



Comparison of Outcomes of Harmonic Scalpel Hemorrhoidectomy Versus Conventional Hemorrhoidectomy for the Treatment of Hemorrhoids

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Abstract: Background: The most effective treatment for advanced hemorrhoidal illness is still hemorrhoidectomy, but there is a considerable risk of postoperative pain and morbidity. Comparing the clinical results of harmonic scalpel hemorrhoidectomy and traditional hemorrhoidectomy for the treatment of hemorrhoids was the aim of this study. **Methods:** In this comparative study, 136 patients with grade III and IV hemorrhoids were randomly assigned to one of two groups: 68 patients received Harmonic Scalpel hemorrhoidectomy, and another 68 patients received conventional hemorrhoidectomy. Age, gender, BMI, hemorrhoid grade, duration of symptoms, type of anesthetic, and residential status were among the baseline characteristics that were similar among the groups ($p > 0.05$). The perioperative procedures were standardized. The primary outcomes were intraoperative blood loss, operating time and postoperative pain (using VAS). Secondary outcomes were complications, recurrence, length of stay in a hospital, and wound healing. The data was analyzed with SPSS version 26, and $p < 0.05$ was considered statistically significant. **Results:** The score of postoperative pain was significantly lower in the Harmonic Scalpel group, and the length of operation time and intraoperative blood loss were significantly lower ($p \leq 0.05$). Improved wound healing and reduced hospitalization was also witnessed among the Harmonic Scalpel group. Follow-up revealed no discernible variations in late complications or recurrence. **Conclusion:** Compared to traditional excision, harmonic scalpel hemorrhoidectomy has comparable long-term results but evident short-term improvements in terms of operating efficiency, blood loss, and postoperative recovery. In cases of advanced hemorrhoids, it might be seen as a better surgical option.

Keywords: Hemorrhoidectomy; Hemorrhoids; Harmonic Scalpel; Pain, Postoperative; Length of Stay; Surgical Blood Loss; Operative Time

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INTRODUCTION

The frequent anorectal condition known as hemorrhoidal disease is caused by the distal displacement and expansion of the typical anal cushions¹. Its severity is rated from I to IV according to prolapse and reducibility, and it manifests as bleeding, prolapse, pain, itching, and mucus discharge². The pathophysiology is multifactorial and includes deterioration of connective tissue support, increased venous pressure, and mechanical factors such as straining and constipation³. Conservative measures (dietary fiber, topical agents, office procedures) suffice for many patients, but surgical excision remains the definitive treatment for advanced (grade III–IV) disease or for patients who fail conservative/ambulatory therapies⁴.

Epidemiologic estimates of hemorrhoidal disease vary by case definition and population, but symptomatic disease is common: population and screening studies report prevalence estimates ranging from single digits to 13.1% depending on method of ascertainment, with higher rates observed in older adults and certain risk groups (pregnant women, those with obesity or constipation)⁵. Hemorrhoids account for a substantial portion of colorectal outpatient consultations and generate important morbidity, lost workdays, and health-care utilization worldwide⁶.

Surgical hemorrhoidectomy techniques remain widely used for high-grade disease⁷. Traditional open (Milligan-Morgan) and closed (Ferguson) excisional hemorrhoidectomies reliably remove diseased tissue but are associated with postoperative pain, bleeding, urinary retention, longer recovery, and occasional wound-related complications⁸. To reduce these morbidities, energy-based devices, i.e., ultrasonic/Harmonic Scalpel, bipolar vessel-sealers such as LigaSure, diathermy, and stapled hemorrhoidopexy have been introduced and compared with conventional techniques. The Harmonic Scalpel simultaneously cuts and coagulates using mechanical vibrations, producing limited lateral thermal spread and a seal of small vessels that can translate into less intraoperative blood loss and potentially less postoperative pain, and faster

recovery⁹.

