



RESEARCH ARTICLE

DOES THE USE OF LIGASURE IMPROVE THE OUTCOME OF HEMORRHOIDECTOMY?

<sup>1</sup>Wael Barakaat Ahmed Mohamed, <sup>\*</sup><sup>1</sup>Omar Abdelraheem and <sup>2</sup>Mohammed A. Omar

Department of General Surgery, Faculty of Medicine, Sohag University<sup>1</sup>, South Valley University<sup>2</sup>, Egypt

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ABSTRACT

**Background:** Several surgical modalities were advocated to improve the results of hemorrhoidectomy. Ligasure is one of the recent techniques to optimize the outcome of hemorrhoidectomy. But until now, conventional Milligan and Morgan diathermy hemorrhoidectomy is still the standard operation. Our aim in this study is to answer the question, does the use of Ligasure improve the outcome of hemorrhoidectomy in comparison with the conventional hemorrhoidectomy?.

**Patients and Methods:** This was a prospective comparative multicenter study. The study populations consisted of patients attended to the surgical outpatient clinic in Sohag University Hospitals and Qena University Hospitals between October 2013 and April 2017. The patients were classified into two groups, the first group had conventional hemorrhoidectomy and the second group had Ligasure hemorrhoidectomy. Demographic data and surgical outcome were compared in both groups.

**Results:** 185 patients had fulfilled our inclusion criteria and were included in this study. 93 patients had conventional hemorrhoidectomy (CH) and 92 had Ligasure hemorrhoidectomy (LH). The mean age of both groups were 41.55±10.36 and 39.50±8.59 years respectively without significant P value (P= 0.183). The mean operative time for CH was (30.34±8.51 minutes) and for LH (18.43±5.51 minutes) which was statistically significant (P=0.027). The intraoperative blood loss and postoperative pain were significantly lower in LH (P=0.001). Hospital stay was significantly shorter (P=0.001) among ligasure group. Also, the return to work was earlier in LH (P=0.001).

**Conclusion:** Ligasure hemorrhoidectomy had many advantages over conventional hemorrhoidectomy such as reduction of operative time, less intraoperative blood loss, less postoperative pain, shorter hospital stay and early return to work. So it is safe substitute to conventional technique and should be used when available.

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INTRODUCTION

Hemorrhoids is one of the most frequently diagnosed clinical cases in the surgical outpatient clinic, with estimated prevalence about 39% of the population worldwide (Riss *et al.*, 2012). Goligher classified internal hemorrhoid into four grades according to the degree of prolapse (Salvati, 1999). Hemorrhoidectomy indicated mainly for grade III and grade IV hemorrhoids. Conventional hemorrhoidectomy (CH) (Milligan and Morgan) till now is considered the gold standard operation for hemorrhoids, although it had significant postoperative pain and discharge (Jayaraman *et al.*, 2006). Several surgical techniques were involved in the last decades to optimize the results of hemorrhoidectomy such as ligasure, harmonic scalpel, bipolar diathermy and staplers. Ligasure is a device used to achieve vessel sealing via combination of pressure and electrocoagulation with a minimal thermal spread so it was used safely for hemorrhoidectomy (Filingeri *et al.*, 2005).

Several studies were used to compare LH versus CH, but till now no evidence based study recommends its use and the conventional Milligan and Morgan diathermy hemorrhoidectomy still the standard operation. The aim of this study is to answer the question, does the use of Ligasure improve the outcome of hemorrhoidectomy in comparison with the conventional hemorrhoidectomy?.

MATERIALS AND METHODS

This was a prospective comparative multicenter study. The study populations consisted of patients attended to the surgical outpatient clinic in Sohag University Hospitals and Qena University Hospitals between October 2013 and April 2017. The patients were classified into two groups, the first group had CH and the second group had LH. All patients were evaluated by full history taking, complete physical examination including per rectal examination and routine laboratory examination. Patients above the age of 40 years were examined by sigmoidoscope to exclude any tumor. After an explanation of the steps of both operations, all patients had

\*Corresponding author: Omar Abdrheem,  
Department of General Surgery, Faculty of Medicine, Sohag University, South Valley University, Egypt.

been assigned a written consent to participate in the study. Ethical committee approval was obtained before the start of the study.

### Inclusion criteria

- Grade III and grade IV hemorrhoids.
- Symptomatic disease.
- Age above 18 years.

