

COMPARISON OF ADVANCED BIPOLAR TISSUE FUSION TECHNOLOGY (LIGASURE™) HEMORRHOIDECTOMY VERSUS CONVENTIONAL MILLIGAN MORGAN HEMORRHOIDECTOMY

By

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ABSTRACT

Background: Conventional hemorrhoidectomy is a common surgical procedure which associated with postoperative morbidities such as pain, urine retention, postoperative bleeding and anal stenosis. The use of the Ligasure™ could result in decreased incidence of postoperative pain and complications as it has minimal thermal spread and limited tissue burn.

Objective: To evaluate hemorrhoidectomy using advanced bipolar electrocautery tissue fusion technology (LigaSure™) versus conventional Milligan-Morgan technique by monopolar diathermy.

Patients and methods: This prospective study included sixty patients scheduled for elective hemorrhoidectomy at Al-Azhar University Hospitals (El-Hussen and Bab Al-sha'reia University Hospitals), Department of Surgery. All sixty patients were divided in two equal comparative groups: Group A underwent conventional Milligan-Morgan hemorrhoidectomy and group B underwent Ligasure™ hemorrhoidectomy. Data of the sixty patients of the study was collected by the mean investigator himself from January 2020 to September 2020, then the analysis of the data was followed by different statistical methods. Such as the chronological presentation, the percentages, the arithmetic averages, and the t test. The data of the study were analyzed by statistical program SPSS, then Microsoft Excel sheets used to graph the results and integrated into Microsoft Word.

Results: Ligasure™ hemorrhoidectomy has a major improvement over the conventional technique. Technically, the Ligasure™ method was much simpler and can be safely carried out by relatively inexperienced junior surgeons. In comparison with conventional hemorrhoidectomy, Ligasure™ hemorrhoidectomy had less operating time (17.28 vs 9.85 minutes, p value <0.001) and had less intraoperative blood loss (65 vs. 17 ml, p value: <0.001). The post-operative pain was lesser in Ligasure™ than conventional hemorrhoidectomy. Post procedure complications such as bleeding (3.5% vs 10%), urinary retention (10% vs 20%) and wound infection (14% vs 20%) were all lower in the Ligasure™ group, and shorter postoperative hospital-stay (1.4 vs 3.2 days).

Conclusion: Ligasure™ hemorrhoidectomy was a suture less hemorrhoidectomy technique to achieve tissue and vessel sealing. It was safe, simple and effective, with less intraoperative bleeding, postoperative discomfort and other complications in comparison to conventional hemorrhoidectomy.

Keywords: Ligasure™ hemorrhoidectomy, Hemorrhoids, Milligan-Morgan, open hemorrhoidectomy.

INTRODUCTION

Hemorrhoids are common anorectal disorders. This term is derived from the Greek adjective meaning bleeding (Haema-bleed, Rhoos flowing) and emphasizes the most important symptoms of this disease. The word pile derived from Latin word "Pila" meaning a ball can be applied to all patients present with some sort of swelling. At least 50% of the people over the age of fifty have some degree of hemorrhoid formation (Vinayaka, 2018).

Hemorrhoids are symptomatic enlargement and down displacement of the normal anatomical anal cushions. They represent a common medical condition and, therefore, a major socioeconomic problem. It is a multifactorial disease. Many factors can be the etiologies of hemorrhoidal development, including chronic constipation and prolonged straining. The abnormal dilation and distortion of the vascular cushions together with destructive changes in the connective tissue within the anal cushion is a main finding of hemorrhoidal disease. This disease has been known since ancient era with treatment modalities evolving from red hot poker to infrared photocoagulation (Sun *et al.*, 2016).

Conventional methods of hemorrhoidectomy (Milligan-Morgan or Ferguson) produce excellent results with very less recurrence rates, but wounds produced have contribute to postoperative pain and infection. The availability of new techniques and devices has stimulated researches to look for the best treatment for curing hemorrhoids. The ideal technique should be with high safety and

efficacy of the treatment and low post-operative pain, and discomfort along with an effective cost for the same (Xu *et al.*, 2015).

The Ligasure™ system (high frequency electro-thermal vessel sealing system) is a recently introduced device. It applies a precise amount of energy to the tissue, while they are being held in tight apposition under pressure. Thermal changes are confined to the tissue within-the-jaw of the handset. This process takes 2 to 6 sec, depending on vessels size and included tissue (Aigner *et al.*, 2016).