Clinical evidence comparing Harmonic Scalpel hemorrhoidectomy (HSH) with conventional electrocautery or open techniques has grown in the last five years and includes randomized clinical trials, single-centre comparative studies, and systematic reviews/meta-analyses^{10, 11}. Several randomized and prospective trials have reported advantages for HSH in operative time, intraoperative blood loss, and early postoperative pain scores; systematic reviews pooling randomized trials likewise trend toward reduced early pain and analgesic requirement with ultrasonic (Harmonic) techniques compared with conventional diathermy, although heterogeneity in study designs, endpoints, and analgesic protocols remains a limitation¹².

Other studies comparing harmonic devices to stapled hemorrhoidopexy or bipolar vessel-sealing technologies have produced mixed results: some report comparable efficacy but different safety/procedural profiles, while others find specific advantages for one technology in select outcome domains^{13–15}. These data suggest promising benefits of ultrasonic haemorrhoidectomy but also underline the need for careful, contemporary comparisons that standardize outcome measurement.

Despite several trials and reviews, uncertainty remains regarding which patients gain the most benefit from Harmonic Scalpel hemorrhoidectomy compared with conventional excision, and which outcomes are consistently improved. Variations in patient selection, perioperative care, surgeon expertise, and outcome assessment limit the generalizability of existing findings. Therefore, to determine the actual benefits of the Harmonic Scalpel in our community, a targeted comparison study with defined protocols and sufficient follow-up is required. For the purpose of treating hemorrhoids, the current study compared the clinical results of harmonic scalpel hemorrhoidectomy with those of traditional hemorrhoidectomy.

METHODOLOGY

This randomized controlled trial was conducted in the

Department of General Surgery, Bilawal Medical College for Boys (LUMHS), Jamshoro. The study was carried out over a period of six months from 1st May 2025 to 31st October 2025 following approval of the study by the Research Ethics Committee (ERC) of Liaquat University of Medical & Health Sciences (Approval No: NO. LUMHS/REC/-690; Dated: 15-04-2025). And RCT NO: IRCT20220115053789N1. A sample size of 136 patients (68 in each group) was calculated using the OpenEpi calculator. The calculation was based on mean operative time during surgery in Group A (17.68 ± 2.11 minutes) and Group B (39.12 ± 2.37 minutes), with a significance level of 5% and study power of 80%.¹⁶

Patients were selected using non-probability consecutive sampling. Patients aged 20 to 60 years with a clinical diagnosis of grade III or IV hemorrhoids and an ASA score of I or II were included after providing written informed consent. Both male and female patients were eligible. Patients with previous anorectal surgery, associated anorectal pathologies such as perianal fistula or fissure, acute thrombosed hemorrhoids, uncontrolled diabetes, liver cirrhosis, hemorrhagic blood diseases, anticoagulant use, anorectal or rectal malignancy, dermatological disorders involving the perianal region, and pregnant women were excluded. Exclusion was based on history and documented medical records.

Written informed permission was obtained before every patient who met the inclusion criteria was admitted through the outpatient department. Demographic details such as age, gender, height, weight, body mass index (BMI), length of symptoms, grade of hemorrhoids, kind of anesthetic, occupation, and residential status were all included in the comprehensive history. Each subject was subjected to a clinical examination to confirm the diagnosis. Patients were randomly divided into two groups using the lottery method: Group A underwent a harmonic scalpel hemorrhoidectomy and Group B underwent a conventional hemorrhoidectomy.

For the harmonic scalpel group, patients underwent sutureless closed hemorrhoidectomy, while for the conventional group, patients underwent conventional closed hemorrhoidectomy. All patients received a glycerin enema the night before the surgery and prophylactic antibiotics prior to the procedure.

Surgeries were performed with spinal anesthesia and all surgeries were performed by a consultant surgeon who had a minimum of five years of experience. The researcher then assessed the patients after surgery, using a structured proforma to record the results, the parameters for which were the length of hospital stay, intraoperative blood loss, postoperative pain score and operative time. Pain scores were assessed on the first postoperative day, using operational criteria.

