids being removed via diathermy. IH: internal hemorrhoid, EH: external hemorrhoid.

## Methods

### Population and design

We performed a single-center, prospective, cohort observational study at the Yano Proctological Clinic in Takamatsu, Japan, between February 2020 and December 2020. Eligible patients were 20 years of age or older, with a confirmed diagnosis of hemorrhoids (grade 3 or 4), scheduled to undergo distal hemorrhoidectomy with aluminum potassium sulfate and tannic acid (DHA) [5]. The analyses used multiple linear regression techniques.

### Exclusions

The study excluded patients with anal fissures or a history of anal surgery. In addition, patients who submitted no records or incorrect records for the first postoperative defecation, did not defecate once over 3 days, or did not adhere to instructions about oral analgesics were excluded.

### Ethical guidelines

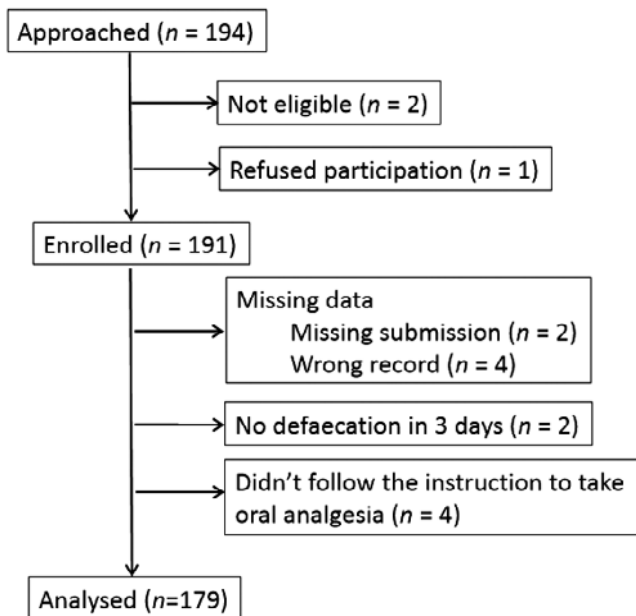
The study protocol was reviewed by the Japan Medical Association Ethical Review Board. The study was registered with the Medical Information Network and clinical trial registry (jRCT1030190224). The study was performed concerning the Declaration of Helsinki, which complied with the study protocol.

### Procedure of surgery

All hemorrhoidectomies were day surgeries. In the DHA procedure, the internal hemorrhoid components are not resected. Instead, sclerosing agents, aluminum potassium sulfate, and tannic acid (Zione<sup>®</sup>; Mitsubishi Tanabe Pharma Corporation, Osaka, Japan) are injected into them, and only the external hemorrhoid components are resected. While external hemorrhoids are excised via ligation in the original DHA procedure, electrocautery diathermy was used to excise the external hemorrhoids without any ligation in this study (Figure 1). The patient was in the Sims' position. As local anesthesia, 20 ml of 1.0% lidocaine was submucosally injected into the hemorrhoids. The external hemorrhoids were resected before ALTA was injected into the internal hemorrhoids. The surgeon resected the larger two of the three hemorrhoids and left the smallest hemorrhoid unresected [6]. ALTA was injected into all three hemorrhoids. The ALTA solution was submucosally injected via a proctoscope into internal hemorrhoids, and the total amount of ALTA injected was recorded. One fixed surgeon performed all operations.

### Postoperative care

For all patients, tablets of loxoprofen sodium hydrate (Loxonin<sup>®</sup>, Daiichi-Sankyo, Tokyo, Japan), an oral non-steroidal anti-inflammatory drug (NSAID), were dispensed to control pain with an instruction to take a 60-mg tablet



**Figure 2.** Study flow chart.

orally every 6 h, four times daily, for 3 days. The first NSAID tablet was administered in the operating room immediately after the surgery. Patients were asked before surgery whether they wanted to use an oral laxative postoperatively; those who wished to were instructed to take two 330-mg tablets of a magnesium laxative (magnesium hydroxide, Magmit<sup>®</sup>, Nihon Shinyaku, Kyoto, Japan) once daily at bedtime for 7 days from the day of surgery.

