

Comparison of Outcome of Bipolar Electrocautery versus Harmonic Scalpel in the Management of Third and Fourth Degree Hemorrhoids

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ABSTRACT

Objective: To compare the outcome of bipolar electrocautery versus harmonic scalpel in the management of third degree hemorrhoids.

Methodology: This is a comparative study performed at different hospitals Karachi and Hyderabad from the duration of January 2020 to June 2020. Patients with symptomatic grade III hemorrhoids and grade IV hemorrhoids were randomly divided into two groups. . Either group had 64 patients. One group underwent hemorrhoidectomy using bipolar electrocautery (Group A), other group underwent hemorrhoidectomy using harmonic scalpel hemorrhoidectomy (Group B).

Results: The total number of patients was 128 with 64 in either group. The mean operating time in group A was 22 ± 4.7 minutes, while that in group B was 35 ± 2.2 minutes. The mean duration of hospital stay among group A was 1.7 ± 0.5 days while among group B patients was 2.1 ± 1.2 days. Mean VAS score for pain at first post-operative day in group A patients was 7 ± 0.6 days while mean VAS score for pain among group B patients was $8.5 \pm .2$ days.

Conclusion: Our study concludes that harmonic scalpel hemorrhoidectomy offers better post-operative patient satisfaction score as compared to bipolar diathermy. No significant difference in hospital stay was found. The number of patients with post-operative urinary retention were more in harmonic scalpel group while in diathermy group, more patients had post-operative hemorrhage.

Keywords: Harmonic scalpel hemorrhoidectomy, bipolar electrocautery, grade III hemorrhoids, grade IV hemorrhoids, hemorrhoids, hemorrhoidectomy

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Introduction

The congestion of the venous plexus of the anal canal gives rise to a condition called hemorrhoids. At the initial stages it can be treated by dietary and lifestyle changes. However, some cases can be managed by using procedures such as band ligation, infra-red photocoagulation, and sclerotherapy. These procedures can be performed in the clinic.^{1,2} Advanced cases require surgical intervention. The foremost procedure for the management of hemorrhoids was surgical hemorrhoidectomy. This is a painful procedure. With the advancement, surgeons have tried to limit the size of incision using closed and semi-open

incision. With further advancement, laser hemorrhoidectomy was introduced which has significantly reduced the post-operative complications. Other procedures introduced for the management of hemorrhoids include harmonic scalpel and bipolar electrocautery. Some researchers have advocated the use of harmonic scalpel as it has resulted in less lateral thermal injury (0-1.5 mm deep).³ It uses high frequency ultrasonic waves. It produces vibrations at a rate of approximately 55,500 Hz per second. These vibrations disrupt the hydrogen bonds in the proteins and results in coagulum formation which seals the vessels.^{4,5} It is favorable in many cases due to less

lateral thermal injury. The production of vaporizing fluids at 37 degrees minimizes thermal injury.⁶ Grade I, II and grade III hemorrhoids require less surgical invasion while grade IV hemorrhoids and grade III hemorrhoids with prominent external veins require compulsory surgical management.⁷

The associated postoperative pain following hemorrhoidectomy depends upon the type of excision device, incision, suturing of anal mucosa and surgical site infection. Excision using a harmonic scalpel is a newer approach and has been pronounced for better perioperative and postoperative outcomes. It breaks the hydrogen bond and mediates the formation of coagulum vessels at hypothermic conditions and consequently, is related to reduced damage to the encircling tissue.⁸⁻¹⁰

In this study, we compare the outcome of bipolar electrocautery and harmonic scalpel in the management of symptomatic third degree hemorrhoids and fourth degree hemorrhoids. We compare the outcome based on patient satisfaction, postoperative VAS score for pain and post-operative complications.