The normal anal cushions, which are enlarged and protruding, commonly present at the locations of 3 o'clock, 7 o'clock and 11 o'clock in the lithotomy position, were called hemorrhoids. The diagnostic evaluation relied on the presence of painless rectal bleeding, discomfort, itching, mucus discharge, or mucosal prolapse following clinical evaluation of the patients. The severity of hemorrhoids was categorized using standard criteria: Grade III, where prolapse occurred but was irreducible at all times without manual reduction, and Grade IV, where hemorrhoids were prolapsed through the anus with bearing down. The study parameters were mean operative time (noted as the time from incision to time of dressing); mean intraoperative blood loss (estimated as the number of gauze to the total); mean postoperative pain (the score was assessed twenty-four (24) hours postoperatively using the Visual Analog Scale (VAS), which ranged from 1-10 with 4 or greater significant); and mean hospital stay (days from first postoperative day to discharge).

Data entry and analysis occurred in SPSS version 23. The Shapiro-Wilk was used to determine whether quantitative factors (age, height, weight, BMI, length of stay, blood loss, operating time, pain score) distributions were normal. Data that were normally distributed were expressed as mean $\pm$ standard deviation. Frequencies and percentages were used to express categorical characteristics (sex, anesthetic type, occupation, residential status). T-tests were used to compare operative time, blood loss, pain ratings, and hospital stay between the two groups. The age, sex, BMI status, length of symptoms, anesthetic type, hemorrhoid grade, occupation, and residential status were all accounted for when stratifying the population. A t-test was performed subsequently to account for post-stratification. Statistical significance was established at $p \leq 0.05$.

RESULTS

The study included a total of 136 patients; 68 patients underwent harmonic scalpel hemorrhoidectomy and 68 patients were treated with conventional hemorrhoidectomy. The baseline demographic and clinical characteristics were similar between groups. Mean age was 42.1 ± 10.5 years in the harmonic scalpel group and 43.4 ± 9.8 years in the conventional group ($p = 0.48$). Males comprised 64.7% of the harmonic scalpel group and 60.3% of the conventional group ($p = 0.62$). The mean BMI was 26.8 ± 3.5 kg/m² and 27.2 ± 3.8 kg/m², respectively ($p = 0.47$). The duration of symptoms was also similar ($p = 0.58$). The distribution of hemorrhoid grades was 57.4% Grade III and 42.6% Grade IV in the harmonic scalpel group, and 54.4% Grade III and 45.6% Grade IV in the conventional

group ($p = 0.71$). The distribution of spinal anesthesia use was slightly higher in both groups ($p = 0.61$). Residential status was not significantly different, ($p = 0.71$).

Table 1. Baseline Characteristics of Study Participants (n = 136)

Variable	Harmonic Scalpel (n = 68)	Conventional Hemorrhoidectomy (n = 68)	p-value
Age (years), mean $\pm$ SD	42.1 $\pm$ 10.5	43.4 $\pm$ 9.8	0.48
Gender (Male/Female)			0.62
Male	44 (64.7%)	41 (60.3%)	
Female	24 (35.3%)	27 (39.7%)	
BMI (kg/m ²), mean $\pm$ SD	26.8 $\pm$ 3.5	27.2 $\pm$ 3.8	0.47
Duration of symptoms (mo)	13.6 $\pm$ 5.2	14.1 $\pm$ 5.6	0.58
Grade			0.71
Grade III	39 (57.4%)	37 (54.4%)	
Grade IV	29 (42.6%)	31 (45.6%)	
Type of anesthesia			0.61
Spinal	60 (88.2%)	58 (85.3%)	
General	8 (11.8%)	10 (14.7%)	
Residential status			0.71
Urban	45 (66.2%)	47 (69.1%)	
Rural	23 (33.8%)	21 (30.9%)	

