

Comparison of Hemorrhoid Electrotherapy with Direct Current and LigaSure Hemorrhoidectomy in the Treatment of Hemorrhoidal Disease

Firat Aslan¹, Muzaffer Onder Oner², Serhat Binici¹, Burhan Beger³

¹Van Yüzüncü Yıl University, Faculty of Medicine, Department of General Surgery, Van, Türkiye

²İzmir University of Economics, Faculty of Medicine, Medical Point Hospital, Department of General Surgery, İzmir, Türkiye

³Van Yüzüncü Yıl University, Faculty of Medicine, Department of Pediatric Surgery, Van, Türkiye

Abstract

Introduction: This study aims to compare LigaSure hemorrhoidectomy and direct current electrotherapy in the treatment of grade 2 and grade 3 internal hemorrhoids.

Material and Methods: This retrospective study included patients with symptomatic grade 2 or 3 internal hemorrhoids unresponsive to medical treatment. In the galvanization group, hemorrhoidal columns were coagulated using electrotherapy with a current probe set between 2 mA and 16 mA. LigaSure hemorrhoidectomy was routinely performed as an open surgical procedure. Operative time, postoperative pain, length of hospitalization, and clinical stage were recorded. Patients were followed for 3 months to assess healing, late complications, and recurrence. The patients' follow-ups were conducted via phone up to 2 years.

Results: All patients underwent rectoscopy at the 3rd postoperative month. Patients with grade 2 or 3 hemorrhoids, as confirmed by endoscopy and physical examination, were classified as having a recurrence. The LigaSure method showed a statistically significant difference in recurrence rates. The mean operative time for the galvanization method was 26 minutes, and this difference was also statistically significant. Pain scores were significantly lower with direct current electrotherapy compared to other methods.

Conclusion: Hemorrhoidal coagulation with galvanic electrotherapy reduces operative time and hospitalization duration. Additionally, the relapse rate and postoperative pain, as measured by VAS scores, are lower with this procedure compared to LigaSure hemorrhoidectomy. However, late complications and the intensity of late postoperative pain may be comparable between the two surgical methods.

Key words: Hemorrhoid; hemorrhoidectomy; ligasure; VAS scores.

Introduction

Hemorrhoids are vascular cushions located within the anal canal that contribute to maintaining continence and protecting the sphincter during defecation. These structures are composed of fibrovascular connective tissue, smooth muscle fibers, and a rich neurovascular network, functioning as part of the normal anatomical architecture of the anorectum (1,2). Histologically, due to the absence of muscular walls, hemorrhoidal tissue is classified as sinusoidal in nature (2). When these vascular cushions are subjected to excessive pressure, trauma, or degeneration, they may become symptomatic, leading to hemorrhoidal disease characterized by

bleeding, prolapse, or discomfort (3,4). Epidemiological studies suggest that nearly half of the general population will experience symptoms. Of hemorrhoidal disease at some point in their lifetime, and approximately 5–10% of these individuals require surgical intervention (3). Hemorrhoidal disease is typically categorized as internal, external, or mixed, based on its anatomical presentation (5). The choice of treatment for internal hemorrhoids is largely dependent on the grade of severity. Conservative management—including dietary regulation, lifestyle changes, and pharmacological therapy—is preferred for Grade I and II disease. Minimally invasive interventions such as rubber band ligation and sclerotherapy are also commonly employed

*Corresponding Author: Firat Aslan Van Yüzüncü Yıl University, Faculty of Medicine, General Surgery department Van, Türkiye
Email: dr.aslan.2609@hotmail.com Orcid: Firat Aslan [0000-0001-8508-196X](https://orcid.org/0000-0001-8508-196X), Muzaffer Onder Oner [0000-0002-7174-3800](https://orcid.org/0000-0002-7174-3800), Serhat Binici [0000-0003-3034-1239](https://orcid.org/0000-0003-3034-1239), Burhan Beger [0000-0002-1565-8062](https://orcid.org/0000-0002-1565-8062)

