



## Comparative Study to Outcome of Conventional versus Ligasure Hemorrhoidectomy

Dr. Amr Mohamed El Hefny, Dr. Abdel Rahman Mohamed El Ghandour, Mohamed Adel Mohamed Salman

General Surgery Department, Faculty of Medicine- Ain-Shams University, Cairo Egypt  
[midosalman14@gmail.com](mailto:midosalman14@gmail.com)

**Abstract:** Ligasure Hemorrhoidectomy is a sutureless, closed hemorrhoidectomy technique dependent on a modified electrosurgical unit to achieve tissue and vessel sealing. It is safe and effective. In this study, compared with conventional excisional hemorrhoidectomy, LigaSure hemorrhoidectomy was superior and more advantageous in terms of short operative time, minimum blood loss, less postoperative pain, faster wound healing and less postoperative complications. It is simple, safe, and easy to learn procedure. The major limitations for this study were the small sample size and short follow up of the patients as compared to previous studies. The basic disadvantage with the LigaSure technique in our locality is its expensive cost but this disadvantage has been noted with all new techniques. Even though encouraging preliminary results of the studies are available about this new surgical technique with less number of complications but we need to do more prospective trials comparing the two groups of Ligasure to the traditional one with large sample size and long term follow ups for recurrence to conclude its definite good efficacy, so that it will become a good option of treatment for third and fourth degree hemorrhoids. LigaSure hemorrhoidectomy could be the gold standard procedure for all symptomatic piles.

[Amr Mohamed El Hefny, Abdel Rahman Mohamed El Ghandour, Mohamed Adel Mohamed Salman. **Comparative Study to Outcome of Conventional versus Ligasure Hemorrhoidectomy.** *J Am Sci* 2019;15(10):58-65]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). <http://www.jofamericanscience.org>. 7. doi:[10.7537/marsjas151019.07](https://doi.org/10.7537/marsjas151019.07).

**Keywords:** Comparative; Study; Outcome; Conventional versus; Ligasure Hemorrhoidectomy

### 1. Introduction

Hemorrhoids are one of the most common ailments to afflict mankind. The incidence of hemorrhoids increases with age and it seems likely that at least 50% of people over the age of 50 years have some degree of hemorrhoid formation. Men seem to be affected roughly twice as frequently as women (Kaushik et al., 2019).

Hemorrhoidectomy is superior to any proposed conservative procedure, including rubber band ligation, sclerotherapy, photocoagulation, and cryotherapy for treating symptomatic grades III and IV hemorrhoids. The availability of new techniques and devices has stimulated researchers to look for the best treatment for curing hemorrhoids. The ideal technique should combine high safety and efficacy of the treatment with low postoperative pain and discomfort along with an effective cost for the same (Kaushik et al., 2019).

Symptomatic hemorrhoids are no longer as agonizing as before because of the new modalities of operation that require shorter hospital stay and allowing patients to return to work earlier (Hetzler & Senagore, 2009).

All symptomatic piles definitely need surgical excision, especially when conservative measures or nonsurgical interventions fail to resolve the symptoms.

Excision of piles whether surgically or by diathermy or even by stapler hemorrhoidopexy is usually indicated for symptomatic Grade 3 and 4 piles or when conservative measures fail for earlier grades of hemorrhoids or presence of concomitant chronic anal fissure or fistula. Excision of hemorrhoids is usually associated or results in severe and sometimes intolerable postoperative pain which take about 2–8 weeks postoperatively (Hetzler & Senagore, 2009).

Such pain remains the main concern which make some patients reluctant to perform hemorrhoidectomy. Therefore, the search for less painful, feasible, and effective alternative is still going on and still the main concern of many surgeons. Even when hemorrhoidectomy performed by diathermy using a monopolar cautery, still the pain is a well-known post-operative complication due to thermal spread and damage to nearby richly innervated tissue. Thus, limitation and minimizing the extent of thermal injury is expected to result in significant reduction of postoperative pain (Ghnam, 2017).

Recently, the introduction of LigaSure vessels sealing electrosurgical unit for the treatment of piles had gained wide acceptance and popularity.

LigaSure vessels unit is an improved version of bipolar diathermy with further advantage of achieving homeostasis by its vessels sealing system. It can seal blood vessels up to 7 mm in diameter. The delivered energy is confined to tissue grasped between the jaws of the forceps with very limited spread of thermal effect to the adjacent tissues (Noori, 2018).