### Exclusion criteria

- Inflammatory bowel disease.
- Previous anorectal surgery.
- Thrombosed piles.
- Pregnant females.
- Patients received anticoagulant medications.
- Secondary hemorrhoids

**Primary outcome measurements:** postoperative pain measurement using visual analog scale during the first postoperative day and assessment of intraoperative and postoperative bleeding.

**Secondary outcome measurements:** included operative time, hospital stay, postoperative complication and return to work

### Surgical techniques

All operations were done under spinal anesthesia. All patients were admitted at the same operative day and received enema at the morning of the operation and one bottle of metronidazole 500mg IV infusion one hour before surgery. All operations were performed in lithotomy position. We used the technique that described by Loder and Phillips (Loder and Phillips, 1993) for Conventional Milligan and Morgan hemorrhoidectomy group (CH): after anal dilatation (that was done gently and in all directions) starting at the left lateral (3 o'clock position) the hemorrhoids pedicle was dissected using diathermy without any pedicle ligature. Then the same technique was used for right posterior and right anterior hemorrhoid pedicles. For LH, we used the same previous step but instead of diathermy, Ligasure Precise™ vessel sealing system (Tyco Healthcare, Boulder, CO) was used. All operations were completed without the use of pedicle ligature or anal packing. All the patients discharged on the second postoperative day and instructed to have sitz bath at least twice per day, bulk forming laxative and analgesic.

### Statistical analysis

Data were summarized as mean  $\pm$  standard deviation (SD) for numerical variables and number (percentage) for non-parametric variables. Student's t-test and Chi-square test were used to compare variables. A (P) value of  $<0.05$  was considered significant.

## RESULTS

From October 2013 to April 2017, 185 patients had fulfilled our inclusion criteria and were included in this study. 93 patients had CH and 92 had LH. The mean age for CH was  $41.55 \pm 10.36$  years and for LH  $39.50 \pm 8.59$  years however, this was not statistically significant ( $P=0.183$ ). In CH group

male/female ratio was 61/32 while in LH male/female ratio was 64/28, however this was not statistically significant. Table (1) represents the patient's demographic data.

**Table 1. Patient's demographic data**

	Ligasure hemorrhoidectomy	Conventional hemorrhoidectomy	P value
Number	92	93	
Age (years)	$39.50 \pm 8.59$	$41.55 \pm 10.36$	0.183
Sex			
Male	64	61	0.638
female	28	32	
Grade			
iii	19	14	0.211
iv	73	79	

The operative findings and postoperative results were detected and compared in both groups as shown in Table (2). The mean operative time for CH was  $30.34 \pm 8.51$  minutes and for LH  $18.43 \pm 5.51$  minutes which was statistically significant ( $P=0.027$ ). The intraoperative blood loss and postoperative pain during the first day were significantly lower in LH ( $P=0.001$ ). Hospital stay was significantly shorter in LH ( $P=0.001$ ). Also, the return to work was earlier in LH in comparison with CH ( $P=0.001$ ).

**Table 2. Operative and postoperative outcomes**

	Ligasure hemorrhoidectomy	Conventional hemorrhoidectomy	P value
Mean Operating time (minutes)	$18.43 \pm 5.51$	$30.34 \pm 8.51$	0.027*
Mean intraoperative blood loss (ml)	5	32	0.001*
Pain after 24 Hours. Using VAS score	$5.82 \pm 0.92$	$7.63 \pm 1.11$	0.001*
Mean Hospital stay (days)	1.02	1.29	0.001*
Mean Return to work (days)	7.08	18.88	0.001*
Mean Follow up times (months)	28.86	31.00	0.197

As regards, post-operative complications table (3) there was no significant difference between both groups except that CH had a significant higher urinary retention rate than LH. The incidence of post-operative bleeding, stricture and fecal incontinence were more among patients with CH but without statistically significant difference.

**Table 3. Postoperative complications**

	Ligasure hemorrhoidectomy	Conventional hemorrhoidectomy	P value
Bleeding	1	5	0.211
Urinary retention	6	20	0.005*
Incontinence	0	2	0.497
Stricture	0	2	0.497