Received: 11.06.2025, Accepted: 12.09.2025



Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

(5). However, Grades III and IV internal hemorrhoids often necessitate surgical excision. One of the widely practiced surgical procedures, Ferguson hemorrhoidectomy, involves the excision of the hemorrhoidal complex, including the overlying mucosa and submucosal vascular plexus (6). While effective, this approach is frequently associated with considerable postoperative pain and potential complications such as bleeding, anal stenosis, and fecal incontinence (7,8). In an effort to reduce these complications, non-excisional methods such as direct current (DC) electrotherapy have been developed. This technique utilizes a generator to convert 220-volt alternating current into low-voltage direct current, which is delivered through a specially designed dual-probe applicator (9). DC electrotherapy offers a non-surgical and tissue-sparing alternative by inducing coagulation and fibrosis within the hemorrhoidal plexus. Initially introduced in 1867, this technique was later comprehensively reviewed and standardized by Dr. Wilbur E. Keesey in 1934 (10). Traditional hemorrhoidectomy, whether open or closed, remains the mainstay for advanced disease (11); however, interest in electrotherapy has resurfaced due to its simplicity, outpatient feasibility, and lower morbidity. In this study, we aimed to evaluate the comparative efficacy and safety of direct current electrotherapy versus LigaSure hemorrhoidectomy in patients diagnosed with Grade III and IV symptomatic internal hemorrhoids.

Materials and Methods

The study was conducted between January 2019 and June 2022, with ethical approval (Consent No. 2019/14) obtained from the Clinical Research Ethics Committee of Van Training and Research Hospital. A total of 50 patients with severe hemorrhoidal disease were included in the study. Of the patients, 36 were female and 14 were male, with an average age of 42 years. Patients with Grade 2 and 3 hemorrhoids were included in the study. After obtaining written consent, patients were randomized into two groups. Those with a history of anal surgery, fecal incontinence, or concurrent anal conditions such as anal fissures or anal fistulas were excluded from the study. Electrotherapy (Group 1, 25 patients) was administered to patients with odd numbers, while LigaSure hemorrhoidectomy (Group 2, 25 patients) was performed on those with even numbers. The groups were evaluated based on age, gender, clinical stage, duration of operation, postoperative pain, length of hospital stay, and

relapse rates. Twelve hours before the surgical procedure, patients underwent colon cleansing using a Fleet Phospho-Soda enema. Surgical procedures were performed on all patients under spinal anesthesia in the lithotomy position. Before the operations, a single dose of 1 gram of cefazolin sodium was administered intravenously. Electrotherapy using galvanization or direct current was conducted with the Ultroid Kit™ (Microvasive Inc., Watertown, MA). While the patient was positioned in the lithotomy position, the positive electrode was placed under the hip. The probe tip assembly was attached to the control handle, and the hemorrhoid to be treated was isolated using the anoscope. The probe was then positioned on top of the hemorrhoid, and the current was gradually increased to 2 mA. The probe tip was advanced 0.5 cm into the hemorrhoidal vein. The current was gradually increased to a maximum of 16 mA for 1 to 2 minutes or to a level deemed appropriate based on patient tolerance. The current was then slowly reduced to zero, and both the probe and anoscope were removed. After LigaSure hemorrhoidectomy, the vein of the hemorrhoidal tissue was sealed with the LigaSure device, and the wound was left open following the procedure(12). Pain plays a significant role in hemorrhoidal disease, as it can lead to a fear of defecation, resulting in increased constipation and exacerbating symptoms(13). For analgesia, 25 mg of tenoxicam sodium was administered intravenously. Pain levels were assessed using a Visual Analog Scale (VAS), with scores ranging from 0 (no pain) to 10 (unbearable pain). The highest pain scores and analgesic requirements were recorded. All patients were prescribed diclofenac sodium, and they were discharged with instructions for an iodine-sanitizing water bath, a laxative, and analgesics. Follow-up appointments were scheduled for the 7th day, 1st month, 2nd month, and 3rd month postoperatively. During the third follow-up, all patients underwent a rectoscopic examination. The patients' follow-ups were conducted via phone up to 2 years.

Statistical analysis: Data analysis was conducted using the SPSS (Statistical Package for the Social Sciences) version 11.5. The normality of the distribution for continuous variables was assessed using the Shapiro-Wilk test. Descriptive statistics are presented as mean $\pm$ standard deviation (minimum-maximum) for continuous variables and as patient counts and percentages for categorical variables. The average age of patients was compared using the Student's t-test, while the length of hospitalization was analyzed using the

Table 1: Distribution of Patients by Age, Gender, and Disease Stage

GROUPS	FEMALE	MALE	AVERAGE AGE	2 nd GRADE HEMORRHOID	3 rd GRADE HEMORRHOID
GROUP 1 (n=25)	19	6	43.1	8 (32%)	17 (68%)
GROUP 2 (n=25)	17	8	42.6	11 (44%)	14 (56%)

