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ORIGINAL RESEARCH

Is the combination of laser hemorrhoidoplasty and Ferguson hemorrhoidectomy superior to conventional surgical techniques in terms of postoperative pain in hemorrhoid patients? A retrospective comparative analysis

Fatih Yanar[1], Aykhan Abbasov[2], Burak Ilhan[1], Berke Sengun[1], Beyza Ozcinar[1], Basak Erginel[3,*], Hakan Yanar[1,2]

[1]Department of Surgery, Istanbul University Faculty of Medicine, 34093 Istanbul, Turkey
[2]Department of Surgery, Liv Hospital, 34340 Istanbul, Turkey
[3]Department of Pediatric Surgery, Istanbul University Faculty of Medicine, 34093 Istanbul, Turkey

***Correspondence**
basak.erginel@istanbul.edu.tr
(Basak Erginel)

Abstract

This study aimed to evaluate early and long-term results of three surgical methods (Ferguson hemorrhoidectomy, laser hemorrhoidoplasty, and the combined method), especially for pain management in hemorrhoidal disease. Between January 2018 and January 2020, 154 patients diagnosed with symptomatic grade II–III hemorrhoid disease were treated with three surgical techniques: (1) Ferguson hemorrhoidectomy (FH); (2) laser hemorrhoidoplasty (LHP); (3) combined (Ferguson hemorrhoidectomy + laser hemorrhoidoplasty) method. Patients were retrospectively evaluated for duration of surgery, recovery time of symptoms, postoperative pain, early and late complications, and recurrence. When the postoperative early and mid-term pain levels of the patients were compared, the results showed that patients treated with the Ferguson technique had the most severe pain scores after surgery at postoperative 6th, 12th, 24th hours, and 1st week, compared to the other techniques (LHP and combined method) ($p < 0.001$). The LHP method had the lowest pain levels when compared to the Ferguson and the combined methods ($p < 0.001$). The combined method had significantly lower pain scores than the Ferguson method in all periods after surgery ($p < 0.001$). Upon the development of postoperative perianal thrombosis in two patients in the LHP group, one patient underwent thrombectomy, and the other patient underwent medical treatment. There were two hemorrhoid disease recurrences, with a median follow-up period of 24 (12–36) months in the LHP group. In the FH group, reoperation and hemostasis were done for bleeding on the postoperative sixth day in one patient, and a Foley catheter was applied due to urinary retention in one patient. Two anal fissures were seen postoperatively in one month in the FH group and recovered with medical treatment. In patients with multiple hemorrhoid packages, the combined method can be better used safely and effectively, with significantly lower pain scores than the Ferguson method only.

Keywords

Hemorrhoids; Laser hemorrhoidoplasty; Hemorrhoidectomy; Pain; Recurrence

1. Introduction

The prevalence of symptomatic hemorrhoid disease is about 4%–5% in the population, and it is an important reason for admission to outpatient clinics. The disease symptoms (pain, bleeding, prolapses, *etc.*) negatively affect the patients' quality of life, and surgery is required for approximately 10%–20% of patients [1]. Hemorrhoid disease is also one of the most common one-day surgery indications in general surgery practice. Milligan-Morgan and Ferguson hemorrhoidectomy (FH) are commonly used procedures in surgical treatment. Since hemorrhoid surgery treatment is quite painful in the postoperative period, different techniques have been used to reduce operative time, blood loss, and postoperative analgesic requirements. Stenosis is another important problem if multiple hemorrhoids are present. The use of laser treatment has become widespread in recent years due to its effectiveness in rapidly reducing pain and bleeding, as well as facilitating a quicker return to daily activities [2]. In this study, we aim to evaluate the feasibility of three surgical methods (Ferguson hemorrhoidectomy, laser hemorrhoidoplasty, and the combined method) and compare their postoperative pain scores.

2. Materials and methods

2.1 Study design

In this retrospective case-control study, between January 2018 and January 2020, 154 consecutive patients who were operated on at the Istanbul Faculty of Medicine and Istinye University Medical Faculty, Department of Surgery with a diagnosis of grade 2–3 hemorrhoid disease and operated on with the Ferguson hemorrhoidectomy, laser hemorrhoidoplasty, or combined (Ferguson hemorrhoidectomy + laser hemorrhoidoplasty) method were included in the study. Previously operated for hemorrhoid disease, Grade 1 and 4 hemorrhoid disease, thrombosed hemorrhoid diseases, and inflammatory bowel disease were excluded from the study. Hemorrhoids were graded using the Golighter classification [3]. Preoperatively, a colonoscopy was performed to rule out other pathologies in patients older than 45 years, rectal bleeding history, and family history of colorectal malignancy. The visual analog scale (VAS) is a pain rating scale first used by Hayes and Patterson in 1921. The visual analog scale (VAS), a validated, subjective measure for acute and chronic pain is used for evaluating pain score. Scores are recorded by making a handwritten mark on a 10-cm line that represents a continuum between "no pain" and "worst pain" [4].