## DISCUSSION

One of the most common surgical procedures performed worldwide is hemorrhoidectomy. However, it is significantly associated with post-operative pain. One of the possible mechanisms that explain post-operative pain is the nerve damage by the thermal spread (Altomare *et al.*, 2008). The goals of the modern surgical practice are to achieve cure with

minimal morbidity and mortality without recurrence and early return to activity. So modern devices were developed and modify the technique of hemorrhoidectomy to achieve these goals such as ligasure, harmonic scalpel, bipolar diathermy and staplers (Filingeri *et al.*, 2005). The LigaSure™ vessel sealing system produces localized coagulation and minimal collateral thermal spread of maximum only 2 mm, so it is allowing fast bloodless dissection with minimal collateral tissue damage, so it has been used for hemorrhoidectomy (Nienhuijs and de Hingh, 2009). In this study, the use of ligasure after hemorrhoidectomy significantly reduces post-operative pain in comparison with the conventional technique ( $P=0.027$ ). Our results are supported by the results of Ghnam, (Ghnam M Wagih, 2017) and the study of Chuang-Wei, *et al.* (2013) who reported also significant reduction of post-operative pain after Ligasure hemorrhoidectomy. Other current similar studies reported reduction of post-operative pain after LH (Altomare *et al.*, 2008; Nienhuijs and de Hingh, 2009; Ghnam M Wagih, 2017; Chuang-Wei Chen *et al.*, 2013; Chung and Wu, 2003). Reduction of the postoperative pain by using ligasure could be attributed to the minimal thermal spread and less damage to the surrounding tissue (Nienhuijs and de Hingh, 2009). Another explanation that Ligasure hemorrhoidectomy is a sutureless technique so in absence of suture on the pedicle, no ischemia or tissue necrosis developed and this may lead to reduction of postoperative pain and bleeding (Milito *et al.*, 2010). On the other hand, smaller number of studies reported that there's no significant difference between both groups as regard postoperative pain (Jayne *et al.*, 2002; Palazzo *et al.*, 2002). The present study revealed that the intraoperative blood loss was significantly lesser in LH than CH, this was matched with the results of Ghnam (2017) and this can be explained by the meticulous hemostasis due to the use of ligasure device. These results also agreed with the results of Palazzo *et al.* and Fareed who reported comparable results (Palazzo *et al.*, 2002; Fareed *et al.*, 2009).

This study showed that LH had a significant shorter operative time than CH and this was supported by many other studies (Ghnam M Wagih, 2017; Palazzo *et al.*, 2002; Fareed *et al.*, 2009; Pattana-Arun *et al.*, 2006). This can be explained also, by better hemostatic control and bloodless field. In our study, we had no registered cases of anal stenosis after Ligasure hemorrhoidectomy although we had two cases after conventional Milligan-Morgan hemorrhoidectomy but it is not statistically significant. This matched with the studies, of Ghnam and Wang and colleagues (Ghnam M Wagih, 2017; Wang *et al.*, 2006) and this may be due to reduction of postoperative pain after LH so, reduction of the anal spasm and minimal thermal damage to the surrounding tissues. Also, in this study we had no registered cases of fecal incontinence after LH while we had two cases after CH but it is not statistically significant as reported by other studies (Jayne *et al.*, 2002; Basdanis *et al.*, 2005). The fecal incontinence after CH is due to, the incorporation of underlying sphincter muscle in the hemorrhoidal excision by mistake from the surgeon and the postoperative inflammatory healing process play a role in postoperative incontinence. Moreover, excessive sphincter stretching done by mistake before doing CH. This component of sphincter stretching usually is minimized by using LigaSure™ device (Jayne *et al.*, 2002).

The present study reported a significant shorter hospital stay among patients with LH in comparison with the other CH group ( $P=0.001$ ). Also, LH patients return to their work earlier

than patients with CH ( $P= 0.001$ ). These results agree with the reported results of other parallel studies (Ghnam M Wagih, 2017; Wang *et al.*, 2006; Kwok *et al.*, 2005), which compared CH versus LH and showed that the Ligasure technique had less early postoperative pain without any adverse effects on postoperative complications, return to activity, and rate of fecal incontinence. The follow up time of the present study was more than two years. It was about 29 months for LH and 31 months for CH. Up to our knowledge little studies reported a long term follow up more than two years (Chuang-Wei Chen *et al.*, 2013; Peters *et al.*, 2005).

## Conclusion

Ligasure hemorrhoidectomy had many advantages over conventional hemorrhoidectomy such as reduction of operative time, less intraoperative blood loss, less postoperative pain, shorter hospital stay and early return to work. So it is safe substitute to conventional technique and should be used when available.

