



# **Comparative Analysis for the Treatment of Hemorrhoids Using Harmonic Scalpel versus Conventional Hemorrhoidectomy: A Single-Center Experience**

**Fatma Al-Thoubaity<sup>1\*</sup>**

<sup>1</sup>*Department of Surgery, King Abdulaziz University, Jeddah, Saudi Arabia.*

## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: 10.9734/JAMMR/2020/v32i2330729

### Editor(s):

(1) Dr. Syed Faisal Zaidi, King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia.

### Reviewers:

(1) Nadeem Kizilbash, Northern Border University, Saudi Arabia.

(2) Rami Abdulrahman Sairafi, Security Forces Hospital Riyadh, Saudi Arabia.

(3) Iman M. K. Abumourad, National Research Centre, Egypt.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/63328>

**Original Research Article**

**Received 20 September 2020**

**Accepted 26 November 2020**

**Published 17 December 2020**

## **ABSTRACT**

**Background:** Hemorrhoidectomy is one of the most effective treatments for Grade III/IV hemorrhoids. This study was aimed to compare the outcomes and postoperative complications arising from the harmonic scalpel hemorrhoidectomy with conventional hemorrhoidectomy.

**Methods:** In this retrospective study, 1120 patients were operated on for symptomatic Grade III/IV hemorrhoids during April 2004-April 2020. In the conventional hemorrhoidectomy patient group, the operation was performed by Ferguson closed method using monopolar electrocautery, while the other patient group was operated using a harmonic scalpel. Patient demographic data and common patient complaints were recorded. Operation duration and blood loss during the procedure were noted. Regular follow up of the patients was done for 4 weeks, and postoperative pain relief was recorded using the Visual Analog Scale. Finally, patient satisfaction and complete wound healing were analyzed along with postoperative complications like incontinence, secondary hemorrhage, recurrence, and anal stenosis.

**Results:** The patient demographic characteristics and preoperative complaints were similar for both groups. Harmonic scalpel procedure resulted in shorter operation time and less blood loss.

\*Corresponding author: E-mail: [alfatma683@gmail.com](mailto:alfatma683@gmail.com);

Postoperative pain relief was substantially better in the patient group who underwent harmonic scalpel hemorrhoidectomy. Harmonic hemorrhoidectomy procedure also resulted in higher patient satisfaction and wound healing. Minimal postoperative complications were observed for both groups.

**Conclusion:** Harmonic scalpel hemorrhoidectomy is a safe and effective procedure that achieves simultaneous tissue and vessel sealing. It reduces the duration of the operation, blood loss, postoperative pain, and complications compared to a conventional hemorrhoidectomy procedure.

*Keywords: Conventional hemorrhoidectomy; harmonic scalpel; hemorrhoidectomy.*

## 1. INTRODUCTION

Hemorrhoids are a prevalent anorectal condition, which is defined as symptomatic enlargement and distal displacement of normal anal cushions, with a lifetime risk of up to 5% [1]. Hemorrhoidal disease occurs more frequently in individuals who are 40 years or above [2]. Constipation and prolonged straining are among the major factors responsible for hemorrhoid development [3]. The most common symptoms associated with hemorrhoids is anal bleeding, pain, itching, and prolapse [3-4]. For early Grade I and Grade II hemorrhoids, conservative medical treatment is recommended, however, late-stage Grade III and Grade IV hemorrhoids require surgical treatment [4]. Surgical intervention may also be necessitated due to concomitant conditions such as anal fissures and ulcers [5].

