

## Original Research Article

# Comparative study of harmonic scalpel haemorrhoidectomy versus conventional (milligan and morgan) haemorrhoidectomy

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## ABSTRACT

**Background:** Haemorrhoids are dilated veins occurring in relation to the anus. There are various treatment modalities for haemorrhoids and among them surgical treatment is considered to be most effective one. Harmonic scalpel hemorrhoidectomy was compared with conventional in terms of symptomatic relief and complications.

**Methods:** The aim of our study was to compare harmonic scalpel haemorrhoidectomy with conventional in terms of various intraoperative and postoperative factors for the treatment of grade III and IV haemorrhoids.

**Results:** In our case study of 25 patients average time taken was  $17.68 \pm 2.84$  minutes, while it was  $28.44 \pm 3.69$  minutes in control group. The mean blood loss was  $8.96 \pm 2.15$  ml,  $31.72 \pm 3.28$  ml in the case and control group respectively. Postoperative pain with VAS in case group on the first postoperative day was  $5.92 \pm 0.72$ , while it was  $8.52 \pm 0$  in the control group. The dose of analgesia was less in case group. The postoperative wound site soakage was less in case study, early ambulation and return to normal work was faster in case study group.

**Conclusions:** Harmonic scalpel haemorrhoidectomy is a simple, bloodless, safe and effective procedure in terms of blood loss, postoperative pain early return to routine work because of less lateral thermal injury.

**Keywords:** Early ambulation, Harmonic scalpel, Less painful

## INTRODUCTION

Haemorrhoids are cushions of specialized, highly vascular tissue found within the anal canal, in the sub mucosal space. They contain blood vessels, elastic tissue, connective tissue, and smooth muscle.<sup>1</sup> The anal sub mucosal smooth muscle (Treitz's muscle) originates from the conjoined longitudinal muscle. Some of the vascular structures within the cushion when examined microscopically lack a muscular wall. The lack of a muscular wall characterizes these vascular structures more as sinusoids and not veins. It is the most prevalent anorectal condition with a peak period of onset between 45-65 years of age.<sup>2</sup> At least 50 percent of people over the age of 50 years have evidence of haemorrhoids

although asymptomatic.<sup>2</sup> Surgical treatment is the standard procedure for grade III and IV haemorrhoids.<sup>3</sup> The Harmonic Scalpel cuts and coagulates by using lower temperatures than those used by electro surgery or lasers. Harmonic Scalpel technology controls bleeding by coaptive coagulation at low temperatures ranging from 50°C to 100°C: vessels are coapted (tamponaded) and sealed by a protein coagulum. Coagulation occurs by means of protein denaturation when the blade, vibrating at 55,500 Hz, couples with protein, denaturing it to form a coagulum that seals small coapted vessels.<sup>4</sup> The main concern for the patient remains the postoperative pain and early ambulation which are related to the incision, application of suture and lateral thermal damage with cauterization.<sup>5</sup> In this study our aim was to compare the

outcome of patients with grade III and IV disease who were subjected to haemorrhoidectomy using harmonic scalpel and conventional closed technique.

**METHODS**

This study was conducted on fifty (50) patients with grade III and IV haemorrhoids attending OPD in the post graduate Department of surgery, Acharya Shri Chander College of Medical Sciences and Hospital Sidhra, Jammu over a period of one year. The patients were divided into two groups consisting of twenty-five patients in each group. Bleeding per rectum was the chief complaint in both the groups. Detailed history including age, sex, occupation, present illness, past history and family history including bleeding per rectum and method of presentation.

**Inclusion criteria**

The patients with only haemorrhoidal disease (grade III and IV) were included in each group

**Exclusion criteria**

- History of inflammatory bowel diseases,
- Associated anal canal fissure or fistula,
- Previous haemorrhoidal surgery,
- Faecal incontinence,
- Immunosuppression,
- Recent use of anti-coagulants,
- Pregnancy,
- Dermatological disorders like acute dermatitis, fungal infections of perianal region.

A comparative study was conducted in these two groups of cases and all the patients were assessed according to following protocol

- Duration of surgery
- Intra operative blood loss
- Postoperative pain and analgesia
- Duration of hospital stay
- Postoperative complications including anal stenosis.
- Days taken for return to work
- Patients acceptability of the procedure in each group in terms of less pain
- Cost effectiveness
- Postoperative follow up for 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup> weeks for complete healing of wounds.