Ligasure hemorrhoidectomy can be recommended as the ideal technique because of its limited tissue injury, facilitated wound healing, and decreased post-operative pain. Many trials were performed to compare LigaSure hemorrhoidectomy with conventional hemorrhoidectomy, and it is suggested that LigaSure hemorrhoidectomy is a safe and efficient method to improve surgical outcomes. The primary goal of some trials was to evaluate the benefits of the system over traditional approaches (Ghnam, 2017).

This prospective study was designed to compare between ligasure and conventional hemorrhoidectomy as regards operative time and intraoperative bleeding as well as postoperative pain, hospital stay, healing process, bleeding, recurrence and anal stenosis.

#### **Aim of the Work**

To compare between the two approaches for hemorrhoid surgery - Ligasure hemorrhoidectomy and conventional hemorrhoidectomy - in terms of operative time and intraoperative blood loss, as well as postoperative pain, hospital stay, healing process, bleeding, recurrence and anal stenosis.

## **2. Patients and Methods**

### **Type of study:**

Prospective randomized study.

### **Study Setting:**

This study was conducted on 30 consecutive patients presenting for hemorrhoidectomy at Ain-Shams University hospital, Ahmed Maher Teaching hospital and other authorized hospitals under supervision of thesis supervisors.

Thirty patients with grade III or IV hemorrhoids were randomized equally to conventional hemorrhoidectomy (group A) and Ligasure hemorrhoidectomy (group B). Operative details were recorded.

### **Study Period:**

The patients had been followed-up weekly for 2 months and then monthly for 6 months to evaluate healing process, ongoing symptoms and postoperative complications.

### **Study Populations:**

Patients attending at Ain-Shams University hospital, Ahmed Maher Teaching hospital and other authorized centers with the following criteria:

### **Inclusion criteria:**

This study was performed on patients of grade 3 and 4 hemorrhoids either diagnosed for the first time or already diagnosed before, who were referred to outpatient department.

### **Exclusion criteria:**

#### **These patients were excluded from the study:**

1. Patient of Grade-I and II hemorrhoid
2. Patients who undergo a combined procedure for fissures or fistulae.
3. Those having other conditions like thrombosed hemorrhoids, inflammatory bowel diseases and immune-compromised patients.
4. Previous ano-rectal operation.
5. Hematologic pathology, patients on antiplatelet medications, patients with hypertension, uncontrolled diabetes and liver cirrhosis and unwillingness of the patient were also excluded.

### **Sampling method:**

Simple random sampling of patients with hemorrhoids grade 3 or 4 who were presented at surgical clinic of Ain Shams University hospital, Ahmed Maher Teaching hospital and other authorized hospitals.

### **Type of Patients:**

This was a prospective study that included 30 patients of 3rd or 4th degree hemorrhoids of age ranging twenty to fifty years old and from both sexes attending to the hospital. The patients were randomly allocated into two groups each included 15 patients, first group underwent conventional hemorrhoidectomy, the second group underwent hemorrhoidectomy by ligasure.

## **3. Results**

Quantitative data was represented as mean, standard deviation, median and range. Data were analyzed using independent t-test to compare means of two groups. Qualitative data were presented as number and percentage and compared using Chi square test. Graphs were produced by using Excel. P-value is considered significant if it is less than 0.05. The study results included intraoperative blood loss, operative time, post-operative pain scoring according to numeric pain scale for both groups, hospital stay, healing process, postoperative bleeding, recurrence and anal stenosis.

### **Analysis of intra-operative blood loss and operative time:**

**Intra-operative blood loss was assessed according to "Blood Loss Estimation Using Gauze Visual Analogue".** Mean intra-operative blood loss for group A was 55 ml with a range of 25-75 ml, while in group B was 31.67 ml with a range of 25-75 ml. Data are shown in table (1).

As regards operative time, the mean operative time in group A was 15 minutes with a range of 10-20

minutes, while in group B was 11.67 minutes with a range of 10-30 minutes. Data are shown in table (1).

Table (1) shows that there was high statistically significant difference found between the two groups (A,B) regarding intra operative blood loss. Operative blood loss in group B was significantly less than group

A (31.67 ± 14.84 ml in group B versus 55.00 ± 19.36ml in group A, P value 0.001).