### Evaluation

A nurse, who was not directly involved in this study, handed out a survey form to each patient before surgery and instructed them on how to complete the form. The survey form contained illustrations of seven stool forms with different levels of consistency often used in the BSFS. The seven illustrations of the stool were accompanied by verbal explanations in Japanese, which corresponded to the following explanations in English translated by a native English speaker fluent in Japanese. Moreover, the survey form contained three questions about the first defecation. The first question was on which day the defecation occurred, followed by three options: the day of surgery (Day 1), the day after surgery (Day 2), and 2 days after surgery (Day 3). The second question was about the intensity of pain, under which there was a 10-cm horizontal straight line; the patients used this line to indicate the intensity of pain based on self-assessment. The intensity of pain at defecation was rated between 0 (no pain) and 10 (very severe pain) using a visual analog scale (VAS). The third question was about the stool shape; below the question, there was a blank space to indicate which one of the seven illustrations was closest to the patient's stool with a corresponding number. The space

was left blank when there was no defecation. The day of surgery was counted as Day 1 in this study. Moreover, the nurse interviewed patients to ask questions about their constipation scores [7]. The score ranged from 0 to 30, with 0 indicating normal and higher scores indicating more severe constipation. Patients submitted the completed forms within 1 week after surgery. At the time of submission, the nurse asked the patients whether they had taken the analgesic as instructed. Patients who failed to submit the form within 1 week received a reminder call.

### Outcome measurements and definition

The intensity of pain at the first defecation after hemorrhoidectomy was defined as the first pain score. The consistency of stool at that defecation was defined as the first Bristol Stool Form Scale (first BSFS) score. The first pain score was the primary outcome measure.

### Statistical analysis

To summarize patients' baseline clinical and demographical characteristics, all data were expressed as medians and interquartile range (IQR) for continuous variables and as numbers and percentages for categorical variables. We compared these variables between the three category groups of the first BSFS (1-2, 3-5, and 6-7) using the Kruskal-Wallis test and  $\chi^2$  test for the continuous and categorical variables. The division of the three groups followed the precedent study [8]. Furthermore, we used a multivariable non-linear regression model to examine the association between the first BSFS and the first pain score. The first BSFS score was treated as a continuous variable to minimize information loss. The regression model was adjusted for the following covariates: age, sex, constipation score, magnesium hydroxide use, hemorrhoid grade, the amount of ALTA solution, duration of operation, and the day of the first defecation. This regression model assessed the non-linear association between the first BSFS score and the first pain score using a restricted cubic spline method with three knots. Statistical significance was defined as a  $p$ -value < 0.05. All analyses were conducted using R version 4.0.3 (R Foundation for Statistical Computing, Tokyo, Japan).

## Results

Figure 2 shows a flow chart of the study. Two patients with concomitant anal fissures were not eligible. This study included 179 patients. Table 1 shows the clinical data and results of 179 patients. The first BSFS results in 179 patients were as follows: type 1 in 13, type 2 in 12, type 3 in 23, type 4 in 74, type 5 in 35, type 6 in 19, and type 7 in 3 patients (Figure 3). The median first pain score in 179 patients was 5.3 (3.0-7.5). The median of first pain scores according to first BSFS scores were 7.0, 7.4, 5.5, 6.0, 3.8, 3.3,