**RESULTS**

In our study of 25 patients who underwent Harmonic scalpel haemorrhoidectomy, the mean age of the study group was 46.08 years while in control group it was 44.56 years (Table 1). In our case study of 25 patients average time taken for surgery was 17.68 ± 2.84 minutes, while it was 28.44 ± 3.69 minutes in control group (Table 2). The mean blood loss was 8.96 ± 2.15 ml, 31.72 ± 3.28 ml in the case and control group respectively (Table 3). Postoperative pain with VAS in case group on the first postoperative day was 5.92 ± 0.72, while it was 8.52 ± 0 in the control group Table 4. In our case study group none of the patients had immediate postoperative bleeding or post spinal headache, but 3 patients (12%) went into urinary retention, while in control group 7 (28%) had urinary retention (Table 1).

**Table 1: Showed age distribution, grade, postoperative complications and hospital stay.**

Group	Case 25	Control 25	P value	Remark
Age	46.08 ± 13.30	44.56 ± 14.56	0.701	NS
Sex	Males 19(76%)	17 (68%)	0.528	NS
	Females 6(24%)	8(32%)		
Grade	III 24(96%)	20(80%)	0.081	NS
	IV 1(4%)	5(20%)		
Anesthesia	Spinal 21(84%)	19(76%)	0.479	NS
	epidural 4(%)	6(24%)		
Postoperative complications (urinary retention)	3(12%)	7(28%)	<0.001	S
Mean hospital stay	2.00 ± 0.00	3.72 ± 0.46	<0.001	S

**Table 2: Showed duration on surgery in minutes in both the groups.**

Group	≤ 20 minutes	≤ 30 minutes	≤ 40 minutes	Average
Case (n=25)	22 (88%)	3 (12%)	0 (0%)	17.68 ± 2.84
Control (n=25)	1 (4%)	18 (72%)	6 (24%)	28.44 ± 3.69
p- Value	<0.001			
Remarks	S			

Total number of dressing pad used in postoperative period was less in case group (Table 5).

**Table 3: showed average blood loss in both groups.**

Group	≤ 20 ml	≤ 30 ml	≤ 40 ml	Average
Case (n=25)	25 (100%)	0 (0%)	0 (0%)	8.96 ± 2.15
Control (n=25)	0 (0%)	12(48%)	13(52%)	31.72 ± 3.28
p-value	<0.001			
Remarks	S			

Average hospital stay was 2, and 3.72 ± 0.46 days in case and control group respectively. The average time in days for patients in case group to return to their routine work

ranged from 6-12 days (average 8.35 ± 2.02 days) while in control group it was 7-25 days (average 16.12 ± 4.95) (Table 6).

**Table 4: Showed visual analogue score.**

Visual analogue score(VAS)	Case (n=25)	Control (n=25)	p-value	Remarks
Day 1	5.92 ± 0.70	8.52 ± 0.84	<0.001	S
Day 2	3.76 ± 0.59	6.60 ± 0.81	<0.001	S
Day 7	1.16 ± 0.37	3.48 ± 0.92	<0.001	S

**Table 5: Showed number of pads used in the postoperative period.**

Group	No. of pads used in 1 <sup>st</sup> 24 hrs (%)			
	0	1	2	3
Case (n=25)	3(12%)	20(80%)	2 (8%)	0 (0%)
Control (n=25)	0 (0%)	8 (32%)	16(64%)	1 (4%)
p-Value	0.00016			
Remarks	HS			

**Table 6: Showed return to normal work in (days).**

Group	≤ 1 week	≤ 2 weeks	≤ 3 weeks	≤ 4 weeks	Average (in days)
Case (n=25)	12(48%)	13(52%)	0	0	8.35 ± 2.02
Control (n=25)	3(12%)	8(32%)	10(40%)	4(16%)	16.12 ± 4.95
P-value	<0.001				
Remarks	S				

**DISCUSSION**

Surgical haemorrhoidectomy is generally done for grade III and grade IV haemorrhoids. There are many procedures done for haemorrhoids. The new surgical techniques decreases the post operative complication especially pain and bleeding. The Harmonic scalpel has unique advantage of causing less postoperative pain because of very little lateral thermal injury.<sup>6</sup> The active blade of the instrument vibrates longitudinally against an inactive blade over an excursion of 50 to 100 microns.