Results also found that in comparison with group A, group B had a shorter operating time (11.67 ± 5.23min in group B versus 15.00 ± 3.78 min in group A, P value 0.055).

**Table (1):** Statistical analysis between Group A (conventional hemorrhoidectomy) and Group B (ligasure hemorrhoidectomy) regarding intraoperative blood loss and operative time:

		Type of procedure		Test value•	P-value	Sig.
		Group A	Group B			
		No. = 15	No. = 15			
Intra operative blood. Loss (ml)	Mean±SD	55.00 ± 19.36	31.67 ± 14.84	3.704	0.001	HS
	Range	25 – 75	25 – 75			
Duration of surgery (min)	Mean±SD	15.00 ± 3.78	11.67 ± 5.23	2.000	0.055	NS
	Range	10 – 20	10 – 30			

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

•: Independent t-test

#### **Pain scoring in the post-operative period:**

Post-operative pain was assessed using numerical analogue scale (0-10) in weeks 1,2,3,4 following surgery.

**Table (2):** Statistical analysis of pain score in the post-operative period in both groups (A and B)

Post-operative pain		Type of procedure		Test value ‡	P-value	Sig.
		Group A	Group B			
		No. = 15	No. = 15			
Wk 1	Median (IQR)	6 (5 - 7)	4 (3 - 5)	-3.875	0.000	HS
	Range	4 – 8	2 – 5			
Wk 2	Median (IQR)	4 (3 - 5)	1 (1 - 1)	-4.447	0.000	HS
	Range	2 – 5	0 – 3			
Wk 3	Median (IQR)	2 (1 - 3)	0 (0 - 0)	-4.263	0.000	HS
	Range	0 – 3	0 – 1			
Wk 4	Median (IQR)	0 (0 - 1)	0 (0 - 0)	-2.693	0.007	HS
	Range	0 – 1	0 – 0			
<b>Friedman Test</b>		<b>44.473</b>	<b>42.118</b>			
<b>P-value</b>		<b>0.000 (HS)</b>	<b>0.000 (HS)</b>			

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

‡: Mann Whitney test

The previous table showed that there was high statistically significant difference found between the two groups (A, B) regarding postoperative pain score.

The numerical analogue pain scores to assess post-operative pain were less in group B than group A with statistical significance through weeks 1,2,3,4 (P value <0.01).

#### **Analysis of the post-operative wound healing and post-operative hospital stay:**

In group A, 4 patients had bad healing representing 26.7% and 11 patients had good healing representing 73.3%. That is shown in table (3)

While in group B, only one patient had bad healing representing 6.7% and, 14 patients had good healing representing 93.3%. That is shown in table (3)

Therefore, no significant difference between the two groups as regards wound healing.

**Table (3):** Statistical analysis between both groups regarding postoperative wound healing and hospital stay

		Type of procedure				Test value*	P-value	Sig.
		Group A		Group B				
		No.	%	No.	%			
Wound healing	No	4	26.7%	1	6.7%	2.160	0.142	NS
	Yes	11	73.3%	14	93.3%			
Hospital stay ( day)	1 Day	15	100.0%	15	100.0%	-	-	-

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

\*: Chi-square test

The previous table shows that wound healing was better in group B than group A by assessing the wound in the postoperative period.

All patients stayed in the hospital for 1 day. Therefore, no statistical difference was noted as regards post-operative hospital stay.

**Table (4):** Statistical analysis between the two groups (A, B) regarding postoperative recurrence:

Postoperative recurrence	Conventional group (A)		Ligasure group (B)		Test value	P-value	Sig.
	No. (%)		No. (%)				
No	12 (80.0%)		14 (93.3%)		1.154	0.283	NS
Yes	3 (20.0%)		1 (6.7%)				

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

\*: Chi-square test

The results found that there was no significant statistical difference between the two groups (A, B) as regards postoperative recurrence. Despite that, there were 3 patients in the A group (conventional) had

recurrence; while in the B group (ligasure) only one patient had recurrence. One patient was managed surgically and the others were managed conservatively.

