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Comparative Study between Harmonic Scalpel Procedure and Traditional Surgical Procedure in Management of Hemorrhoids

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Abstract: ***Background: Hemorrhoids are normal anatomic clusters of vascular tissue, smooth muscle, and connective tissue that lie along the anal canal in 3 columns, Aim and objectives: The goal of this study was to compare the cost, operative time, and post-operative complications such as bleeding, pain, post-operative healing process, anal stenosis, and recurrence of hemorrhoidectomy using a Harmonic scalpel without ligation of the pedicle to a traditional surgical procedure of the pedicle. Subjects and methods: The current research was a prospective randomised experiment that took place between January 2019 and June 2021 on patients from Al-Azhar (Damietta) University Hospitals. Result: There was a statistically significant link between operation type and healing duration (p =0.001). The time it took for patients who had Harmonic scalpel hemorrhoidectomy to recover was statistically significantly shorter. On the contrary, there was a statistically significant link between the kind of operation and the length of stay in the hospital. Conclusion: It is concluded that although it was more expensive, but the Harmonic Scalpel group showed significantly lower postoperative pain, bleeding, anal stenosis, faster wound healing and less hospital stay when compared to the electrocautery group.***

Keywords: hemorrhoidectomy, Hemorrhoids, Harmonic scalpel, anal stenosis

1. Introduction

Hemorrhoids are normal anatomic clusters of vascular tissue, smooth muscle, and connective tissue that lie along the anal canal in 3 columns, forming the anal cushions; they lie in left lateral, right anterior, and right posterior positions **[1].**

Hemorrhoids occur when the supporting connective tissues of the anal cushions deteriorate and slides downward, causing venous dilatation and the overlying mucosa becomes thin and friable leading to painless bright bleeding per rectum. Hemorrhoids are maybe external or internal. External hemorrhoids develop distal to the dentate line and are usually associated with pain while internal hemorrhoids develop proximal to the dentate line and are typically painless **[2]**.

Milligan-Morgan open hemorrhoidectomy **[3]** and Ferguson closed hemorrhoidectomy (1959) are the most successful hemorrhoidectomy techniques **[4].**

Despite the fact that they are the most efficient therapy for haemorrhoids, they may cause problems such as postoperative bleeding, surgical-site discomfort, wetting, delayed healing, and anal stenosis. As a consequence, new surgical equipment, surgical techniques, and supporting treatments have been developed to help patients deal with postoperative problems. The Harmonic scalpel is used in hemorrhoidectomy as the use of high frequency ultrasonic radiation to split through tissues at a relatively low temperature, causing breakdown of protein hydrogen bonds. Because of the moderate temperature (80 °C), there was very little lateral thermal damage (1.5 mm) **[5].** In this paper, we discuss our experiences with the Harmonic scalpel in hemorrhoidectomy and compare the postoperative consequences to those seen with conventional surgical procedures.

2. Patients and Methods

The present study was a prospective randomized trial that was conducted on patients selected from, Al-Azhar (Damietta) University Hospitals through the period from January 2019 to June 2021.

Fifty consecutive patients were randomly divided equally into two groups: Harmonic scalpel hemorrhoidectomy without pedicle ligation (Group I), Electrocauteryhemorrhoidectomy with pedicle ligation (Group II).

Ethical Statement: We confirm that the present study run in concordance with international ethical standards and applicable local regulatory guidelines. A written informed consent was obtained from the patients of every eligible patient.

Inclusion criteria
All patients enrolled in the study were: Adults above the age of eighteen. Internal haemorrhoids of grade III with exterior components or Disease of the fourth grade

Exclusion criteria: Additional anorectal disease in patients (fissure or fistula), **n**eurologic deficits (paraplegia, previous strokes), patients on narcotic analgesics and patients with bleeding tendency.

Preoperative Evaluation
All patients underwent: Complete history taking, complete clinical examination (both general and local), sigmoidoscopic examination and routine clinical laboratory tests

Study's Procedures:
The patients were admitted to the surgery department in the hospital one day before the operation to be prepared for the operation. The patient was instructed to do a glycerin enema 12 h before surgery, and prophylactic antibiotic was given before the operation Under spinal or general anaesthesia, the patients were put in lithotomy positions. In every instance, the open approach was utilised. Tape was applied to both sides of the buttocks to reveal the anus.

An anoscope was used to assess the condition of the haemorrhoids. In all cases, the surgical hemorrhoidectomy method was standardised**.**All of the patients had an open Milligan-Morgan three-quadrant hemorrhoidectomy.