One edge of the instrument is relatively sharp for cutting purpose and the blunt one is for coagulation. There is localized coagulation with lateral tissue injury (0-1.5 mm) deep, while the depth of thermal injury is up to 15 mm by using monopolar diathermy.<sup>6,10</sup> In our study of 25 patients who underwent Harmonic scalpel haemorrhoidectomy, the mean age of the study group was 46.08 years; this was in accordance with the study conducted by Armstrong DN et al the mean age of 49.2 years.<sup>7</sup> In a study conducted by Waleed Omar et al a total of 36 patients were operated with Harmonic scalpel, the

mean age was 35 years.<sup>6</sup> In our conventional group the mean age was 44.56 years which was in comparison to the study done by Mustafa T et al.<sup>8</sup> In our study of 25 patients who underwent haemorrhoidectomy by conventional method the mean age of our patients was 44.56 years which was in accordance with the other studies.<sup>6-8</sup> In our study of 25 patients who underwent Harmonic scalpel haemorrhoidectomy, there were 19 males and 6 females. In our study of control group who underwent conventional haemorrhoidectomy, there were 17 males and 8 females. In our study of 50 patients grading was done on the basis of digital rectal examination and proctoscopy as both were done in all patients while none of our patient required sigmoidoscopy or colonoscopy. In our study group 24 had grade III haemorrhoids and 1 had grade IV haemorrhoids, while 20 had grade III while 5 patients had grade IV in control group. In our case study of 25 patients average time taken was  $17.68 \pm 2.84$  minutes. The study conducted by Waleed Omar et al [6] (2011) ( $p < 0.001$ ) in their study of 36 patients the mean operative time was  $11 \pm 3$  minutes, while the study conducted by Mustafa T et al ( $p < 0.001$ ) reported the operation time of 10-25 minutes.<sup>8</sup> In a study conducted by Ramadan E et al the average operation time was 13.2 minutes.<sup>9</sup> In our control study of 25 patients the mean operation time was  $28.44 \pm 3.69$  minutes.

Blood loss during surgery in our case study of 25 patients varied from 7 to 15 ml with mean of  $8.96 \pm 2.15$  ml, the loss of blood was estimated by counting the total number of gauze pieces used which were weighted before and after surgery by taking one gram of weight equivalent to one ml. The study conducted by Waleed Omar et al (2011) in 36 patients reported blood loss in the range of 0-20 ml with mean of  $13 \pm 3$  ml. In our control group of 25 patients, the intraoperative blood loss varied from 20 to 40 ml with mean of  $31.72 \pm 3.28$  ml while the study conducted by Waleed Omar, et al reported blood loss in the range of 20-40 ml the mean of  $25 \pm 4$  ml.<sup>6</sup> In our study the blood loss was significantly lower in case group as compared to control study ( $p < 0.001$ ) which was consistent with the study done by Waleed Omar et al ( $p < 0.001$ ).<sup>6</sup>

For the management of postoperative pain, parenteral diclofenac sodium and tramadol were used for the first postoperative day. From second postoperative day all patients were shifted to oral drugs with diclofenac sodium and serrapeptidase especially in Harmonic scalpel groups, while some patients in control group needed intermittent intramuscular injectable diclofenac sodium along with oral analgesics. Postoperative pain evaluation was done using visual analogue scale (VAS) ranging from 1 to 10. In our Harmonic study group the score on the first postoperative day was  $5.92 \pm 0.72$ , on the second postoperative day it was  $3.76 \pm 0.59$  and  $1.16 \pm 0.37$  on the seventh postoperative day. The study conducted by Mustafa T et al (2008) reported the VAS score of 2, 2, 0 on first, second and seventh postoperative days