Methodology

This is a comparative study performed at the different hospitals of Karachi and Hyderabad from January 2020 to June 2020. Informed consent was taken from patients participating in the study. Patients with symptomatic grade III hemorrhoids and grade IV hemorrhoids were randomly divided into two groups. Either group had 64 patients. One group underwent hemorrhoidectomy using bipolar electrocautery (Group A), Other group underwent hemorrhoidectomy using harmonic scalpel hemorrhoidectomy (Group B). Inclusion criteria include patients having symptomatic grade III or IV hemorrhoids, giving informed consent to participate in the study. Exclusion criteria include patients not giving consent or those with co-morbid conditions, pregnant females, taking immune-suppressants or anti-platelet agents and patients with history of previous anal surgery. It was ensured that patients should stop taking analgesics at least 3 months before surgery. The demographic features from both groups were almost similar.

Patients were placed in a prone jack-knife procedure after administration of spinal anesthesia. Lidocaine 0.5% along with adrenaline diluted at ratio of 1:200,000 was injected at the submucosal and mucosal tissues. In group A patients, who underwent harmonic scalpel hemorrhoidectomy, the ultrasonic harmonic scalpel was

applied along the dilated veins and skin tags. Wounds were then closed using a polyglactin suture.

In group B patients underwent hemorrhoidectomy using bipolar electrocautery. A self retaining retractor was used to expose the dilated veins. Diathermy was applied to all dilated veins and skin tags until complete excision was ensured. Similar to group A, wounds were closed using polyglactin suture.

During the post-operative course, all patients were allowed to resume oral intake of solid and liquid diet 4 hours after surgery. They were given a laxative post-surgery. Patients were trained to irrigate the wound after every bowel movement and three times a day with clean tap water. Patients were prescribed analgesics and advised to use if any complaint of pain. They were asked to follow up at one week and later on after every two weeks. They were asked to visit the emergency department in case of any bleeding. At every follow up visit the anal canal was examined for any edema or hematoma.

The duration of surgery, post-operative complications, use of analgesics and hospital stay was analyzed. Patients were asked to rate their level of satisfaction at 6 weeks of follow up from 0-10 with zero being the lowest and 10 being highly satisfied. Patients were also asked to report pain at 1st post-operative day using VAS scale. Data was analyzed using SPSS v20.0

Results

The total number of patients was 128 with 64 in either group. The total number of males in our study were 97(75.78%) and females were 12(24.21%). The mean age was 41 ± 7.2 . The male to female ratio was 8:1.

In group A, there were 45 males and 19 females whereas in group B, there were 52 males and 12 females. 45(70.31%) patients in group A had symptomatic grade III hemorrhoids whereas 19(29.65%) patients had grade IV hemorrhoids. In group B, 42(65.62%) patients had grade III hemorrhoids while 22(34.37%) had grade IV hemorrhoids. The mean number of hemorrhoids resected in group A was 3.2 ± 1.1 while those in group B was 3.3 ± 0.7 . The mean operating time in group A was 22 ± 4.7 minutes, while that in group B was 35 ± 2.2 minutes ($p=0.03$). The mean duration of hospital stay among group A was 1.7 ± 0.5 days while among group B patients was 2.1 ± 1.2 days ($p=0.043$). Mean VAS score for pain at first post-operative day in group A patients was 7 ± 0.6 days

Table I: Differences in variables among groups

	Group A	Group B	p-value
Mean Operating Time (In Minutes)	22 ± 4.7	35 ± 2.2	0.031
Duration of Stay (In days)	1.7 ± 0.5	2.1 ± 1.2	0.043
VAS score for pain at 1 ST post-operative day (From 0 to 10)	7 ± 0.6	8.5 ± 1.2	0.056

while mean VAS score for pain among group B patients was 8.5 ± 1.2 (p=0.056). This is described in Table I.

The most common complication among group A patients was urinary retention found in 4 patients while most common complication among group B patients was wound edema at 6 weeks follow up which was found in 3 patients. One patient from group B had urinary retention while two patients from group B had hemorrhage (Table II).