Hemorrhoidectomy is the most effective surgical treatment for prolapsed hemorrhoids and is associated with the lowest recurrence rate; about 10% to 20% require surgical treatment due to symptom severity [6-7]. Commonly, a conventional hemorrhoidectomy procedure can be performed either by Ferguson's closed method or Milligan-Morgan's open method, with a scalpel or electrocautery [8-9]. However, hemorrhoidectomy is not without complications, which include postoperative pain, urinary retention, secondary hemorrhage, formation of skin tags, anal stenosis, and fecal incontinence [10]. These complications can increase the duration of the patient's hospital stay, hospital revisits, and delays the return to the workplace [11]. Therefore, newer devices and methods have been developed to further minimize patient discomfort and allow them to return to work early. Hemorrhoidectomy procedures performed with new devices such as bipolar electrothermal devices, ultrasonic scalpels, ligasure scalpels, and circular staplers have reported better pain relief, less bleeding during the surgical procedure and decrease the need for analgesics postoperatively as compared to conventional hemorrhoidectomy [11-15].

Harmonic scalpel hemorrhoidectomy, which was introduced first in 1992, is among the most widely used procedures that have gained acceptance in the following years [5]. The harmonic scalpel uses ultrasonic vibration to cut tissue and automatically stop bleeding at the same time [16]. Apart from hemorrhoidectomy, a harmonic scalpel is also routinely used in other surgical procedures such as cholecystectomy and myomectomy [5]. A hemorrhoidectomy performed with an ultrasonic scalpel has several advantages, including less damage to tissues, better hemostasis, less stimulation to neuromuscular tissues, and local control of the surgical site when compared to a hemorrhoidectomy performed with surgical scissors or monopolar electric cautery [12-13]. The present study aims to analyze the short-term and long-term outcomes of haemorrhoidectomy performed by ultrasonic harmonic scalpel sealing system and compare the effectiveness of this alternative procedure with the conventional Ferguson's closed haemorrhoidectomy procedure.

## 2. METHODS

### 2.1 Study Design

This retrospective study was carried out in the Department of Surgery, Bakhsh hospital (single-center) in Jeddah, Saudi Arabia, from April 2004 and April 2020, by a single female surgeon. In this study, 1120 patients were operated on for symptomatic Grade III and Grade IV hemorrhoids. Out of 1120 patients, 117 patients underwent a conventional hemorrhoidectomy performed by Ferguson closed method using monopolar electrocautery, from April 2004-April 2006 (over 2 years). The remaining 1003 patients were operated on for hemorrhoidectomy using a harmonic scalpel from April 2006 till April 2020 (over 14 years).

Exclusion criteria for the patients were liver cirrhosis, HIV positive, uncontrolled diabetes, or a bleeding diathesis. Patients on anticoagulant medication or

aspirin had to stop their medication 5 days before the surgery.

The patients were then prepared preoperatively and admitted to the Surgery Ward of the hospital on the morning of the procedure. The patients were subsequently discharged on the next day except when they had to stay longer for a post-operative complication. All procedures were carried out under general anesthesia or spinal anesthesia. The procedure was carried out with the patient in a lithotomy position. The initial steps for both the procedures were the same and included: Delivery of hemorrhoidal masses with artery forceps, one being applied at the base of hemorrhoid, the other at the apex. Skin incision at the base of hemorrhoids and submucosal dissection to lift the hemorrhoid mass off the internal sphincter by monopolar diathermy. The hemorrhoid pedicle was transfixed with 2/0 vicryl sutures and the mucosal edges of the defect opposed with 2/0 vicryl. Operative time was reported.

A harmonic scalpel (instruments with automatic vessel-sealing systems) is a surgical instrument that is used to cut and cauterize tissue simultaneously. Unlike electrosurgery, the harmonic scalpel uses ultrasonic vibrations instead of electric current to cut and cauterize tissue and automatically stop bleeding at the same time. During the harmonic scalpel hemorrhoidectomy procedure, the jaws of the handset were applied on the pedicle, and the instrument was activated by the hand. A computer-controlled feedback loop automatically stopped the flow of energy when the coagulation of the vessels and mucosa was achieved. The hemorrhoid tissue was coagulated and cut across the coagulated tissue seal. No sutures were applied as the ultrasonic device also achieved mucosal fusion. Anal canal packing was not routinely done except when there was a doubt regarding complete hemostasis. Operative time was reported for the procedure. Voltaren suppositories 100mg was inserted rectally, and Marcaine 0.25% 10 cc was injected locally in the perineal area. The patients were encouraged to take a Sitz bath on the evening of surgery and were given laxatives in the form of Agiolax once daily for 4 weeks. Subsequently, patients were asked to grade the severity of pain on 0–10 Visual Analogue Scale (VAS) on the evening of surgery (day 0), the next day (day 1), and after a week on follow-up (day 7).