respectively, while the study conducted by Waleed Omar et al reported the VAS score of in the range of  $4.7 \pm 0.6$ ,  $4.5 \pm 0.4$ ,  $2.5 \pm 0.4$  on the first, second and seventh postoperative days respectively.<sup>6</sup> The study conducted by Armstrong DN et al reported in their study reported VAS score of 4.5, 4.8 and 3.8 on the first, second and seventh postoperative days respectively.<sup>7</sup> In our control group the mean of visual analogue score on first postoperative day was  $8.52 \pm 0.84$ . On the second and seventh postoperative days it was  $6.60 \pm 0.81$  and  $3.48 \pm 0.92$  respectively. In a study reported by Mustafa T et al, the VAS score was 3, 2, 1 on the first, second and seventh postoperative days respectively, while the study done by Waleed Omar et al reported the VAS in the range of  $7.8 \pm 1.0$  on the first postoperative day followed by  $7.5 \pm 1.0$ ,  $5.8 \pm 0.8$  on the second and seventh postoperative days respectively.<sup>8,7</sup> The study done by Armstrong DN et al reported the VAS of 8.2, 8.1 and 6.4 on the first, second and seventh postoperative days respectively.<sup>7</sup> When we compared visual analogue score of our case study with control one the pain was much less in our case study ( $p < 0.001$ ) same as given by other studies like Waleed Omar et al ( $p < 0.001$ ), Armstrong DN, et al ( $< 0.001$ ) and Mustafa T et al ( $p < 0.001$ ).<sup>6-8</sup> For the management of postoperative pain, parenteral diclofenac and tramadol were used on the first postoperative day when the patients were on intravenous fluids. From the second postoperative day all patients were shifted to oral analgesic drugs. In our Harmonic study group analgesic was given on demand in the form of diclofenac sodium 1.5mg /kg. On the first postoperative day the mean analgesic given was  $138.40 \pm 10.17$  mg followed by  $115.20 \pm 10.29$  mg,  $74.00 \pm 13.62$  mg on the second and seventh postoperative days. The study conducted by Waleed Omar et al also reported less usage of analgesic as 120-160 mg, 100-150 mg and 50-100 mg on the first, second and seventh postoperative days, while Mustafa T et al in their study reported 170-380 mg on the first postoperative day followed by 170-350 mg on the second postoperative day with no use of analgesics on the seventh postoperative day.<sup>6,8</sup> In the study conducted by Armstrong DN et al, the postoperative analgesic used was hydrocodone 10 mg by mouth every four hourly.<sup>7</sup> The patients were asked to keep a careful record of the number of narcotic analgesics required during each 24-hour postoperatively. The number of narcotic analgesics required per 24-hour period was significantly lower in the harmonic scalpel group. In our control group of 25 patients who were operated by conventional haemorrhoidectomy, the dose of analgesic used was  $270 \pm 17.56$  mg,  $243 \pm 10.31$  mg,  $140.80 \pm 11.61$  mg on the first, second and seventh postoperative days. The study conducted by Mustafa T et al reported usage of 200-395 mg, 170-350 mg, 100 mg was used on the first, second and seventh postoperative days, while Waleed Omar et al in their study reported analgesic usage in the dosage of 250-300 mg, 225-300 mg, 120-160 mg on the first, second and seventh postoperative days.<sup>8,6</sup> The dosage of analgesic requirement was quite less in our case group as compared to control group ( $p < 0.001$ ) on the first, second and

seventh postoperative days, the results were in accordance with the results given by Waleed Omar et al [6] ( $p < 0.001$ ), Mustafa T et al ( $p < 0.001$ ), Armstrong DN et al ( $p < 0.001$ ).<sup>8,7</sup> Patient were shifted on oral therapy including antibiotics, diclofenac-serrapeptidase tablets and laxatives. In our Harmonic group for the first twenty four hours we had to use one surgical pad in 20 (80%), two pads in 2 (8%) and no use of pad in 3 (12%) of patients. In our conventional group we had to use two pads in 16 (64%), one pad in 8 (32%) and three pads in one patient. When we compared the use of surgical pads in both the groups, the results were highly significant ( $p < 0.00016$ ) because most of the patients in Harmonic group used only one pad.