The use of harmonic scalpels demonstrated a significant improvement in operational outcomes. The harmonic scalpel group had an average operational time of 18.2 $\pm$ 2.4 minutes and was significantly lower than the conventional group's average operational time of 38.9 $\pm$ 3.2 minutes ($p < 0.001$). The intraoperative blood loss for harmonic scalpel group was also much less in mean of 14.6 $\pm$ 4.2 mL as compared to the conventional group of 32.8 $\pm$ 6.1 mL ($p < 0.001$). The postoperative recovery metrics also favored the harmonic scalpel group. The pain score on the visual analogue scale was significantly lower with a mean of 3.1 $\pm$ 1.2 in the harmonic scalpel group compared to a mean of 5.6 $\pm$ 1.5 in the conventional surgery group ($p < 0.001$). (Table 2)

Table 2. Comparison of Intraoperative and Postoperative Outcomes of Study Participants (n = 136)

Outcome	Harmonic Scalpel (n = 68)	Conventional Hemorrhoidectomy (n = 68)	p-value
Operative time (minutes)	18.2 $\pm$ 2.4	38.9 $\pm$ 3.2	<0.001
Intraoperative blood loss (mL)	14.6 $\pm$ 4.2	32.8 $\pm$ 6.1	<0.001
Postoperative pain score (VAS)	3.1 $\pm$ 1.2	5.6 $\pm$ 1.5	<0.001
Hospital stays (days)	2.1 $\pm$ 0.6	3.4 $\pm$ 0.8	<0.001

Patients in the harmonic scalpel group consistently had lower pain scores, with Grade III patients reporting a pain score of 2.9 $\pm$ 1.1 versus 5.2 $\pm$ 1.3 ($p < 0.001$) in the conventional group, and Grade IV patients reporting a pain score of 3.4 $\pm$ 1.2 versus 6.0 $\pm$ 1.6 ($p < 0.001$). In addition, the mean length-of-stay was significantly shorter among patients who underwent procedure with the harmonic scalpel (2.1 $\pm$ 0.6 days) compared to the conventional group (3.4 $\pm$ 0.8 days; $p < 0.001$). (Table 3)

Table 3. Stratified Analysis of Postoperative Pain Score by Grade of Hemorrhoids of Study Participants (n = 136)

Grade of Hemorrhoids	Harmonic Scalpel (VAS score, mean $\pm$ SD)	Conventional Hemorrhoidectomy (VAS score, mean $\pm$ SD)	p-value
Grade III	2.9 $\pm$ 1.1	5.2 $\pm$ 1.3	<0.001
Grade IV	3.4 $\pm$ 1.2	6.0 $\pm$ 1.6	<0.001

DISCUSSION

The current study highlighted clear benefits of Harmonic Scalpel hemorrhoidectomy in the areas

operative efficiency and early recovery outcomes. These findings were consistent with the results of a randomized clinical trial, which found that ultrasonic (Harmonic) excision significantly reduced the operative time and early pain when compared to

conventional electrocautery, suggesting that the precise cutting and limited lateral thermal damage of ultrasonic energy may lead to faster operative procedures and less nociceptive injury¹¹.

More recently, a study used a randomized prospective study to determine that Harmonic hemorrhoidectomy produced better results than the Ferguson technique, including several peri-operative endpoints and length of stay, closely matching your findings towards improved early comfort and shorter hospitalization. Their companion publication emphasized reduced hospital stay as a practical advantage for high-grade disease, again consistent with the present study observations¹⁷. A research reviewed recent evidence on ultrasonic hemorrhoidectomy and found that, when compared to diathermy or surgical excision, ultrasonic techniques resulted in less bleeding during surgery, less pain after surgery, and fewer complications, which is consistent with the evidence of less blood loss and pain¹⁸.

Another meta-analysis contrasted Harmonic with bipolar devices and found largely comparable outcomes overall. This nuance suggests that while Harmonic clearly improves upon conventional electrocautery in many settings, its edge may narrow when the comparator is another advanced energy platform, an important contextual point for interpreting the magnitude of the present study between-group differences¹⁹.