Demographic features, symptoms, duration of these symptoms, number of packages, surgical technique, duration of surgery, time to discharge, time to return to routine daily work, pain score at 6th, 12th, 24th hours, and 7th day, and early and late complications were retrospectively evaluated.

2.2 Operative technique

An enema was applied two hours before the procedure with sodium dihydrogen phosphate and disodium hydrogen phosphate. Antibiotic prophylaxis was given to all patients with ampicillin–sulbactam (2 g i.v.) 30 minutes before the procedure or ciprofloxacin if allergic. All surgical procedures were performed while the patient was in the lithotomy position under general anesthesia. A bilateral pudendal nerve block with 0.25% bupivacaine was applied to all patients at the end of the surgery. A retractor was used to expose the hemorrhoids. Hemorrhoid package excisions were performed according to the standard Ferguson hemorrhoidectomy technique [5]. The laser was applied to the patients using a 1470 nm diode laser NeoV V1470 diode laser (Neolaser Ltd, Caesarea, Israel) in LHP and the combined method. All surgeries were performed by the same surgeon experienced in coloproctology, accompanied by the assistants of different surgeons. In the combined method, we removed one or two dominant and prolapsed hemorrhoid packages with the Ferguson technique and applied laser hemorrhoidoplasty to the smallest one or two packages; we removed a maximum of three packages in a patient in all groups. After the end of the operation, a 0.2% nitrofurazone ointment was applied to the outer part of the anal canal, and it was dressed in gauze. No local hemostatic agent was used during the surgery. Diosmin plus hesperidin treatment was started in all patients on the first postoperative day. Patients were routinely adviced to use non-steroidal anti-inflammatory medications and paracetamol for two weeks.

2.3 Statistical analysis

Based on Jin *et al.*'s [6] study, considering a 50% difference in mean pain scores comparing two techniques (2 ± 0.9 versus 3 ± 0.9), while the alpha value was 0.05 with a power of 95%, two-tailed calculations represented the necessity of 23 patients per group. Therefore, a total of at least 69 patients were planned to be scanned retrospectively.

SPSS 21.0 (IBM Corp., released 2012) IBM SPSS Statistics for Windows, Version 21.0. (Armonk, NY, USA: IBM Corp.) was used for the statistical analysis. Continuous variables were expressed as means and standard deviations. For comparison of continuous variables, we used the Kruskal-Wallis H test, and for comparison of categorical variables, chi-square and one-way Analysis of variance (ANOVA) tests were used. A p-value of < 0.05 was considered significant.

3. Results

There were 154 consecutive patients enrolled in the study: 36 patients in the LHP group, 86 patients in the FH group, and 32 patients in the combined group. The median age of the patients in the LHP group was 42.5 (21–74), in the FH group was 43 (24–73), and in the combined group was 39.5 (34–67). The demographic features of the patients are shown in Table 1. The mean operative time for the LHP group was 12.3 ± 3.4 minutes (7–15); for the FH group it was 32.1 ± 7.6 minutes (20–45), and for the combined group it was 20.7 ± 5.2 minutes (15–35). The duration of pre-treatment symptoms for the LHP group was a median of 3 months; for the FH group it was 1 month, and for the combined group it was 2 months (1–12 months).

There was no relationship found between the age of the patients and the pain scores at 6th, 12th, and 24th hours and 7th day ($p = 0.320$, $p = 0.315$, $p = 0.639$ and $p = 0.632$, respectively); there was also no relationship found between the gender of the patients and the pain scores at 6th, 12th, and 24th hours and 7th day ($p = 0.629$, $p = 0.839$, $p = 0.649$, respectively).

There was a statistically significant correlation between the pain scores and surgical methods at all of the 6th, 12th, 24th hours, and 7th day scores ($p < 0.001$). The LHP method had the lowest pain levels when compared to the Ferguson and combined methods. The combined method had significantly lower pain scores than the Ferguson method in all periods after surgery (Fig. 1 and Table 2).