### **3. RESULTS**

In this study, out of 1120 patients, most of the patients were female (1114), while only 6 male patients were operated on for hemorrhoidectomy

(Table 1). The mean age of the patients in the conventional hemorrhoidectomy group was  $46.5 \pm 3.96$  years, whereas the mean age of the patients in the harmonic scalpel group was  $39.8 \pm 8.96$  years. The common complaints among the patients in both groups were painless rectal bleeding, history of constipation, pruritis, and perianal discharge, with not much difference between them. Nonetheless, it was important to note that more patients in the harmonic scalpel group (70.0%) had Grade IV hemorrhoids, while only 60% of patients treated with conventional hemorrhoidectomy had Grade IV hemorrhoids (Table 1). The operative time, as well as the blood loss during the operation, showed significant differences. While the mean duration of the operation in conventional hemorrhoidectomy was  $17.4 \pm 0.7$  minutes, the operation duration was found to be  $13.5 \pm 2.2$  minutes when the operation was performed using a harmonic scalpel (Table 1). Further, we observed low blood loss during harmonic scalpel hemorrhoidectomy (5-10 ml), while higher blood loss (20-50 ml) was observed during the conventional hemorrhoidectomy procedure (Table 1).

Next, postoperative pain relief scores of the patients were analyzed. In the first week postoperative, 642 (64.0%) patients treated with harmonic scalpel reported pain relief, whereas only 64 (54.7%) patients treated by conventional hemorrhoidectomy reported pain relief in the same period (Table 2). Similarly, in the second and third week, the number of patients reporting relief in pain was more in the harmonic scalpel group (second week-782 (78.0%); third week-873 (87.0%)) as compared to the conventional hemorrhoidectomy patient group (second week- 76 (65.0%); third week 82 (70.0%)). Finally, in the fourth week too, a higher percentage of patients treated with harmonic scalpel reported pain relief (943 patients; 94.0%) as compared to the patients treated with conventional hemorrhoidectomy (94 patients; 80.3%) (Table 2).

Postoperative complications arising from the hemorrhoidectomy procedure included secondary hemorrhage, perianal abscess, urinary retention, recurrence, and incontinence. It was observed that 2 (1.7%) patients reported secondary hemorrhage when operated by conventional hemorrhoidectomy, whereas only 1 (0.1%) patient reported secondary hemorrhage in the patient group operated by harmonic scalpel (Table 3). Other postoperative complications like urinary retention (1 patient), gas (2 patients), and wound infection (1 patient) were only reported in the patient group treated by conventional hemorrhoidectomy (Table 3). While,

perianal abscess and recurrence were reported by only 1 patient each in both groups. No patient in both groups reported incontinence, stool, or anal stenosis. Next, wound healing and overall patient satisfaction were analyzed. Among the patients operated by harmonic scalpel, a higher percentage (983 patients; 98.0%) of patients reported complete

wound healing, whereas, among the patients treated by conventional hemorrhoidectomy, 95.0% patients (115 patients) reported wound healing. Finally, patients treated by harmonic scalpel reported high patient satisfaction levels (973 patients; 97.0%) as compared to the conventional hemorrhoidectomy patient group (Table 3).