**Table 1.** Clinical Data and Results of the Study Patients as Classified by the First Bristol Stool Form Scale.

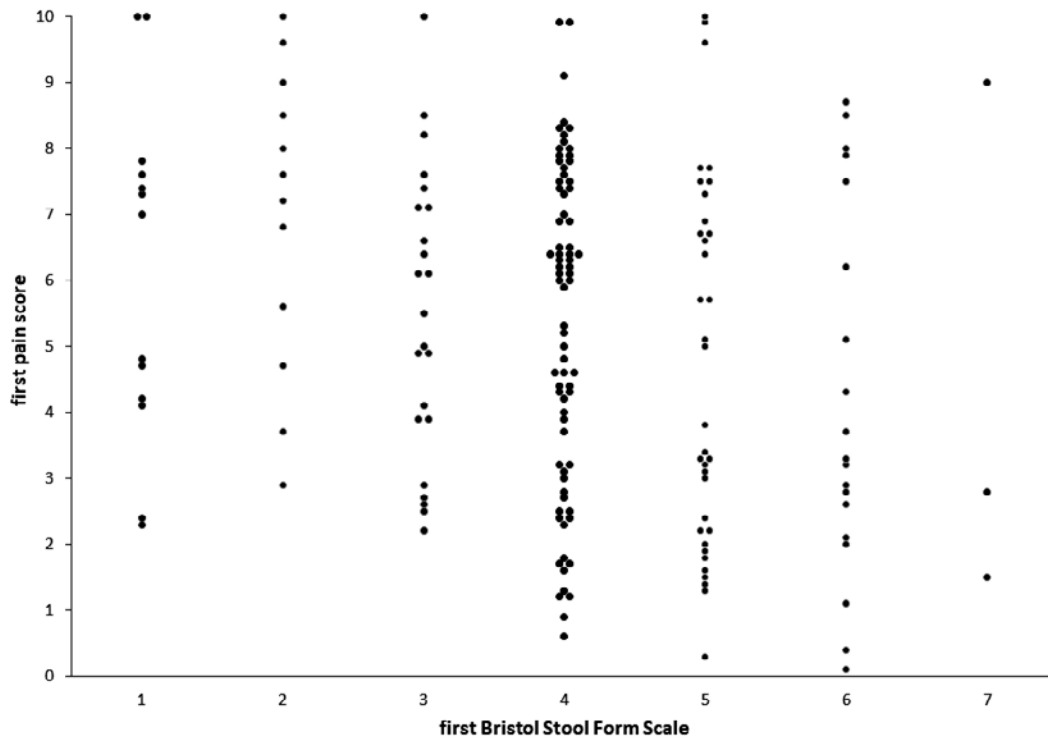
	Overall (n = 179)	BSFS 1-2 (n = 25)	BSFS 3-5 (n = 132)	BSFS 6-7 (n = 22)	p-value
Age (years)*	45 (37–59)	44 (37–50)	46 (37–62)	43 (37–55)	0.62 <sup>a</sup>
Sex ratio					0.077 <sup>b</sup>
Male	52 (29)	3 (12)	40 (30)	9 (41)	
Female	127 (71)	22 (88)	92 (70)	13 (59)	
Constipation score*	1 (0–3)	1 (0–2)	1 (0–3)	1 (0–3)	0.88 <sup>a</sup>
Magnesium hydroxide use					0.28 <sup>b</sup>
Yes	55 (31)	11 (44)	37 (28)	7 (32)	
No	124 (69)	14 (56)	95 (72)	15 (68)	
Hemorrhoid grade					0.86 <sup>b</sup>
III	144 (80)	21 (84)	105 (80)	18 (82)	
IV	35 (20)	4 (16)	27 (20)	4 (18)	
The amount of ALTA solution (ml)*	13 (10–16)	12 (10–15)	12 (10–16)	15 (12–18)	0.21 <sup>a</sup>
Operation duration (min)*	15 (12–18)	15 (12–21)	15 (12–18)	17 (13–20)	0.24 <sup>a</sup>
First defecation day					0.93 <sup>b</sup>
Day 1	29 (16)	4 (16)	21 (16)	4 (18)	
Day 2	115 (64)	15 (60)	85 (64)	15 (68)	
Day 3	35 (20)	6 (24)	26 (20)	3 (14)	
First pain score (VAS)*	5.3 (3.0–7.5)	7.2 (4.7–8.0)	5.4 (3.0–7.3)	3.3 (2.2–7.2)	0.014 <sup>a</sup>

BSFS: Bristol stool form scale, ALTA: aluminum potassium sulfate and tannic acid, VAS: visual analogue scale.