Upon the development of postoperative perianal thrombosis in two patients in the LHP group, one patient underwent thrombectomy, and the other patient underwent medical treatment. In the FH group, hemorrhage was detected on the 6th day in one patient, and a Foley catheter was applied due to urinary retention in one patient and was removed after 24 hours. Two hemorrhoid disease recurrences were observed during the median follow-up period of 24 (12–36) months in the LHP group; no recurrence was detected in the FH and combined groups during the follow-up. In two patients, an anal fissure was detected in the FH group and treated with medical treatment and a sitz bath (Table 3).

TABLE 1. Demographic and clinical features of the patients.

	Laser alone N = 36	Combined N = 32	Ferguson only N = 86
Age mean ± SD Median (min–max)	44.94 ± 14.86 42.5 (21–74)	43.13 ± 9.11 39.5 (34–67)	43.66 ± 11.16 43.0 (24–73)
Gender (Male/Female)	21 (58.3%)/15 (41.7%)	21 (65.6%)/11 (34.4%)	57 (66.3%)/29 (33.7%)
Follow-up (mon) median (min–max)	24 (12–36)	20 (12–34)	21 (18–32)
Duration of surgery (min) mean ± SD (min–max)	12.3 ± 3.4 (7–15)	20.7 ± 5.2 (15–35)	32.1 ± 7.6 (20–45)
Postoperative hospital stay (h) median ± SD (min–max)	10 (6–18)	12 (6–24)	16 (12–24)
Duration of symptoms before surgery (mon) median ± SD (min–max)	3 (1–12)	2 (1–12)	1 (1–12)

SD: standart deviation; min: minimum; max: maximum.