**Table 1. Clinical profile of the study group**

<b>Clinical features</b>	<b>Conventional hemorrhoidectomy group (Total patients = 117)</b>	<b>Harmonic scalpel group (Total patients = 1003)</b>
<b>Total number of patients (n = 1120)</b>		
<b>Gender</b>	<b>n (%)</b>	<b>n (%)</b>
Female	115 (98.3%)	999 (99.6%)
Male	2 (1.7%)	4 (0.4%)
Age (years)	46.5 ± 3.96	39.8 ± 8.96
Mean ± SD		
<b>Duration of symptoms (in months)</b>	6-48	6-36
<b>Complaints</b>		
Painless rectal bleeding	111 (95.0%)	673 (67.1%)
History of constipation	115 (98.3%)	983 (98.0%)
Pruritus	23 (19.7%)	118 (11.8%)
Perianal discharge	2 (1.7%)	28 (2.8%)
<b>Degree of hemorrhoids</b>		
Grade III	47 (40.2%)	301 (30.0%)
Grade IV	70 (59.8%)	702 (70.0%)
<b>Operation time (in minutes)</b>	17.4 ± 0.7	13.5 ± 2.2
<b>Blood loss (during procedure)</b>	20-50 ml	5-10 ml

**Table 2. Results of pain relief**

<b>Number of patients whose post defecation pain relieved</b>	<b>Conventional hemorrhoidectomy group n (%)</b>	<b>Harmonic scalpel group n (%)</b>
First week	64 (54.7%)	642 (64.0%)
Second week	76 (65.0%)	782 (78.0%)
Third week	82 (70.0%)	873 (87.0%)
Fourth week	94 (80.3%)	943 (94.0%)

**Table 3. Postoperative complication of hemorrhoidectomy**

<b>Complications</b>	<b>Conventional hemorrhoidectomy group n (%)</b>	<b>Harmonic scalpel group n (%)</b>
Secondary hemorrhage	2 (1.7%)	1 (0.1%)
Perianal abscess	1 (0.9%)	1 (0.1%)
Urinary retention	1 (0.9%)	0
Recurrence	1 (0.9%)	1 (0.1%)
Incontinence	0	0
Gas	2 (1.7%)	0
Stool	0	0
Patient satisfaction	111 (95.0%)	973 (97.0%)
Anal stenosis	0	0
Anal fistulae	1 (0.9%)	0
Wound infection	1 (0.9%)	0
Wound healing	111 (95.0%)	983 (98.0%)

#### 4. DISCUSSION

Hemorrhoidal disease is a common anorectal medical problem worldwide, which decreases the overall quality of life of an individual. Treatment for Grade III/IV hemorrhoids requires a hemorrhoidectomy procedure. Postoperative pain, complications, and recovery duration are the major factors impacting patient satisfaction levels and cause apprehensions in patients undergoing hemorrhoidectomy. Conventional hemorrhoidectomy is often associated with significant morbidity and prolonged convalescence [17]. In the present study, we have performed and compared the outcomes for the harmonic scalpel hemorrhoidectomy procedure with the conventional Ferguson's closed hemorrhoidectomy procedure.

In our study, the majority of the patients in both groups were female and around or above 40 years of age. The major symptoms displayed by the patients included painless rectal bleeding, a history of constipation, pruritus, and perianal discharge. Further, the majority of the patients who were operated on in both groups had Grade IV hemorrhoids (Table 1). One of the major limitations of conventional closed hemorrhoidectomy is that the operative time is higher and does not achieve sufficient vascular coagulation leading to blood loss. Furthermore, because the surgeon has to suture deeply in the mucosa to stop bleeding, it causes postoperative pain, anal stenosis, and loss of the workforce [13]. However, harmonic scalpel hemorrhoidectomy overcomes these challenges by reducing the operation time ( $13.5 \pm 2.2$  minutes) vs. conventional hemorrhoidectomy ( $17.4 \pm 0.7$  minutes). These results agree with the previous studies where it was observed that harmonic hemorrhoidectomy takes lower time than conventional hemorrhoidectomy [11,13,15]. Further, the blood loss during the procedure by harmonic scalpel (5-10 ml) was substantially lower than that observed during conventional hemorrhoidectomy, and it also corroborates with the findings of earlier studies (Table 1) [15,18].