## REFERENCES

- Altomare DF, Milito G, Andreoli R, Arcan\_a F, Tricomi N, Salafia C. *et al.* 2008. LigaSure for Hemorrhoids Study Group. Ligasure Precise vs conventional diathermy for Milligan-Morgan hemorrhoidectomy: a prospective, randomized, multicenter trial. *Dis. Colon Rectum.*, 51:514-9.
- Basdanis G, Papadopoulos V, Michalopoulos A, Apostolidis S, Harlaftis N. 2005. Randomized clinical trial of stapled hemorrhoidectomy vs. open with ligasure for prolapsed piles. *Surg. Endosc.*, 19:235-239.
- Chuang-Wei Chen, MD,a,b, Chieh-Wen Lai, MD,b,c, Yao-Jen Chang, MD,b,c, Chung-Ming Chen, MD,a,b and Koung-Hong Hsiao, MD,a,b Taipei and Hualien. 2013. Results of 666 consecutive patients treated with Ligasure hemorrhoidectomy for symptomatic prolapsed hemorrhoids with a minimum follow-up of 2 years. *Surgery*, 153:211-8.
- Chung Y, Wu HJ. 2003. Clinical experience of sutureless closed hemorrhoidectomy with ligasure. *Dis. Colon Rectum.*, 46:87-92.
- Fareed M, El-Awady S, Abd-El monaem H, Aly A. 2009. Randomized trial comparing Ligasure to closed Ferguson hemorrhoidectomy. *Tech. Coloproctol.*, 13:243-6.
- Filingeri V, Gravante G, Cassisa D. 2005. Physics of radiofrequency in proctology. *Eur. Rev. Med Pharmacol Sci.*, 9:349-54.
- Ghnam M Wagih, 2017. Prospective randomized controlled trial of LigaSure™ versus conventional hemorrhoidectomy for grade III and IV hemorrhoids. *International Journal of Surgery and Medicine*, 3(1):8-13.
- Jayaraman S, Colquhoun PH, Malthaner BA. 2006. Stapled versus conventional surgery for hemorrhoids. *Cochrane Database Syst. Rev.*, 18:(4) CD005393.
- Jayne D, Botterill I, Ambrose N, Brennan T, Guillou P, O'Riordan D. 2002. Randomized clinical trial of ligasure versus conventional diathermy for day-case haemorrhoidectomy. *Br. J. Surg.*, 89:428-432.
- Kwok SY, Chung CC, Tsui KK, Li MK. 2005. A double-blind, randomized trial comparing LigaSure™ and Harmonic™ Scalpel hemorrhoidectomy. *Dis. Colon Rectum.*, 48: 344-8.
- Loder PB. and Phillips RK. 1993. Hemorrhoidectomy. *Curr. Probl. Surg.*, 5:29-35.

- Milito G., Cadeddu F., Muzi M. G., Nigro C. and Farinon A. M. 2010. "Haemorrhoidectomy with Ligasure vs. conventional excisional techniques: a meta-analysis of randomized controlled trials," *Colorectal Disease*, vol. 12, no. 2, pp.85–93.
- Nienhuijs S1, de Hingh I. 2009. Conventional versus Ligasure hemorrhoidectomy for patients with symptomatic Hemorrhoids. *Cochrane Database Syst. Rev.*, 21(1): CD006761.
- Palazzo F, Francis D, Clifton M. 2002. Randomized clinical trial of ligasure versus open hemorrhoidectomy. *Br. J.Surg.*, 89:154-157.
- Pattana-Arun J, Sooriprasoet N, Sahakijruggruang C, TantiphlachivaK, Rojanasakul A. 2006. Closed vsLigasure hemorrhoidectomy: a prospective, randomized clinical trial. *J. Med. Assoc. Thai* 89:453-8.
- Peters CJ, Botterill I, Ambrose NS, Hick D, Casey J, Jayne DG. 2005. Ligasurevs conventional diathermy haemorrhoidectomy: long-term follow-up of a randomized clinical trial. *Colorectal Dis.*, 7:350-3.
- Riss S, Weiser FA, Schwameis K, Riss T, Mittlböck M, Steiner G, Stift A. 2012. The prevalence of hemorrhoids in adults. *Int. J. Colorectal Dis.*, 27: 215-220.
- Salvati EP. 1999. Nonoperative management of hemorrhoids: evolution of the office management of hemorrhoids. *Dis. Colon Rectum.*, 42: 989-993.
- Wang JY, Lu CY, Tsay HL, et al. 2006. Randomized controlled trial of igasure with submucosal dissection vs. Ferguson haemorrhoidectomy for prolapsed haemorrhoids. *World J. Surg.*, 30:462–6.

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