Table II: Post-Operative Complications

Complication	Group A (n=64)	Group B (n=64)
Urinary retention	4(6.25%)	1(1.56%)
Wound edema at 6 weeks	0	3(4.68%)
Hemorrhage	0	2(3.12%)

Discussion

Our study concludes that the rate of post-operative complications was less in patients undergoing harmonic scalpel hemorrhoidectomy. The patient satisfaction score was greater among patients with harmonic scalpel hemorrhoidectomy. Our findings are similar to many other researchers. Kendirci M compares the effectiveness of harmonic scalpel hemorrhoidectomy, bipolar scissors hemorrhoidectomy and conventional scissors excision and ligation. He concludes that harmonic scalpel hemorrhoidectomy had a good pain score compared with the other two. There was no difference in complication rates among these three procedures. The patient satisfaction score was greatest among patients with harmonic scalpel hemorrhoidectomy.¹¹⁻¹³ Khan et al also compared the following strategies but the difference in Chung et al and Khan et al's study was the mucosal approximation performed in Khan's study. Khan et al concluded that harmonic scalpel is more effective than other procedures however there was no difference found in post-operative pain and the duration of surgery.¹⁴ Some international studies concluded in his study that patients with harmonic scalpel had better post-operative outcomes when compared to patients managed with electrocautery.^{6,15,16}

Hashem et al suggest that harmonic scalpel was superior in post-operative pain control as compared to bipolar electrocautery¹⁷. Our study findings also show that patients

with bipolar electrocautery have greater requirement for analgesic as compared to harmonic scalpel. Ivanoc et al has also concluded from his study results that harmonic scalpel is more effective in control of post-operative pain and hence decreases post-operative analgesics.¹⁸ Pain after surgical management of hemorrhoids is due to high temperature affecting the peri-anal skin.^{19,20} The vaporizing effect of harmonic scalpel reduces the temperature and also prevents lateral thermal spread hence decreasing post-operative pain.

In another study done on diathermy hemorrhoidectomy under local anesthesia at Liaquat university of medical health sciences Jamshoro Pakistan showed it is safe, feasible and causes less pain.²¹ In another article from Italy the authors considered that the diathermy hemorrhoidectomy is the gold standard.²²

Tan et al compared the outcome of diathermy and harmonic scalpel. He reports no difference in post-operative pain scores however 5 patients from diathermy group developed post-operative bleeding versus one patient in the group which underwent hemorrhoidectomy using harmonic scalpel.²³ In our study 2 patients from diathermy group developed post-operative hemorrhage however no patient from harmonic scalpel developed any bleeding.

Mustafa et al compared different techniques of hemorrhoidectomy in his study. He concluded that harmonic scalpel hemorrhoidectomy is the most effective in reducing post-operative pain. He further concluded that the use of sutures is the reason for post-operative pain.²⁴ In another study conducted in 2005, Chung et al compared stapled hemorrhoidopexy with harmonic scalpel hemorrhoidectomy for the management of patients with grade III hemorrhoids. He concluded that stapled hemorrhoidopexy has a better outcome at 6 months follow up when compared to harmonic scalpel hemorrhoidectomy.²⁵ Further studies are required to compare the outcome of harmonic scalpel hemorrhoidectomy and stapled hemorrhoidopexy.

Other post-operative complications associated with hemorrhoidectomy include urinary and anal

incontinence.²⁶ In our study four patients from harmonic scalpel group and one patient from diathermy group developed urinary incontinence. No patient developed fecal incontinence. Other complications such as anal stenosis, impaired wound healing and recurrence was also absent. Though harmonic scalpel offers good results however it is not cost effective. It is also associated with a prolonged learning curve. However, the benefits associated with harmonic scalpel use include reduced pain and hence reduction in the use of narcotics and analgesics, reduced frequency of urinary retention.

The limitations of our study include a small sample size and inability to compare other categories of hemorrhoidectomy. Further research is required comparing other procedures of management of 3rd degree symptomatic hemorrhoids and fourth degree hemorrhoids.

Conclusion

Our study concludes that harmonic scalpel hemorrhoidectomy offers better post-operative patient satisfaction score as compared to bipolar diathermy. No significant difference in hospital stay was found. The number of patients with post-operative urinary retention were more in harmonic scalpel group while in diathermy group, more patients had post-operative hemorrhage.

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