The aim of the present study was to evaluate hemorrhoidectomy using advanced bipolar electro cautery tissue fusion technology (LigaSure™) versus conventional Milligan-Morgan technique by monopolar diathermy.

PATIENTS AND METHODS

This prospective study will include sixty patients scheduled for elective hemorrhoidectomy at Al-Azhar University Hospitals (El-Hussen and Bab Al-sha'reia University Hospital) Department of General Surgery, during the period from January 2020 to September 2020; all sixty patients were divided in two equal comparative groups: **Group A** underwent conventional hemorrhoidectomy, and **group B** underwent Ligasure™ hemorrhoidectomy.

Inclusion criteria: Age ranged from 17 to 60 years, failure of conservative and non-surgical treatment.

Exclusion criteria: Patients with bad general condition who declared unfit for safe elective anesthesia, patients with thrombosed piles or patients with 4th

degree piles associated with complete rectal prolapse, patient with chronic pain conditions or on opioid analgesics for any other cause.

Surgical Techniques: Spinal anesthesia was given to all patients. The patient was placed in lithotomy position, sterilization done with betadine, delivery of hemorrhoidal masses with artery forceps, one being applied at the base of hemorrhoidal mass, the other at the pedicle. Skin incision at the base of hemorrhoids and submucosal dissection to lift the hemorrhoidal mass from the internal sphincter by monopolar diathermy. In group A, trans fixation of the pedicle was done using absorbable vicryl zero. The isolated hemorrhoidal tissue was then excised a few millimeters below the ligature. The trans fixation suture remained long for further inspection at the end of the operation then cut short (**Figure A-C**). In group B, the jaws of the handset were applied on the

pedicle then fairing by the foot paddle. The flow of the energy stopped when coagulation of the vessels and mucosa was achieved. The hemorrhoid mass was excised by cutting across the coagulated tissue seal. No sutures were applied as the Ligasure™ device also achieved mucosal fusion (**Figure D**).

Statistical Analysis: The results had been collected, evaluated, calculated, tabulated and statistically analyzed using a computer statistical package SPSS version 20 by different statistical methods, such as the chronological presentation, the percentages, the arithmetic averages, and the t-test. Mean pain scores for each day of follow up in both groups were compared using Wilcoxon's rank-sum test. The statistical program SPSS was used to analyze the data of this study, then Microsoft Excel sheets used to graph the results and integrated into Microsoft Word, p-value ≤ 0.05 was considered significant.



Figures: (A) 3rd degree hemorrhoids (B) delivery of te hemorrhoidal mass (C) conventional hemorrhoidectomy (D) Ligasure™ hemorrhoidectomy

RESULTS

Ligasure™ hemorrhoidectomy has a major improvement over the conventional technique. Technically, the Ligasure™ method was much simpler and can be safely carried out by relatively inexperienced junior surgeons. In comparison with conventional hemorrhoidectomy, Ligasure™ hemorrhoidectomy had less operating time (17.28 vs. 9.85 minutes, p value <0.001)

and had less intraoperative blood loss (65 vs. 17 ml, p value: <0.001). The post-operative pain was lesser in Ligasure™ than Conventional hemorrhoidectomy. Postoperative complications such as bleeding (3.5% vs. 10%), urinary retention (10% vs. 20%) and wound infection (14% vs. 20%) were all lower in the Ligasure™ group. And less postoperative hospital stay (1.4 vs. 3.2 days) (Table 1).

Table (1): Comparison between group A and group B as regard complications intraoperative bleeding and operation time

Items		Groups	Group A (30 patients)	Group B (30 patients)	P value
Post-operative complication	Urine retention		6 (20%)	4 (10%)	>0.05
	Post-operative 1 ^{ry} bleeding		1 (3.3%)	0 (0%)	
	Post-operative 2 nd bleeding		0 (0%)	0 (0%)	
	Severe agonizing pain		4 (13.3%)	1 (3.3%)	
	Severe anal spasm		1 (3.3%)	1 (3.3%)	
	Sphincter dysfunction (incontinence)		1 (3.3%)	1 (3.3%)	
	Wound infection and sepsis		0 (0%)	0 (0%)	
	Delayed wound healing		1(3.3%)	1 (3.3%)	
	Anal stenosis		1 (3.3%)	1 (3.37%)	
Patients without complication			15 (50%)	21(70%)	<0.001
Intra operative bleeding (ml) Mean ±SD			64.88±4.6 ml	17±3.16 ml	< 0.001
Operation time (min)	5-10 min		2 (6.7%)	12 (40%)	< 0.001
	11-20 min		18 (60%)	18 (60%)	
	20-30 min		10 (33.3%)	0 (0%)	

DISCUSSION

Analysis of the results obtained from this study showed that there was no significant statistical difference between Ligasure™ hemorrhoidectomy and ligation-excision hemorrhoidectomy as regarding personal demographic data: age ranged between 22-60 in first group, and between 23-56 in second group, 18 females and 12 males in first group, and

16 females and 14 males in second group. The results were similar to *Scheyer et al.*, (2016) where the two groups were comparable in sex distribution and age.