Harmonic scalpel group: In harmonic scalpel hemorrhoidectomy, excision of hemorrhoids was done with the help of vascular forceps and without damaging the internal anal sphincter. The hemorrhoidal pedicle was coagulated with a harmonic scalpel without ligation of the pedicle.

Traditional surgical group: Ligation of the pedicle with 0 polyglycolic acid material after electrocautery and excision was done.

Postoperative Care: Multiple elongated wrapped gauze soaked with antisepticwas inserted in the anal canal postoperatively to help in hemostasis. Diclofenac potassium, paracetamol, metronidazole, flavonoid, local antibiotics and laxatives were prescribed postoperatively. Patients were discharged from hospital 24 h after the surgery if they had no complications postoperatively.

Follow-up and Study's Outcomes: Scores of pain at rest and after defecation were recorded on visual analog scale (VAS) from 0 to 10. The patients were evaluated for wound healing, early and late complications such as hemorrhage, retention of urine, anal verge stenosis and fecal incontinence just after the operation and along the period of follow-up. Bleeding was considered major if the patient needed blood transfusion, reoperation, or close observation for the vital signs. Patients were followed up on 1, 3, 7, 15, 30 days, and at least 3 months plus on 6 months after surgery, and the patients were assessed by other assessors who were blind to the type of operation done for the patient.

Statistical Analysis: For the data input, an Excel spreadsheet was created.

To minimise possible mistakes, for numerical variables, we used validation checks, and for categorical variables, we used an option-based data entry method. SPSS software was used to conduct the analysis (Statistical Package for the Social Sciences, version 24, SSPS Inc, and Chicago, IL, USA). The Shapiro-Wilk Test is used to determine if the data is normal. To compare parametric quantitative variables, Non-parametric quantitative variables were compared using Mann-Whitney tests and Wilcoxon matched pair's tests, while independent Student t-tests and paired t-tests were used.The Chi-square test or the McNemar-Bowkertest was used to examine categorical variables. To determine the determinants of death, researchers used multilinear logistic regression. A statistically significant p-value is less than 0.05.

3. Results

Table (1) illustrates the relationship between the operation type and demographic data, such as age in years, gender, and medical history.

The relationship between procedure type and operational characteristics is shown in Table 2.

The kind of operation and operating time had a statistically significant relationship (p =0.002).

Harmonic scalpel hemorrhoidectomy patients had a statistically significant reduced operational time.

On the contrary, no statistically significant correlations were found between the type of blood loss (p =0.32) or the method of bleeding control (p =0.67).

Table 3 demonstrates the relationship between operation type and pain ratings.

The kind of operation and operating time had a statistically significant relationship (p =0.001).

At day 1, 3, 7, 15, and 30, patients who had a Harmonic scalpel hemorrhoidectomy had a statistically significant reduced pain score.

The relationship between operation type and postoperative results is shown in Table 4.

There was a statistically significant link between operation type and healing duration (p =0.001).

The time it took for patients who had Harmonic scalpel hemorrhoidectomy to recover was statistically significantly shorter.

On the other hand, there was a statistically significant link between the kind of operation and the length of stay in the hospital (p =0.18).

Table 5 depicts the relationship between operation type and late complications.

The kind of operation and late complications had a statistically significant relationship (p=0.001).

Late complications were statistically significantly lower in patients who had Harmonic scalpel hemorrhoidectomy.

Table 1: The demographic characteristics of the included patients

Variables	Electrocautery group (N =25)	Harmonic group (N =25)	P-value
Age in years			
• Mean ±SD	40.04 ±11.9	39.96 ±11.4	0.98
• Median (range)	38 (20 -61)	40 (21 -60)	
Gender, No. (%)			
• Male	15 (60%)	12 (48%)	0.32
• Female	10 (40%)	13 (52%)	
Medical History			
• Asthma	1 (4%)	1 (4%)	
• DM	2 (8%)	5 (20%)	
• HTN	1 (4%)	0	0.45
• DM, HTN	2 (8%)	2 (8%)	
• IHD	2 (8%)	0	
• DM. HTN, IHD	0	2 (8%)	

*Data are presented as mean ±SD, median (Range), or number (%)

Table 2: Operative Characteristics of the Included Patients

Variables	Electrocautery group (N =25)	Harmonic group (N =25)	P-value
Operative time in min			
• Mean ±SD	25.6 ±3.2	16.96±12.1	0.001
• Median (range)	25 (20 – 30)	17 (14 – 20)	
Blood loss in mL			
• No blood loss	19 (76%)	22 (88%)	0.32
• Minor blood loss	5 (20%)	2 (8%)	
• Major blood loss	1 (4%)	1 (4%)	
Management of Blood loss			
• Vit K, packing	3 (12%)	1 (4%)	
• Conservative	2 (8%)	1 (4%)	0.67
• Operative	1 (4%)	1 (4%)	