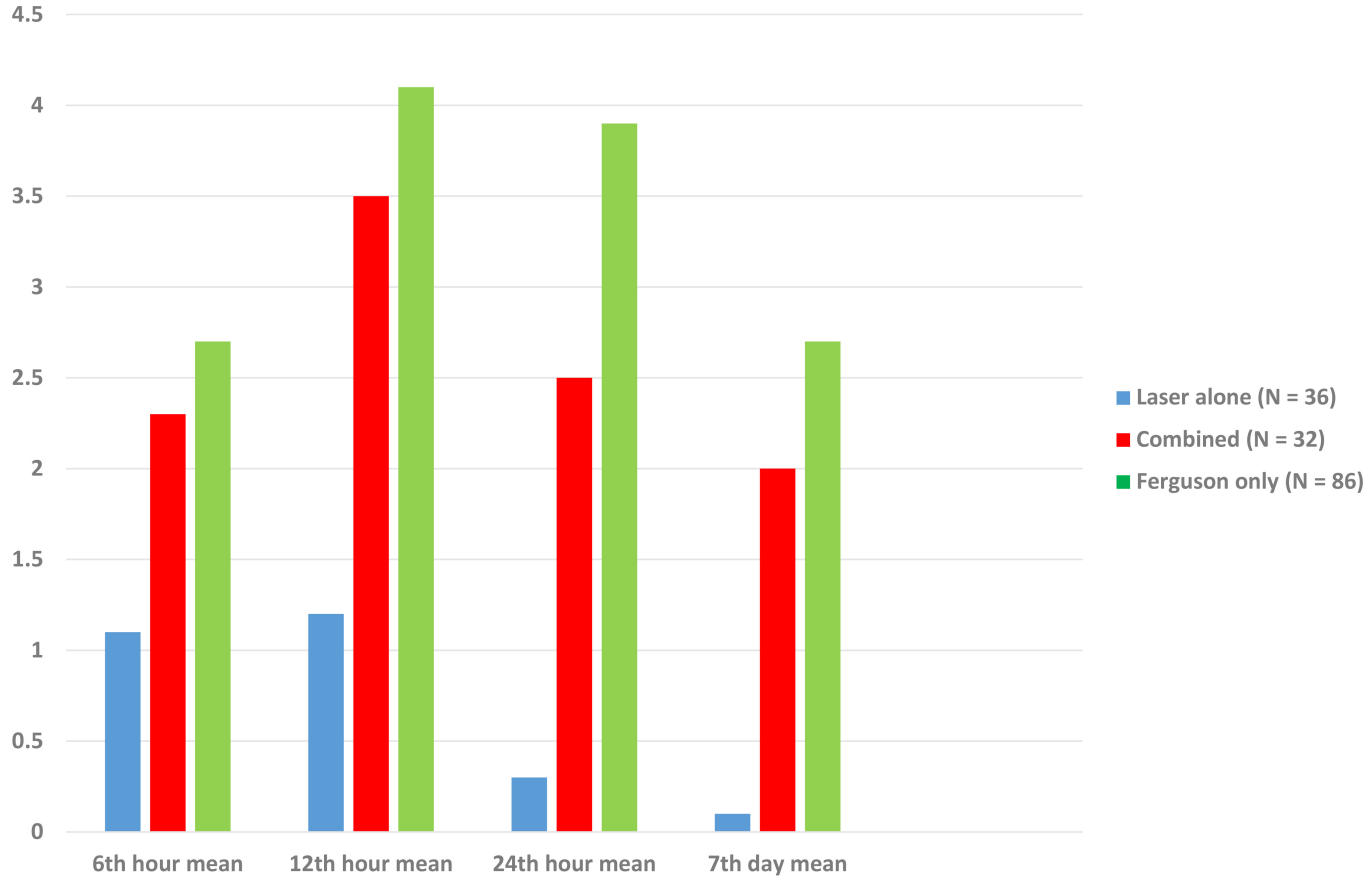

FIGURE 1. Pain scores of three surgical modalities at 6th, 12th, 24th hours and 7th day of surgery (according to VAS).

TABLE 2. Postoperative pain scores of patients in three groups.

Pain score	Laser alone	Combined	Ferguson only	*p*
6th h mean ± SD (min–max)	1.1 ± 0.7 (0–2)	2.3 ± 0.9 (1–5)	2.7 ± 1.2 (1–6)	<0.001*
12th h mean ± SD (min–max)	1.2 ± 0.8 (0–4)	3.5 ± 1.3 (1–6)	4.1 ± 1.1 (2–7)	<0.001*
24th h mean ± SD (min–max)	0.3 ± 0.6 (0–2)	2.5 ± 1.3 (0–5)	3.9 ± 0.9 (1–7)	<0.001*
7th d mean ± SD (min–max)	0.1 ± 0.2 (0–1)	2.0 ± 0.9 (0–3)	2.7 ± 1.1 (1–7)	<0.001*

*SD: standart deviation; min: minimum; max: maximum. *p-value of < 0.05 was considered significant.*

TABLE 3. Postoperative complications and recurrences of the patients in the three groups.

	Laser alone N = 36	Combined N = 32	Ferguson only N = 86
Urinary retention	0	0	1 (1.2%)
Postoperative bleeding	0	0	1 (1.2%)
Postoperative thrombosis	2 (5.5%)	0	0
Recurrence	2 (5.5%)	0	0
Anal fissure	0	0	2 (2.3%)

4. Discussion

The study can conclude that the combined method with Ferguson hemorrhoidectomy plus laser hemorrhoidoplasty is feasible and can be safely performed in patients with multiple hemorrhoid packs with both 2nd and 3rd degree diseases. The reason for this recommendation can be explained as follows: in chronic Grade 2 disease, LHP can be a treatment of choice, and it is very effective for long-term results. In addition, sclerotherapy and rubber band ligation are the other alternatives as treatment methods. However, the problem is in Grade 3 disease. In this group, laser treatment is not preferred because it requires more shots and gives more energy to put out the package. On the other hand, if you do not apply enough shots, the treatment is not effective. You can use open surgery on all packages; however, this also increases postoperative pain and recovery time and could cause anal stenosis.

The most important outcomes in the surgical treatment of hemorrhoid disease are less pain after surgery, a rapid return to daily life, and low recurrence rates.

For patients with symptomatic Grade 3 and 4 hemorrhoid diseases, Milligan-Morgan (open) or Ferguson (closed) hemorrhoidectomy techniques are still considered the gold standard, mainly in patients with fourth-degree hemorrhoids [7]. The recurrence rate is low with these techniques; however, discomfort and postoperative pain decrease the quality of life of patients after surgery, and returning to routine daily work is getting longer [8, 9]. Additionally, potential morbidity, including anal canal stenosis and iatrogenic incontinence, should not be forgotten [10, 11]. On the other hand, in some conditions, patients with severe pain, long-standing swelling, and bleeding with Grade 2 disease, when surgery is indicated, these techniques are unnecessarily extended, and other methods should be preferred [12]. When comparing the postoperative early- and mid-term pain levels of the patients, the results of this study also showed that patients treated with the Ferguson technique had the most severe pain scores after surgery in all time periods (postoperative 6th, 12th, 24th hours, and 1st week) compared to the other techniques (LHP and combined method).