**Table (5):** Statistical analysis between the two groups (A, B) regarding postoperative bleeding:

Postoperative hemorrhage	Conventional group (A)		Ligasure group (B)		Test value	P-value	Sig.
	No. (%)		No. (%)				
No	13 (86.7%)		15 (100.0%)		2.143	0.143	NS
Yes	2 (13.3%)		0 (0.0%)				

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

\*: Chi-square test

The results showed that there was no significant statistical difference between the two groups (A, B) as regards postoperative bleeding. Although, there were 2 patients in the A group (conventional) had

postoperative minor bleeding; while in the B group (ligasure), no patients had postoperative bleeding. These patients were managed conservatively.

**Table (6):** Statistical analysis between the two groups (A, B) regarding postoperative anal stenosis:

Postoperative anal stenosis	Conventional group (A)		Ligasure group (B)		Test value	P-value	Sig.
	No. (%)		No. (%)				
No	12	(80.0%)	14	(93.3%)	1.154	0.283	NS
Yes	3	(20.0%)	1	(6.7%)			

**P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value < 0.01: highly significant (HS)**

\*: Chi-square test

The results showed that there was no significant statistical difference between the two groups (A, B) as regards postoperative anal stenosis. Although, there were 3 patients in the A group (conventional) complicated by postoperative anal stenosis; while in the B group (ligasure), only one patient had postoperative anal stenosis. These patients were managed by anal dilatation.

#### 4. Discussion

For symptomatic grade 3 and 4 hemorrhoids, some form of hemorrhoidectomy remains the accepted modality of treatment. The traditional (Conventional) methods like the Milligan-Morgan method and the Ferguson's method have been in practice for more than half a century for want of a better alternative. From last few years there is availability of the Ligasure™ device. It is so effective in achieving hemostasis that it is described as a 'vessel sealing system'. The energy is delivered only to the tissue grasped within the jaws of the hand piece with minimal spread of electrical or thermal energy to adjacent tissues. Complete coagulation of vessels and also tissues is achieved with minimal charring in contrast to conventional diathermy. A computer controlled feedback loop automatically stops the flow of energy when coagulation of the vessels and mucosa is achieved.

Conventional hemorrhoidectomy is associated with significant pain-related complications such as urinary retention and constipation. Additionally meticulous hemostasis needs to be ensured to avoid postoperative hemorrhage. Occasionally the operative field can become quite bloody, prolonging the surgery.

In our study, we found that Ligasure hemorrhoidectomy is a major improvement over the conventional technique in all these parameters.

In this study, LigaSure electrosurgical unit was used for the treatment of patients who presented with symptomatic piles and compared the results and surgical outcomes with that recorded after conventional hemorrhoidectomy. Results found that LigaSure hemorrhoidectomy when compared with conventional hemorrhoidectomy, is simple, safe, and very effective treatment modality. It is characterized by bloodless sub-mucosal dissection, less operative time, less postoperative pain and besides, excellent surgical outcomes.

Results also found that the amount of intraoperative blood loss and post-operative pain were significantly less in the LigaSure group.

In comparison with conventional method, Ligasure hemorrhoidectomy had a shorter operating time ( $11.67 \pm 5.23$  min versus  $15.00 \pm 3.78$ , P value:

$0.055$ ) and had less intraoperative blood loss ( $31.67 \pm 14.84$  ml versus  $55.00 \pm 19.36$  ml, p value: 0.001)

The numerical analogue pain scores to assess post-operative Pain were less in Ligasure than Conventional Hemorrhoidectomy with statistical significance in the post-operative period (weeks 1,2,3,4).

These findings were consistent with that obtained by Bakhtiar et al, who found that the mean operating time, mean blood loss, and overall pain score were less in that patient underwent hemorrhoidectomy by LigaSure technique (**Bakhtiar et al., 2016**).

Similarly, in a comparative study of Ligasure versus conventional hemorrhoidectomy that was done in El-Menoufia University, As regards operative time, this study found a highly significant shorter operative time in the Ligasure group compared with the conventional group. Significantly in the Ligasure group, patients achieved lower pain score on the first day, seventh day, and second postoperative week ( $P < 0.01$ ) compared with the conventional group. There was no difference between the two groups in terms of degree of patient satisfaction and number of postoperative complications. Additionally, the Ligasure group showed significantly lower intraoperative blood loss; the mean ( $\pm$ SD) was  $1.2 \pm 1.6$  ml (ranging from 0 to 5 ml) compared with  $22.2 \pm 6.58$  ml (ranging from 15 to 35 ml) for the conventional group ( $P = 0.001$ ) (**El Sebaei et al., 2015**).