Table 2: The Impact of Surgical Technique on Operation Time, Length of Hospital Stay, and Recurrence Rates

GROUPS	OPERATION DURATION	HOSPITALIZATION DURATION	RECURRENCE
GROUP 1 (n=25)	26.3±6.09 (20-45) min	1.4±0.5 (1-2) day	%4 (1 patient)
GROUP 2 (n=25)	8.2±7.53 (8-15) min	2.3±0.69 (1-3) day	%16 (4 patients)

Table 3: Distribution of Patients by Postoperative Pain Status

DAY	Vas values	GROUP 1 (n=25)	GROUP 2 (n=25)
OPERATION DAY	VAS 1-4	12 (48%)	22 (88%)
	VAS 4-6	2 (8%)	10 (40%)
	VAS 6-10	1 (4%)	3 (12%)
POSTOPERATIVE 7 th DAY	VAS 1-4	11 (44%)	23 (92%)
	VAS 4-6	2 (8%)	8 (32%)
	VAS 6-10	0 (0%)	6 (24%)

Mann-Whitney U test. Pearson's Chi-Square test or Fisher's Exact Probability test was employed for categorical comparisons. Results with p-values less than 0.05 were considered statistically significant.

Results

In the study group, which consisted of 36 female patients (72%) and 14 male patients (28%), the distribution of patients by gender and age is presented in Table 1. No statistically significant difference was found between the groups in terms of age and gender. Table 2 shows the relationship between operation times and surgical techniques. The average operation time for the LigaSure method was found to be 10 minutes, while the galvanization method had an average time of 26 minutes. This difference was statistically significant ($p < 0.05$). Table 2 also shows the length of hospital stay for patients. In the first group, patients were discharged after an average of 1.4 days, whereas in the second group, the average length of stay was 2.3 days. The difference between the two groups in this regard was found to be statistically significant ($p < 0.05$). All patients underwent rectoscopy at the 3rd postoperative month. Recurrence was defined as the presence of 2nd or 3rd-degree hemorrhoids based on endoscopic and physical examination findings. As shown in Table 2, the recurrence rate was 4% in

the direct-current electrotherapy group, compared to 16% in the LigaSure method group, with this difference being statistically significant ($p < 0.05$). When evaluating postoperative pain, on the day of the operation, 48% of patients in the first group reported VAS scores between 1 and 4, compared to 88% in the second group. On the 7th postoperative day, these rates were 44% and 92%, respectively. For patients scoring between 4 and 6 on the VAS, the rates on the day of the operation were 8% for the first group and 40% for the second group, while in the first postoperative week, these rates were 8% and 32%. The distribution of patients scoring between 6 and 10 on the VAS, indicating intolerable pain, was 0% in the first group and 12% in the second group on the day of the operation, with rates of 0% and 24% on the 7th postoperative day. In terms of pain scoring, all results were statistically significant in favor of direct current electrotherapy ($p < 0.05$). Refer to Table 3 for details.

Discussion

Galvanization, as a non-excisional method, has gained recognition for being a generally well-tolerated, low-risk, and minimally painful technique in the treatment of internal hemorrhoidal disease. Despite these advantages, the current body of literature contains limited comprehensive data evaluating its efficacy and

outcomes in detail (1). The probe utilized for electrotherapy in this study was specifically engineered for simplicity and user-friendliness, as Illustrated in Figure 1.