In our study patients were observed for postoperative complications like immediate bleeding, urinary retention or post spinal headache. In our case study group none of the patients had immediate postoperative bleeding or post spinal headache, but 3 patients (12%) went into urinary retention which was relieved by small feeding tube. In a study conducted by Waleed Omar et al, 3 out of 36 patients had urinary retention, while the study conducted by Mustafa T et al on 22 patients reported retention in 2 patients.<sup>6,8</sup> In our control study group of 25 patients 7 (28%) had urinary retention which was relieved in 4 patients by small feeding tube and 3 had again retention which was relieved by putting in Foleys catheter and it was removed after 12 hours. The study conducted by Waleed Omar et al reported urinary retention in 7 patients out of 36.<sup>6</sup> The study conducted by Mustafa T et al on 22 patients reported retention in 3 patients.<sup>8</sup> When we compared our results the retention was significantly lower in Harmonic scalpel group as compared to conventional group ( $p < 0.001$ ). The results were also shown significant by Waleed Omar et al ( $p < 0.022$ ).<sup>6</sup> Average hospital stay was calculated from the first postoperative day till the patients were discharged. In our case study of 25 patient's hospital stay was 2 days. In a study conducted by Waleed Omar et al reported in their study hospital stay of 1 to 2 days in 36 patients who were operated for haemorrhoids with harmonic scalpel, while Ramadan E et al in their study reported average hospital stay of 21.0 hours.<sup>6,9</sup> In our study of control group the average hospital stay was  $3.72 \pm 0.46$ . The Waleed Omar et al in their study reported hospital stay 36-96 hours, while the study conducted by Ramadan E et al reported average hospital stay of 40.6 hours.<sup>6,9</sup> By comparing our results the hospital stay was significantly less in our case group who were operated by harmonic scalpel haemorrhoidectomy ( $p < 0.001$ ) as compared to control group who were operated by conventional haemorrhoidectomy. In our study group of 25 patients who were operated as Harmonic scalpel haemorrhoidectomy the average time in days for patients to return to their routine work ranged from 6-12 days (average  $8.35 \pm 2.02$  days). The study conducted by Waleed Omar et al ( $n = 36$ ), reported 18 (50%) who returned to their normal work after one week, 10 (27.8) after three weeks, 4 (11.1%) after three weeks and 4

(11.1%) after four weeks.<sup>6</sup> In a study conducted by Armstrong DN, et al ( $n = 25$ ), 10 (55%) patients who returned to their normal in  $< 1$  week, 5 (28%) in 1-2 weeks, 3 (17%) after 3 weeks.<sup>7</sup> In our control group ( $n = 25$ ), who were operated by conventional haemorrhoidectomy, the return to normal work ranged from 7-25 days (average  $16.12 \pm 4.95$ ). The study conducted by Waleed Omar et al ( $n = 36$ ), reported 3 (8.3%) patients who returned to normal work after one week, 9 (25%) within two weeks, 11 (30.6%) within three weeks and 9 (25%) within four weeks, while Armstrong DN et al ( $n = 25$ ) in their study reported 3 (23%) patients who returned to their normal in  $< 1$  week, 4 (31%) in 1-2 weeks, 3 (23%) after 3 weeks.<sup>6,7</sup>

The only disadvantage with the Harmonic scalpel is the extra expense incurred by the patient due to the use of hand piece and generator which itself is costly. Since only one hand piece can be applied with one generator. But when we compared our case study with the control including decreased operative time, less use of analgesia, early discharge from the hospital, earlier return to normal work after operation compensates the cost of machine. Keeping in mind the above factors, over all Harmonic scalpel haemorrhoidectomy was found to be cheaper as compared to the conventional haemorrhoidectomy. In our study all the patients were advised to come for follow the in OPD after first, second, fourth and sixth weeks. All the patients of Harmonic group as well as conventional group were followed for up to six months. On each follow up each patient was asked about any history of pain, bleeding, difficulty in passing stool. In our case study of 25 patients 2 developed anal spam, one at fourth week and another at sixth weeks after surgery. These two patients had broad based haemorrhoids at 3, 7, 1nd 11oclock which were excised in the single setting with harmonic scalpel. None of our patients developed secondary haemorrhage, fecal incontinence or anal stenosis. The study conducted by Waleed Omar et al ( $n = 36$ ), reported secondary haemorrhage, infection in 1 and 1 patient respectively.<sup>6</sup> In our study of control group none of the patient developed any complication like secondary haemorrhage, infection, fecal incontinence or anal stenosis. The study conducted by Waleed Omar et al ( $n = 36$ ) reported secondary haemorrhage, infection, anal stenosis in 3, 1 and 1 patient respectively.<sup>6</sup> The studies conducted by Mustafa T et al did not report any complication in either case or control study.<sup>8</sup>

## CONCLUSION

There was significant difference when the blood loss between the two groups was compared which was less in Harmonic group. The operative time was less in Harmonic group as compared to conventional group. There was early ambulation with less postoperative complications in harmonic scalpel group. From the above observations we conclude that the Harmonic scalpel haemorrhoidectomy is virtually a bloodless operation

with minimal tissue damage. Besides it is safe, fast, and easy to perform. The decreased intra operative blood loss, postoperative pain, early ambulation and early return to routine work overcome the additional cost and maintenance of the instrument used in the surgery and provides a promising avenue for future research.

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