*Data are presented as mean ±SD, median (Range), or number (%)

Table 3: Association between type of procedure and pain

Variables	Electrocautery group (N =25)	Harmonic group (N =25)	P-value
VAS at days 1			
• Mean ±SD	7.64 **±0.81**	6.2 **±0.76**	
• Median (range)	8 (6 – 9)	6 (5 – 7)	0.001
VAS at days 3			
• Mean ±SD	7.44 **±0**.96	5.88 **±0**.67	
• Median (range)	7 (5 – 9)	6 (5 – 7)	0.001
VAS at days 7			
• Mean ±SD	6.56 **±1**.1	4.56 **±0.58**	
• Median (range)	6 (4 – 8)	5 (4 – 6)	0.001
VAS at days 15			
• Mean ±SD	4.84 **±1**.1	2.76 **±0.59**	
• Median (range)	5 (3 – 7)	3 (2 – 4)	0.001
VAS at days 30			
• Mean ±SD	2.64 **±0.95**	0.64 **±0.55**	
• Median (range)	2 (1 – 5)	1 (0 – 2)	0.001

*Data are presented as mean ±SD and median (range)

Table 4: Association between type of procedure and postoperative outcomes

Variables	Electrocautery group (N =25)	Harmonic group (N =25)	P-value
Time to Heal in weeks			
• Mean ±SD	8.52 **±2.2**	5 **±0.86**	
• Median (range)	8 (5 – 12)	5 (4 – 6)	0.001
Hospital Stay in hours			
• Mean ±SD	1.24 **±0**.43	1.08 **±0**.4	
• Median (range)	1 (1 – 2)	1 (1 – 3)	0.18

*Data are presented as mean ±SD and median (range)

Table 5: Late complications of the included patients

Variables	Electrocautery group (N =25)	Harmonic group (N =25)	P-value
Postoperative Complications, (%)			
• No	20 (80%)	23 (92%)	0.001
• Anal stenosis	3 (12%)	1 (4%)	
• Recurrence	2 (8%)	1 (4%)	

*Data are presented as mean ±SD, median (Range), or number (%)

4. Discussion

Hemorrhoidal disease is a common condition that occurs when the internal and/or exterior vascular plexuses around the anal canal become engorged.

The goal of this research was to evaluate the cost, operational time, post-surgical bleeding, discomfort, and healing process of hemorrhoidectomy using Harmonic scalpel without pedicle ligation vselectrocautery with pedicle ligation.

Lim et al. (6) conducted a prospective study on 50 patients who had grade III or grade IV internal hemorrhoids. Hemorrhoidectomy operation was done for all patients: 25 by harmonic scalpel and 25 sutured by 3-0 vicryl material after excision (conventional method). The harmonic scalpel group had a shorter procedure time, lesser pain in the postoperative period as assessed by the VAS, and lesser postoperative hemorrhage (P=0.034). The postoperative complications showed no significant variations between the two groups.

Bulus et al. (7) in his study concluded that hemorrhoidectomy done by harmonic scalpel is more safe and effective, has fewer complications, and causes lesser blood loss and lesser postoperative pain when compared with conventional techniques. Their results were significant regarding operative time, mean hospital stay, and postoperative static pain for postoperative days 1, 7, and 28, respectively. The postoperative complications such as bleeding, anal incontinence, and anal stenosis were lesser in HS hemorrhoidectomy group but without significance.

Talha et al. (8) In hemorrhoidectomy, both harmonic scalpel and ligasure were superior to traditional diathermy in terms of operational time, postoperative discomfort, and painkiller use during the first day after surgery, as well as quicker wound healing.

Abo-Hashem (9) In a 2010 research, he found that harmonic scalpel hemorrhoidectomy resulted in much faster wound healing.

They ascribed the faster wound healing at 6 weeks to little tissue damage, limited charring, reduced local edoema in the surrounding tissues, and the lack of tissue necrosis. Both

Ozer and Abo-Hashem, (9, 10) Harmonic scalpel hemorrhoidectomy is better than conventional

hemorrhoidectomy in terms of postoperative pain score, wound hemostasis, and analgesic usage, according to their findings.

5. Conclusion

It is concluded that although it was more expensive, but the Harmonic Scalpel group showed significantly lower postoperative pain, bleeding, anal stenosis, faster wound healing and less hospital stay when compared to the electrocautery group.

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Author Profile

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