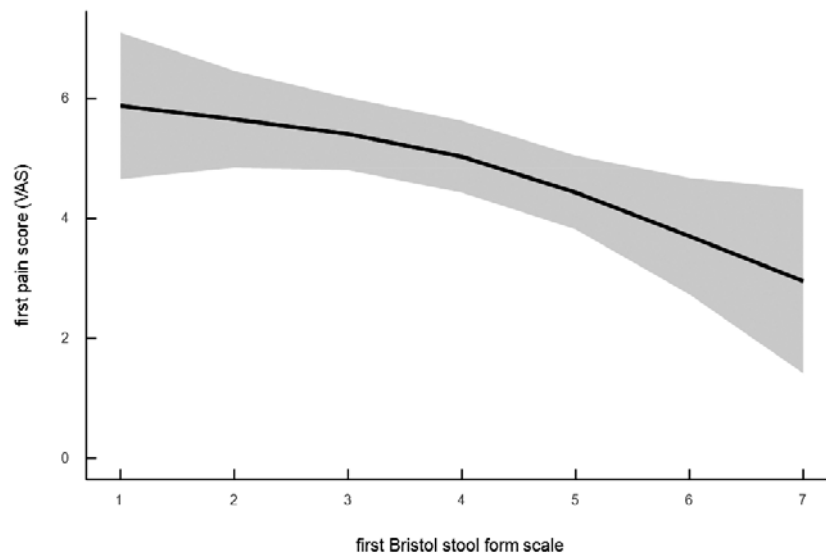
The data are expressed as numbers with percentages in parentheses unless indicated otherwise; \*values are median (interquartile range).

<sup>a</sup>p values were calculated using Kruskal-Wallis test

<sup>b</sup>p values were calculated using  $\chi^2$ test



**Figure 3.** Scatter plot to visualize raw data for first pain score and first Bristol Stool Form Scale.



**Figure 4.** The association between first Bristol Stool Form Scale and first pain score from the restricted cubic spline modeling. The gray shaded area indicates a 95 % confidence interval.  $p = 0.003$  (Multivariable non-linear regression model).

and 2.8, respectively. We performed the non-linear regression analysis to estimate the association between the first BSFS score and the first pain score. The regression model results showed these scales to be negatively correlated with statistical significance ( $p = 0.003$ , Figure 4).

## Discussion

This is the first study to use the BSFS to investigate the relationship between stool consistency and defecation pain after hemorrhoidectomy with enough sample size. Interestingly, these findings differed from the previous pilot study with a small sample size [3]. The results indicated that the harder the stool, the more clinically significant the defecation pain. This is because, unlike previously reported risk factors for postoperative pain, such as sex and age [9], the patient can control the stool consistency. Moreover, it can be controlled easily with conventional postoperative instructions given by surgeons, such as ensuring to take an oral laxative and consuming excessive water [10]. Such a routine should be effective in reducing stool consistency and thus defecation pain. But the frequency of defecation increases when it becomes stool of type 6 or 7, and the patient is in trouble. Therefore, the surgeon should induce a patient to avoid hard stool by an appropriate water intake before and after an operation. Surgeons recommend taking stool softener several days before the operation for patients complaining about hard stool.

An anal sphincter spasm in the vicinity of the wound is presumably involved in the mechanism underlying postoperative pain [11]. We expected the pain scores in this study to be smaller than those reported in previous studies [12,13]

because of the following two characteristics of surgical wounds in this study that are different from wounds of general hemorrhoidectomy. The two characteristics were as follows: wounds were smaller in size because the internal hemorrhoid components were not resected and were smaller in number because only two hemorrhoids were removed. However, the actual results were different from our expectations. This disparity appears to be attributable to the difference in analgesics used. More specifically, narcotics with a potent analgesic effect were used mainly in the previous studies, whereas narcotics were not used in this study.