Postoperative pain relief is one of the essential parameters to analyze the effectiveness of the procedure. As reported in earlier studies, postoperative pain relief was determined by a Visual Analog Scale (VAS) [19]. In the present study, first-week post-operation, the VAS pain relief score was substantially higher for the patients operated by a harmonic scalpel than

those who underwent conventional hemorrhoidectomy. Similarly, in the subsequent weeks (second, third, and fourth), the percentage of patients who experienced substantial pain relief was higher in the harmonic scalpel group as compared to patients in the conventional hemorrhoidectomy (Table 2). Our data agree with previous studies where it was shown that the postoperative pain decreases gradually from Day 0 to Day 28, and patients operated by harmonic hemorrhoidectomy reported better pain relief, which is because harmonic scalpel ensures simultaneous cutting and coagulation of the vessels with limited tissue charring [13,18,20-21]. Different studies have also reported that the patients who undergo harmonic hemorrhoidectomy return to work faster than the patients' who had undergone conventional hemorrhoidectomy [11,13,22-23].

Finally, we studied postoperative complications such as recurrence, secondary hemorrhage, perianal abscess, urinary retention, anal stenosis, anal fistulae, and incontinence, which commonly arise after a hemorrhoidectomy procedure [16,24-25]. In our study, for both conventional and harmonic hemorrhoidectomy, the number of patients displaying postoperative complications was negligible. However, we noted that complications such as urinary retention, gas incontinence, anal fistula, and wound infection were only found in the conventional hemorrhoidectomy group (Table 3). Earlier studies have also reported a lower rate of postoperative complications arising after harmonic hemorrhoidectomy [13,22]. Among both the groups, a higher percentage of patients reported wound healing post harmonic hemorrhoidectomy. Similarly, the harmonic hemorrhoidectomy patient group reported higher patient satisfaction as compared to the patients who had undergone conventional hemorrhoidectomy.

#### 5. CONCLUSION

Harmonic scalpel hemorrhoidectomy is a sutureless closed technique that simultaneously ensures cutting and sealing of the tissues and vessels. It is a safe and effective procedure that requires less operative time, leads to less blood loss, lower postoperative pain, and complications than a conventional hemorrhoidectomy. Since harmonic hemorrhoidectomy procedure does not require suturing, it is easier to achieve hemostasis, allowing hemorrhoidectomy to be a daycare procedure.

## CONSENT AND ETHICAL CONSIDERATIONS

There were minimal ethical implications and issues since it is a retrospective study. Each patient was assigned a specific serial number to protect their identity and confidentiality. Moreover, no one except the investigating research team accessed the patients' records. Institutional Review Board in the Bakhsh hospital approved to review the records of patients on 29-10-2019. A consent form did not apply to our study since the study is retrospective in nature.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