These findings were also similar to that of Noori, who found that LigaSure hemorrhoidectomy was superior and more advantageous in terms of short operative time, minimum or even no blood loss, less postoperative pain, low complications rate, faster wound healing, and early return to work. During the follow-up, 6–9 months period of this study, late complications were traced and recorded. Anal stenosis developed in five patients (10.4%) in conventional group and three patients (6.25%) in LigaSure group. Recurrence of piles was not observed in any patient in both groups during the same follow-up period of this study. The surgical outcomes of LigaSure hemorrhoidectomy showed high patients satisfaction and low recurrence. LigaSure hemorrhoidectomy could be the gold standard procedure for all symptomatic piles to which other procedures are compared (**Noori, 2018**).

Gentile et al. compared between LigaSure and conventional hemorrhoidectomy for IV degree hemorrhoids, and they showed that the LigaSure system is simple and more effective with short operating time, less postoperative pain score due to limited tissue damage, and free from pain earlier than

those with conventional hemorrhoidectomy (**Gentile et al., 2011**).

Milito et al recorded (in their study which compared between hemorrhoidectomy with LigaSure vs. conventional excisional techniques) that patients treated with LigaSure had a significantly shorter operative time, postoperative pain, wound healing time, and time off from the work than patients submitted to excisional hemorrhoidectomy (**Milito et al., 2010**).

Similar study was done in El-Mansoura University and showed, the superiority of LigaSure hemorrhoidectomy over Milligan-Morgan's hemorrhoidectomy especially in reduced operative time, reduced postoperative pain, and a reduced amount of parenteral analgesics required. Significant lower intraoperative blood loss in LigaSure hemorrhoidectomy was found and may be explained by the effective hemostasis achieved by the use of LigaSure device. There were no cases of anal stenosis in both groups (**Ghnam, 2017**).

Nienhuijs and de Hingh compared the patients' tolerance and postoperative pain after LigaSure and conventional hemorrhoidectomy, and they showed that LigaSure technique is superior in terms of postoperative pain, patient's tolerance, and without any adverse effect on the surgical outcomes and postoperative complications (**Nienhuijs and de Hingh, 2009**).

In another comparative study between LigaSure Hemorrhoidectomy and Conventional Hemorrhoidectomy, results found that the duration of surgery, per-operative bleeding and duration of stay in hospital were significantly less with LigaSure Hemorrhoidectomy when compared to conventional Hemorrhoidectomy. Also, postoperative pain and time taken to return to normal activity were almost similar in both methods. One patient in LigaSure Hemorrhoidectomy developed anal stenosis and needed operative intervention (**Vinayaka et al., 2018**).

The usage of LigaSure vessel sealing technique was found by many researchers to result in reduction of postoperative pain and analgesia. This could be related to its very minimal thermal injury to the tissues, the sutureless nature of this technique, proper tissue apposition resulting in rapid wound healing and irreversible nerve ending thermal injury is the main factors that decrease the postoperative pain after LigaSure hemorrhoidectomy. Bessa and Ligasure showed that LigaSure electrosurgical unit provides a superior alternative to conventional diathermy for hemorrhoid surgical excision by decreasing the operative time, postoperative pain, and need for parenteral analgesia in the early postoperative period as well as faster wound healing (**Bessa and Ligasure, 2008**).

Meta-analysis done by Xu, L. and Chen showed that Ligasure hemorrhoidectomy took significantly less time to complete and a shorten hospital stay, with a significantly less blood loss during operation. Postoperative pain is well accepted as a serious problem by patients undergoing hemorrhoidectomy. There was a significant difference between ligasure and conventional hemorrhoidectomy in terms of postoperative pain scores 24 hours after operations (**Xu et al., 2015**).

Our study's results are also comparable to a study done by Nighat Bakhtiar, Foad Moosathat showed major decrease in post-operative pain from immediate post-operative day to 7th post-operative day in patients undergoing the LigaSure technique, i.e. from 4.6 to 1.34 compared to 6.65 to 2.44 in the conventional group observed, these findings support the idea that the new technique of using Ligasure for Hemorrhoidectomy causes decreased postoperative pain. Similarly, the mean operative time in this study was 36.6 minutes in Ligasure group which was less as compared to the conventional group having 52.5 minutes. The bleeding during surgery was also less compared to the conventional method because of the reason that it effectively achieve hemostasis by complete coagulation of the vessel that's why is also called 'vessel sealing system' (**Bakhtiar et al., 2016**).