This study has some limitations. First, only pain intensity with the first defecation was surveyed in this study. Second, this was a single-site study in the institution where only day surgery was performed. Third, the surgical procedure used in this study was special and was not a general hemorrhoidectomy procedure. It will be useful in the future when we compare this surgical procedure with the general procedure about defecation pain. Moreover, further research is warranted on how to reduce defecation pain associated with the time for bowel movement, frequency of defecation, and the posture of the bowel movement.

## Conclusion

This article has two interesting points. First, the Bristol scale was used for the first time to investigate the stool consistency after hemorrhoidectomy. Second, this was the first study to prove that the harder the stool, the greater the pain.

## Conflicts of Interest

There are no conflicts of interest.

**Author Contributions**

T Yano: Design, collection of data, drafting, and final approval of the article.

D Kabata and S Kimura: Contributed to the acquisition and interpretation of data.

**Approval by Institutional Review Board (IRB)**

The ethics review committee of the Japan Medical Association approved the study protocol.

Approval code: R1-13

**References**

1. Joshi GP, Neugebauer EA, PROSPECT Collaboration. Evidence-based management of pain after hemorrhoidectomy surgery. *Br J Surg.* 2010 Aug; 97(8): 1155-68.
2. London NJ, Bramley PD, Windle R. Effect of four days of preoperative lactulose on posthaemorrhoidectomy pain: results of placebo controlled trial. *Br Med J.* 1987 Aug; 295(6594): 363-4.
3. Yano T. Is there a relationship between stool consistency and pain at first defecation after limited half hemorrhoidectomy? A pilot study. *Ann Coloproctol.* 2021 Oct; 37(5): 306-10.
4. Lewis SJ, Heaton KW. Stool form scale as a useful guide to intestinal transit time. *Scand J Gastroenterol.* 1997 Sep; 32(9): 920-4.
5. Abe T, Hachiro Y, Ebisawa Y, et al. Distal hemorrhoidectomy with ALTA injection: a new method for hemorrhoid surgery. *Int Surg.* 2014 May-Jun; 99(3): 295-8.
6. Hayssen TK, Luchtefeld MA, Senagore AJ. Limited hemorrhoidectomy: results and long-term follow-up. *Dis Colon Rectum.* 1999 Jul; 42(7): 909-14.
7. Agachan F, Chen T, Pfeifer J, et al. A constipation scoring system to simplify evaluation and management of constipated patients. *Dis Colon Rectum.* 1996 Jun; 39(6): 681-5.
8. Burgell RE, Bhan C, Lunniss PJ, et al. Fecal incontinence in men: coexistent constipation and impact of rectal hyposensitivity. *Dis Colon Rectum.* 2012 Jan; 55(1): 18-25.
9. Selvaggi F, Pellino G, Sciaudone G, et al. Development and validation of a practical score to predict pain after excisional hemorrhoidectomy. *Int J Colorectal Dis.* 2014 Nov; 29(11): 1401-10.
10. Cheetham MJ, Phillips RK. Evidence-based practice in haemorrhoidectomy. *Colorectal Dis.* 2001 Mar; 3(2): 126-34.
11. Carapeti EA, Kamm MA, McDonald PJ, et al. Double-blind randomized controlled trial of effect of metronidazole on pain after day-case haemorrhoidectomy. *Lancet.* 1998 Jan; 351(9097): 169-72.
12. Gravié JF, Lehur PA, Hutten N, et al. Stapled hemorrhoidopexy versus milligan-morgan hemorrhoidectomy: a prospective, randomized, multicenter trial with 2-year postoperative follow up. *Ann Surg.* 2005 Jul; 242(1): 29-35.
13. Lim DR, Cho DH, Lee JH, et al. Comparison of a hemorrhoidectomy with ultrasonic scalpel versus a conventional hemorrhoidectomy. *Ann Coloproctol.* 2016 Jun; 32(3): 111-6.

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