In a similar vein, pooled trials of absorbable LigaSure compared to Harmonic, with no consistent evidence of superiority along important endpoints were reported. Given your findings, this underlines that the best benefit of Harmonic is seen compared to older electrocautery/open technique methods, whereas head-to-head trials among the modern devices typically show equal efficacy parity with device-specific trade-offs²⁰.

The comparisons with other procedures will allow the results of the current study to be better positioned. In another study, the authors randomized hemorrhoidal surgery patients to stapled hemorrhoidopexy versus Harmonic excision and reported pain, satisfaction, and complications; though both procedures were found to be effective, some of the early pain metrics favored Harmonic based on surgeon experience and case mix, correlating with your signal of reduced early pain²¹. Another study compared laser hemorrhoidoplasty to Harmonic, noting differentiations in postoperative pain and wound-related endpoints, providing again information that choosing techniques can be dependent on grade, tissue bulk, and resource distribution and not a universal rule^{22, 23}.

Another study reported that shorter procedures, reduced pain, and faster recovery with Harmonic versus conventional electrocautery, with some suggesting lower early recurrence, findings that echo our direction of effect, while also noting cost and

learning-curve considerations^{24, 25}. Taken together with the RCT and synthesis data above, the present study results strengthen the contemporary consensus that Harmonic excision offers meaningful early advantages over conventional hemorrhoidectomy, particularly for operative efficiency, hemostasis, and early postoperative pain, while acknowledging that benefits relative to other advanced energy or stapled/laser options may be more modest and context dependent.

Overall, the present study adds high-grade, locally relevant evidence that supports incorporating Harmonic Scalpel hemorrhoidectomy as a preferred option for grade III–IV disease where resources and expertise permit, with future work warranted to compare cost-effectiveness and late outcomes (healing quality, recurrence) under standardized analgesic and rehabilitation protocols.

This study has limitations, even though it provides important evidence about the effectiveness of harmonic scalpel hemorrhoidectomy. The applicability of the results to larger populations may be impacted by the small sample size and the fact it was conducted at a single center. The short follow up period also limited the identification of long term issues such as delayed wound healing, anal stenosis, or recurrence of the condition. The other disadvantage is that pain scoring is subjective. Scoring can vary among patients, although a wide usage, and consequently, it can add response bias to scoring. Also, there are restrictions on confounding variables like experience of the surgeon and differences in intraoperative technique, which restrict total control, which potentially influence the time of operation and outcomes. In spite of these weaknesses, the findings of this research have great clinical implications. The advantages of the harmonic scalpel compared with the conventional hemorrhoidectomy in patients having grade III and IV hemorrhoids was shown with a considerably shorter time of operation, blood loss, postoperative pain, and time of stay. The resulting outcome of all these is better patient satisfaction, premonitory activity returns faster, and lower health care expenses due to shorter admissions. Using the harmonic scalpel, surgeons can continue to give a patient an accurate surgical intervention and avoid perioperative morbidity, hence makes it a feasible alternative in the modern surgical setting. Provided by bigger multicenter studies, it can become a paradigm shift of surgical treatment of advanced hemorrhoids.

CONCLUSION

A harmonic scalpel hemorrhoidectomy has a particular beneficial effect, which is reduced length of stay in the hospital, decreased intraoperative blood loss, reduced postoperative pain, and faster time in the operating room with no loss of safety or effectiveness in comparison to traditional hemorrhoidectomy. The

results support the application of energy-based devices to enhance the outcome of surgical performance. Since hemorrhoids are prevalent and even problematic in many countries of the world, the harmonic scalpel has a modern patient-focused solution which not only enhances the perioperative recovery. It also provides an opportunity of improved usage of healthcare resources. The broader use of this technique can finally discover it to be the new benchmark in the surgical treatment of advanced hemorrhoids once supported by multicenter studies.

LIST OF ABBREVIATIONS

ASA – American Society of Anesthesiologists

BMI – Body Mass Index

HS – Harmonic Scalpel

LOS – Length of Stay

NRS – Numerical Rating Scale (for pain)

VAS – Visual Analogue Scale

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