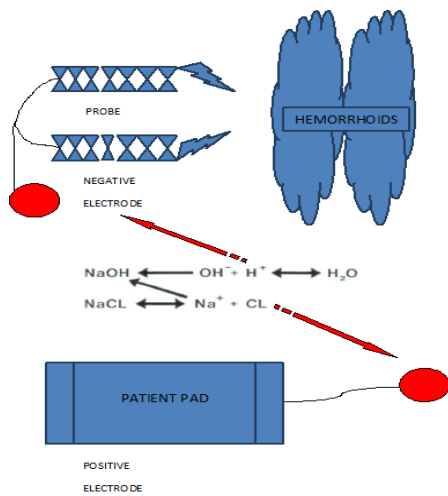


Figure 1:Galvanization application scheme

The primary aim of this investigation was to expand upon the existing scientific literature regarding this modality. In a clinical trial by Izadpanah et al., three different therapeutic strategies for internal hemorrhoids were compared through a randomized allocation of 150 patients diagnosed with symptomatic Grade II or III hemorrhoids. Participants were divided into three cohorts: Group A received Ferguson hemorrhoidectomy, Group B underwent rubber band ligation (RBL), and Group C was treated with direct current electrotherapy. Their results revealed that patients with Grade III hemorrhoids exhibited significantly higher resting and squeezing pressures on manometric evaluation compared to Grade II cases. Following hemorrhoidectomy, Group A showed notable reductions in both maximal resting pressure (from 90.8 to 77.7 mmHg) and squeezing pressure (from 130.6 to 114.8 mmHg), along with an increase in first sensation volume. In contrast, the electrotherapy and RBL groups did not show significant manometric changes. Additionally, Group A patients experienced more frequent postoperative discomfort and pruritus than those in Groups B and C. Overall, the study supported the use of electrotherapy as a straightforward, efficient, and low-complication option for treating uncomplicated internal hemorrhoids of Grades II and III (14). A separate retrospective study by Durgun et al. compared the outcomes of Laser Hemorrhoidoplasty (LHP) and LigaSure™

hemorrhoidectomy (LigH) among 100 patients treated for Grade III hemorrhoids between January 2022 and June 2023. The results indicated that the mean operative time was significantly shorter in the LHP group ($p < 0.001$). Moreover, patients who underwent LHP reported significantly lower pain scores on the visual analog scale (VAS) on both postoperative days one and seven (2.4 ± 0.7 and 1.2 ± 0.9) compared to the LigH group (6.2 ± 1.5 and 3.8 ± 1.3 , respectively) ($p < 0.001$). Recovery time, measured as return to normal daily activities, was also shorter in the LHP cohort. Recurrence rates, however, were higher in the LHP group (22%) than in the LigH group (6%), though still within acceptable limits ($p < 0.001$) (15). Bartın et al. conducted a study evaluating LigaSure hemorrhoidectomy and direct current electrotherapy. Their findings revealed that the average procedure time for the electrotherapy group was 25 minutes. This was closely aligned with our results, where electrotherapy required an average of 26.3 ± 6.09 minutes. In terms of hospital stay, their study reported a mean of 1.3 ± 0.5 days, while we observed a comparable duration of 1.4 ± 0.5 days among electrotherapy patients (1). In line with our findings, a study by Nikshoar et al. (2018) comparing surgical hemorrhoidectomy and electrotherapy found that patients who received electrotherapy experienced significantly less postoperative pain than those who underwent traditional surgical excision (3). Khanna et al. examined the outcomes of LigaSure hemorrhoidectomy and reported a recurrence rate of 3.5% at six weeks postoperatively. Although their results indicate a relatively low recurrence rate, our study noted a recurrence rate of 16% at three months following LigaSure hemorrhoidectomy. This difference may be attributed to socioeconomic factors and inconsistent adherence to postoperative care among our patient population. Notably, recurrence in the electrotherapy group was significantly lower, at just 4%, further supporting its efficacy in appropriate clinical settings (16).

Study limitations: This study has several limitations that should be acknowledged. First, the sample size was relatively small, with only 50 patients, which may limit the statistical power and generalizability of the findings. A larger multicenter study would provide more robust data for comparison. Second, the study was conducted in a single institution, potentially introducing institutional bias related to surgical technique and postoperative care standards. Third, pain assessment was based on patient-reported Visual

Analog Scale (VAS) scores, which, despite being widely accepted, remain subjective and may vary depending on individual pain thresholds and psychological factors. Fourth, the follow-up period of two years, while sufficient for assessing short- to mid-term outcomes, may not fully capture late recurrences or long-term complications such as anal stenosis or incontinence. Lastly, the study did not include a cost-effectiveness analysis or quality-of-life assessment, both of which are important considerations in evaluating the overall utility of minimally invasive techniques like direct current electrotherapy.

Conclusion

This study aimed to enrich the current body of literature by evaluating direct current electrocoagulation as a potential alternative in the management of internal hemorrhoidal disease. Given the known complications and procedural limitations associated with conventional surgical techniques, our findings suggest that electrotherapy presents a promising, minimally invasive option. Among its key benefits, the procedure is associated with minimal discomfort when performed appropriately and is largely perceived as painless by most patients. Furthermore, our observations indicate a high level of patient compliance and satisfaction, with favorable outcomes often achievable in a single treatment session. Serious complications were infrequent, reinforcing the safety profile of the technique. Based on these results, we propose that direct current electrotherapy may be suitable not only for standard surgical settings but also for implementation in outpatient care, offering an efficient and well-tolerated therapeutic alternative for appropriately selected patients.