Mastakov et al. showed that LigaSure technique is very effective and resulted in better surgical outcomes apart from the incidence of postoperative complications that were comparable and not significant. Although anal stenosis developed in 3 patients (6.25%) in the LigaSure group and 4 (8.3%) patients in the conventional excisional group, all patients were treated successfully by conservative measures with anal dilatation and applications of calcium channel blocker ointment in the form of 2% diltiazem with no need for further surgery (**Mastakov et al., 2008**).

These results are also in comparable with another study done in India which reported the post-operative pain after ligasure hemorrhoidectomy on immediate post-operative day as  $4.1 \pm 0.8$  which decreased to  $1.2 \pm 0.2$  on 7th post-operative day. This study also showed less time consumption of LigaSure procedure (**Tan et al., 2008**).

A Comparative Study between Ligasure Hemorrhoidectomy and Conventional Hemorrhoidectomy done by Vinayaka N S and Dr Prajwal R K showed shorter operating time and less intraoperative blood loss. The visual analogue scale (VAS) pain scores to assess post-operative pain were lesser in ligasure than conventional hemorrhoidectomy with statistically significance on post-operative Day 2. The postoperative duration of stay in the hospital was

also significantly less with Ligasure as compared to Conventional group (**Vinayaka et al., 2018**).

A Comparative Study of hemorrhoidectomy using ligasure (group A) v/s conventional open method (group B) done by Kaushik et al. showed that in comparison with group B, group A had a shorter operating time (26.17±5.25 min versus 47.33±5.87, P value <0.001). Regarding operative blood loss in group A was also significantly less than group B (23.33±6.74 ml versus 44.67±9.28 ml, P value <0.001) denoting the effective hemostatic control of Ligasure system. The VAS pain scores to assess post-operative pain were lesser in group A than group B with statistically significance (6.33±0.76 v/s 6.87±0.73, P value <0.01) in the first day, (4.00±0.64 v/s 4.80±0.92, P value <0.001) in the third day, (2.23±0.63 v/s 2.97±0.89, P value <0.001) in the seventh day and (0.67±0.66 v/s 1.57±0.57, P value <0.001) in 14th day. The postoperative duration of stay in the hospital was also significantly less with group A as compared to group B. In conclusion, ligasure hemorrhoidectomy is safe and effective, has lesser blood loss, shorter operative time, shorter hospital stay, lesser postoperative pain, lesser requirement for analgesia, early return to daily activities and absence of major complications. Technically, it is a much simpler procedure because suturing is not required and hemostasis is easy to achieve (**Kaushik et al., 2019**).

Similarly, Jayne et al. and Khanna et al. concluded that Ligasure hemorrhoidectomy has less blood loss, postoperative hospital stay, postoperative pain and complications compared to conventional hemorrhoidectomy (**Jayne et al., 2002**), (**Khanna et al., 2010**).

A comparative study between vessel sealing technique and conventional (Milligan Morgan) excisional hemorrhoidectomy done by Manoj Kumar D. Ahire, Chetan M. Rathod showed that the mean operative time, blood loss, pain score and requirement of analgesia was significantly (p <0.05) higher in patients treated with conventional Milligan Morgan hemorrhoidectomy (MMH) compared to vessel sealing (VS) method. The time for first bowel movement, length of hospital stay was longer in MMH group compared to VS group. The ability of patient to return to normal activities had taken significantly (p <0.05) longer time in patients operated with conventional method compared to VS method. In conclusion, the vessel sealing technique for hemorrhoidectomy is a feasible and time saving technique for the surgeon and a comfortable procedure for the patient (**Ahire et al., 2016**).

Altomare et al. compared between LigaSure and conventional hemorrhoidectomy, and they recorded that LigaSure hemorrhoidectomy resulted in significant decrease in operating time, but no

difference in the incidence of postoperative bleeding (**Altomare et al., 2008**).

Early and late postoperative complications, such as bleeding, urine retention, wound breakdown, delayed wound healing and anal stenosis, results found that these complications, were significantly less in LigaSure hemorrhoidectomy group (**Gentile et al., 2011**).