Laser hemorrhoidopexy is a new method recently used in the treatment of hemorrhoid disease, and it is a revolutionary approach to the treatment of hemorrhoids [12, 13]. Laser hemorrhoidopexy does not cause any changes in the anatomy of the anal canal and improves symptoms by not disrupting the physiological functions of the hemorrhoidal plexus in the anus [13]. In addition, LHP has less postoperative pain than conventional methods [14]. Several prospective randomized studies comparing the LHP procedure with other techniques found that postoperative pain was lower in the LHP group than in all other procedures [14, 15]. Postoperative comfort is the most important factor in the choice of surgical modality for patients [16]. For this reason, most patients want to get LHP for their disease. However, the recurrence rate after LHP in the long term is higher than that after conventional surgery [17]. While offering the method to the patient, according to the severity and grade of the symptoms, this point should be discussed carefully with the patient. According to the results of a randomized controlled study conducted in 2020, the rates of needing treatment due to recurrent symptoms in hemorrhoid disease and the rates of recurrent prolapse are higher in LHP, although the total mean time without complaints after surgery is shorter in LHP than in open techniques [18]. In this study, the postoperative pain scores of all time periods (postoperative 6th, 12th, 24th hours, and 1st week) in the LHP group were statistically less than in the other techniques (FH and FH + LHP). However, in two patients, postoperative thrombosis was detected in the LHP group, and in a follow-up period, recurrent disease was detected in two patients at postoperative 6 and 13 months.

Postoperative pain is an important factor in an early return to normal daily life and work. The relationship between LHP and postoperative pain has been investigated in many studies [1, 2, 19]. In a prospective study conducted by Brusciano *et al.* [19] on 50 patients with Stage 2–3 hemorrhoids treated with a laser, postoperative pain and the time to return to daily activity were evaluated. All patients returned to their daily activities after 2 days. The postoperative pain score (at 12, 18, and 24 hours postoperatively), assessed using the visual analog scale, was quite low (mean value 2). Similarly, in this study, the postoperative pain score of the patients (at postoperative 6, 12 and 24 hours) in the LHP group was lower (mean value of 1.1–1.2–0.3, respectively), and all our patients returned to their daily activities one day after LHP. In the FH group, the postoperative hospital stay was longer, and the return to normal daily life was also longer than in the other groups. There was one bleeding on the 6th day, and there was one urinary retention in the FH group. A Foley catheter was applied and removed after 24 hours.

Nonetheless, not all patients are suitable for laser treatment alone. In a group of patients, there are many hemorrhoid packages, some of which are large and prolapsed, while others may be small and limited in the anal canal. In these patients, performing conventional methods on all packages will result in much pain and long-term discomfort after surgery. The comfort of the patients will be so harmful. However, if you

want to apply lasers to all packages in big packs (grades 3 and 4), it is not preferred because the number of laser shots and given energy will be high in large packs, which will require more energy. If it exceeds the upper energy limit, it may cause tissue damage. As a result, laser treatment alone may not be sufficient in large packs and can cause higher postoperative edema and necrosis after surgery [20]. For that reason, we thought to use the combined method in patients who have more than two packs, and not all of them are suitable for laser. Another minimally invasive technique recently used is ultrasound Doppler-guided hemorrhoidal artery ligation, combined with a procedure for prolapse and hemorrhoids. It has been demonstrated that this technique can be applied with high effectiveness, reduced postoperative pain scores, and lower complication rates. However, the application of this technique is particularly focused on Grade III or Grade IV (*i.e.*, severe hemorrhoids) [21].

In this study, we performed a combined method on patients with Grade 2–3 hemorrhoid disease with more packages of both small and large ones. The reason for choosing the combined method was that when we applied the Ferguson method only to all packages, the postoperative pain was higher, and the complication rate was also higher. However, since we performed the LHP alone, we will not provide a complete cure in patients with large packages, so we have started to use this combined method in this group of patients.

The strength of this study is that it is the first study in the literature to compare the results of conventional methods, lasers, and combined methods in terms of pain scores. The weakness of this study is that the number of patients was low in each group, and the symptoms were measured according to the information received from the patients. Another limitation of the study is that general anesthesia and additional nerve blocks were applied in all patients, and the possibility that other anesthesia options may be applied may produce different pain scores was not evaluated, which may have led to conflicting results.

5. Conclusions

In conclusion, the combined method of FH and LHP can be safely preferred for patients with multiple hemorrhoid packages with both Grade 2 and 3 symptomatic diseases. Thus, postoperative pain decreases, and the recurrence rate remains low.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

FY, HY and BE—designed the research study. AA—performed the research. BI—provided help and advice. BS—analyzed the data. FY, BE and BO—wrote the manuscript. HY and BE—edited the manuscript. All the authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the ethical committee of the Istinye University Medical Faculty (2/2021. K-09). The informed consent of all patients was obtained.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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