Ethical approval: Ethical approval was obtained from the Clinical Research Ethics Committee of Van Training and Research Hospital on 04.07.2019, with decision number 2019/14.

Conflict of interest: The authors declare that they have no conflict of interest related to this study.

Financial support: No financial support was received for this study.

Author contributions: Concept (FA, MOO), Design (FA, SB, MOO), Data Collection and/or Processing (FA, MOO, SB), Analysis and/or Interpretation (FA, BB)

References

1. Bartin, M., Tekeli, A., Eker, E., & Oner, M. (2018). Comparison of Milligan-Morgan Hemorrhoidectomy and direct current electrotherapy for the treatment of Hemorrhoidal disease. *MEDICAL SCIENCE*, 22(90).
2. KORKUT, M. A., ÇALIŞKAN, C., & ÜNSAL, M. G. (2009). Hemoroidal hastalığın tedavisinde güncel yaklaşım. *Kolon ve Rektum Hastalıkları Dergisi*, 19(2), 52-63.
3. Nikshoar, M. R., Maleki, Z., & Honar, B. N. (2017). The clinical efficacy of infrared photocoagulation versus closed hemorrhoidectomy in treatment of hemorrhoid. *Journal of lasers in medical sciences*, 9(1), 23.
4. Wendell-Smith, C. P. (2000). Anorectal nomenclature: fundamental terminology. *Diseases of the colon & rectum*, 43(10), 1349-1358.
5. Speir, E. J., Ermentrout, R. M., & Martin, J. G. (2017). Management of acute lower gastrointestinal bleeding. *Techniques in Vascular and Interventional Radiology*, 20(4), 258-262.
6. Martins, M. A. B., Almeida, L. F. C. D., Cappellaro, A. P., Rocha, L. F. R., & Nobrega Oliveira, R. E. N. D. (2025). Operative versus nonoperative treatment of thrombosed external hemorrhoids: a systematic review and meta-analysis. *Updates in Surgery*, 1-7.
7. El-Haddad, J. (2025). Revisiting the Anatomy of the Rectum and the Anal Canal.
8. Kang, S. I. (2025). Latest Research Trends on the Management of Hemorrhoids. *Journal of the Anus, Rectum and Colon*, 9(2), 179-191.
9. Brown, S. R. (2024). The Modern Management of Haemorrhoids. In *Coloproctology: A Practical Guide* (pp. 285-302). Cham: Springer International Publishing.
10. Keesey, W. E. (1934). Obliteration of hemorrhoids with negative galvanism. *Arch Phys Ther*, 15, 533-540.
11. Watson, A. J., Hudson, J., Wood, J., Kilonzo, M., Brown, S. R., McDonald, A., ... & Cook, J. A. (2016). Comparison of stapled haemorrhoidopexy with traditional excisional surgery for haemorrhoidal disease (eTHoS): a pragmatic, multicentre, randomised controlled trial. *The Lancet*, 388(10058), 2375-2385.
12. Bakhtiar, N., Moosa, F. A., Jaleel, F., Qureshi, N. A., & Jawaid, M. (2016). Comparison of hemorrhoidectomy by

- LigaSure with conventional Milligan Morgan's hemorrhoidectomy. *Pakistan journal of medical sciences*, 32(3), 657.
13. Soeseno, S. W., Wahyudi, P. A. E., & Febyan, F. (2021). Diagnosis and management of internal hemorrhoids: A brief review. *European Journal of Medical and Health Sciences*, 3(5), 1-5.
 14. Izadpanah, A., Hosseini, S. V., & Mahjoob, M. (2010). Comparison of electrotherapy, rubber band ligation and hemorrhoidectomy in the treatment of hemorrhoids: a clinical and manometric study. *Middle East journal of digestive diseases*, 2(1), 9.
 15. Durgun, C., Yiğit, E., & Yiğit Sr, E. (2023). Laser hemorrhoidoplasty versus ligasure hemorrhoidectomy: a comparative analysis. *Cureus*, 15(8).
 16. Khanna, R., Khanna, S., Bhadani, S., Singh, S., & Khanna, A. K. (2010). Comparison of ligasure hemorrhoidectomy with conventional Ferguson's hemorrhoidectomy. *Indian Journal of Surgery*, 72(4), 294-297.