Previous randomized study has also found the similar results. Compared with conventional hemorrhoidectomy, vessel sealing technique reduces mean operative time and requirement of analgesia in addition to lower intraoperative bleeding (**Teksoz et al., 2011**).

## References

1. Ahire MD, Rathod CM, Baghadia S, Nandu B., 2016: A comparison study between vessel sealing technique and conventional (Milligan Morgan) excisional hemorrhoidectomy. *Int Surg J*; 3:1844-9.
2. Altomare DF, Milito G, Andreoli R, Arcanà F, Tricomi N, Salafia C, 2008: Ligasure precise vs. Conventional diathermy for milligan-morgan hemorrhoidectomy: A prospective, randomized, multicenter trial. *Dis Colon Rectum*; 51:514-9.
3. Bakhtiar N, Moosa FA, Jaleel F, Qureshi NA, Jawaid M., 2016: Comparison of hemorrhoidectomy by ligaSure with conventional milligan morgan's hemorrhoidectomy. *Pak J Med Sci*; 32:657-61.
4. Bessa SS and Ligasure VS., 2008: Conventional diathermy in excisional hemorrhoidectomy: A prospective, randomized study. *Dis Colon Rectum*; 51:940-4.
5. El Sebaei OI, El Sisi AA, Amar MS, El Sayed ME., 2015: Randomized comparative study of Ligasure versus conventional (Milligan-Morgan) hemorrhoidectomy. *Menoufia Med J*; 28: 27-33.
6. Gentile M, De Rosa M, Carbone G, Pilone V, Mosella F, Forestieri P, 2011: LigaSure haemorrhoidectomy versus conventional diathermy for IV-degree haemorrhoids: Is it the treatment of choice? A Randomized, clinical trial. *ISRN Gastroenterol*; 467258.
7. Ghnnam WM., 2017: *International Journal of Surgery and Medicine* 3(1):8-13, Prospective, randomized controlled trial of ligasure™ versus conventional hemorrhoidectomy for grade III and IV hemorrhoids.
8. Hetzer F & Senagore A., 2009: The evidence for stapled hemorrhoidopexy and STARR. In: *Transanal stapling techniques for anorectal prolapse*. London: Springer; 95-115.
9. Jayne DG, Botterill I, Ambrose NS, 2002: Randomized clinical trial of Ligasure versus

- conventional diathermy for day-case haemorrhoidectomy. *Br J Surg.*; 89: 428-432.
10. Khanna R, Khanna S, Bhadani S, 2010: Comparison of Ligasure Hemorrhoidectomy with Conventional Ferguson's Hemorrhoidectomy. *Indian J Surg*; 72: 294-297.
  11. Medtronic, 2016: Technology, LigaSure™ tissue fusion. <http://www.medtronic.com/covidien/products/vessel-sealing>.
  12. Milito G, Cadeddu F, Muzi MG, Nigro C, Farinon AM., 2010: Haemorrhoidectomy with ligasure vs conventional excisional techniques: Meta-analysis of randomized controlled trials. *Colorectal Dis*; 12:85-93.
  13. Neinhuijs S and de Hingh I., 2009: Conventional versus LigaSure haemorrhoidectomy for patients with Noori IF., 2018: LigaSure hemorrhoidectomy versus excisional diathermy hemorrhoidectomy for all symptomatic hemorrhoids. *Med J Babylon*; 15:83-8.
  14. Tan KY, Zin T, Sim HL, Poon PL, Cheng A, Mak K., 2008: Randomized clinical trial comparing LigaSure haemorrhoidectomy with open diathermy haemorrhoidectomy. *Tech Coloproctol*; 12(2):93-97.
  15. Teksoz S, Aytaç E, Yavuz N, Tortum OB, Özcan M, Ergüney S, 2011: Comparison of a Vessel Sealing System with a Conventional Technique in Hemorrhoidectomy *Balkan Med J*; 28:189-92.
  16. Vinayaka NS, Prajwal RK, Sudhir M., 2018: A Comparative Study between Ligasure Hemorrhoidectomy and Conventional Hemorrhoidectomy.
  17. Xu L, Chen H, Lin G & Ge Q., 2015: Ligasure versus Ferguson Hemorrhoidectomy in the Treatment of Hemorrhoids. *Surgical Laparoscopy, Endoscopy & Percutaneous Techniques*; 25(2): 106-110.

9/30/2019