## REFERENCES

- Halverson A. Hemorrhoids. *Clin Colon Rectal Surg.* 2007;20:77-85.
- Arslani N, Patrlj L, Rajkovic Z, Papes D, Altarac S. A randomized clinical trial comparing Ligasure versus stapled hemorrhoidectomy. *Surg Laparosc Endosc Percutan Tech.* 2012;22:58-61.
- Lohsiriwat V. Hemorrhoids: from basic pathophysiology to clinical management. *World J Gastroenterol.* 2012;18:2009-17.
- Riss S, Weiser FA, Schwameis K, Riss T, Mittlbock M, Steiner G, et al. The prevalence of hemorrhoids in adults. *Int J Colorectal Dis.* 2012;27:215-20.
- Bilgin Y, Hot S, Barlas IS, Akan A, Eryavuz Y. Short- and long-term results of harmonic scalpel hemorrhoidectomy versus stapler hemorrhoidopexy in treatment of hemorrhoidal disease. *Asian J Surg.* 2015; 38:214-9.
- Agbo SP. Surgical management of hemorrhoids. *J Surg Tech Case Rep.* 2011;3:68-75.
- Cataldo P, Ellis CN, Gregorcyk S, Hyman N, Buie WD, Church J, et al. Practice parameters for the management of hemorrhoids (revised). *Dis Colon Rectum.* 2005;48:189-94.
- Ferguson JA, Heaton JR. Closed hemorrhoidectomy. *Dis Colon Rectum.* 1959;2:176-9.
- Milligan ETC, Morgan CN, Jones LE, Officer R. Surgical anatomy of the anal canal and the operative treatment of hemorrhoids. *Lancet.* 1937; 2:1119–1124.
- Hardy A, Chan CL, Cohen CR. The surgical management of haemorrhoids--a review. *Dig Surg.* 2005;22:26-33.
- Lim DR, Cho DH, Lee JH, Moon JH. Comparison of a Hemorrhoidectomy With Ultrasonic Scalpel Versus a Conventional Hemorrhoidectomy. *Ann Coloproctol.* 2016; 32:111-6.
- Jayne DG, Botterill I, Ambrose NS, Brennan TG, Guillou PJ, O'Riordain DS. Randomized clinical trial of Ligasure versus conventional diathermy for day-case haemorrhoidectomy. *Br J Surg.* 2002; 89:428-32.
- Bulus H, Tas A, Coskun A, Kucukazman M. Evaluation of two hemorrhoidectomy techniques: harmonic scalpel and Ferguson's with electrocautery. *Asian J Surg.* 2014;37:20-3.
- Jayaraman S, Colquhoun PH, Malthaner RA. Stapled versus conventional surgery for hemorrhoids. *Cochrane Database Syst Rev.* 2006;CD005393.
- Megahed HA. Harmonic scalpel versus conventional hemorrhoidectomy. *Al-Azhar Assiut Med J.* 2019;17:24-9.
- Chung CC, Cheung HY, Chan ES, Kwok SY, Li MK. Stapled hemorrhoidopexy vs. Harmonic Scalpel hemorrhoidectomy: a randomized trial. *Dis Colon Rectum.* 2005; 48:1213-9.
- Chen JS, You JF. Current status of surgical treatment for hemorrhoids--systematic review and meta-analysis. *Chang Gung Med J.* 2010;33:488-500.
- Ravi Kumar GV, Madhu BS, Vishal T, Kumar N, Reddy M, Pawar PM. Harmonic scalpel compared with conventional open (Milligan-Morgan) method in surgical management of symptomatic haemorrhoids. *Int Surg J.* 2017;4:2010-2013.
- Kendirci M, Sahiner IT, Sahiner Y, Guney G. Comparison of Effects of Vessel-Sealing Devices and Conventional Hemorrhoidectomy on Postoperative Pain and Quality of Life. *Med Sci Monit.* 2018; 24:2173-2179.
- Sayfan J, Becker A, Koltun L. Sutureless closed hemorrhoidectomy: A new technique. *Ann Surg.* 2001;234:21-4.
- Kwok SY, Chung CC, Tsui KK, Li MK. A double-blind, randomized trial comparing Ligasure and Harmonic Scalpel hemorrhoidectomy. *Dis Colon Rectum* 2005;48:344-8.

22. Mushaya CD, Caleo PJ, Bartlett L, Buetner PG, Ho YH. Harmonic scalpel compared with conventional excisional haemorrhoidectomy: A meta-analysis of randomized controlled trials. *Tech Coloproctol.* 2014;18:1009-16.
23. Khan S, Pawlak SE, Eggenberger JC, Lee CS, Szilagy EJ, Wu JS, et al. Surgical treatment of hemorrhoids: prospective, randomized trial comparing closed excisional hemorrhoidectomy and the Harmonic Scalpel technique of excisional hemorrhoidectomy. *Dis Colon Rectum.* 2001;44:845-9.
24. Ramadan E, Vishne T, Dreznik Z. Harmonic scalpel hemorrhoidectomy: preliminary results of a new alternative method. *Tech Coloproctol.* 2002;6:89-92.
25. Armstrong DN, Frankum C, Schertzer ME, Ambroze WL, Orangio GR. Harmonic scalpel hemorrhoidectomy: five hundred consecutive cases. *Dis Colon Rectum.* 2002;45:354-9.

© 2020 Al-Thoubaity; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:  
<http://www.sdiarticle4.com/review-history/63328>*