In comparison with conventional hemorrhoidectomy, Ligasure™ hemorrhoidectomy had less operating time which was the same as *Faucheron et al.* (2017) study where it was ranging between 9-15 min, and slightly longer

than the study of *Felice et al. (2015)* where it was ranging between 8-12 min.

Regarding post-operative pain and doses of analgesia required, Ligasure™ hemorrhoidectomy technique has the advantage of less post-operative pain and less doses of analgesia required than ligation-excision hemorrhoidectomy. In Ligasure™ hemorrhoidectomy procedure mean pain score was 2.2 ± 1.01 (range 1-4) in comparison to mean pain score 6.67 ± 1.05 (range 5-8) in ligation-excision hemorrhoidectomy. In Ligasure™ hemorrhoidectomy technique mean doses of analgesia was 1.47 ± 0.74 (range 0-3) in comparison to mean doses of analgesia 14.93 ± 2.79 (range 10-20) in ligation-excision hemorrhoidectomy.

The results of the study were nearly the same as the results described by *Faucheron et al., (2017)* where mean doses of analgesia in Ligasure™ hemorrhoidectomy technique was 2.9 ± 7.7 where mean doses for ligation-excision hemorrhoidectomy was 11.7 ± 12.6 . And the same with (*Scheyer et al., 2016*) where mean dose was 2.7 ± 7.3 in Ligasure™ hemorrhoidectomy and 12.5 ± 5.2 for conventional hemorrhoidectomy.

Ravi et al. (2013) found that VAS pain scores at days 1, 7, and 14 postoperatively were lesser in Ligasure™ group compared with Milligan–Morgan group. Moreover, the blood loss during the procedure was lesser in Ligasure™ group. Other postoperative complications such as hemorrhage and urinary retention were more in Milligan–Morgan group.

Regarding hospital stay and return to normal life style in relation to the type of operation, hospital stay was less in Ligasure™ hemorrhoidectomy technique;

Return to normal life style was faster in Ligasure™ hemorrhoidectomy technique.

The results were slightly longer than the study of *Scheyer et al. (2016)* where mean of hospital stay in hours was 12.8 in Ligasure™ hemorrhoidectomy technique in comparison to ligation-excision hemorrhoidectomy which was 48.9. Also, the mean for return to normal lifestyle in Ligasure™ hemorrhoidectomy was 3 days where it was 24.9 days in hemorrhoidectomy.

Post-operative bleeding and infection were significantly lower in Ligasure™ hemorrhoidectomy than in ligation-excision hemorrhoidectomy. The results were near the results of *Scheyer et al. (2016)* where bleeding was observed in 4.8% and infection in 0.3% of cases in Ligasure™ hemorrhoidectomy technique.

As regarding long term post-operative complications in both groups, there was no significant statistical difference between the two groups as regarding to postoperative stenosis and recurrence. The results were nearly the same as *Felice et al. (2015)*.

Talha et al. (2017) showed that both harmonic scalpel and ligasure were superior to conventional diathermy in hemorrhoidectomy, in having lesser operative time, lesser postoperative pain, and lesser analgesic consumption during the first day postoperatively in addition to faster wound healing.

CONCLUSION

Ligasure™ hemorrhoidectomy is a suture less hemorrhoidectomy technique to achieve tissue and vessel sealing. It is safe, simple and effective, with less intraoperative bleeding, postoperative

discomfort and other complications in comparison to conventional hemorrhoidectomy. Technically it is simpler because suturing is not required and hemostasis is easy to achieve. It has the potential of making haemorrhoidectomy a day-care procedure.

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مقارنة التقنية المتقدمة ثنائية القطب لصهر الأنسجة (ليجاشور) مقابل إستخدام طريقة ميلجيان مورجان التقليدية لعلاج البواسير جراحياً

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خلفية البحث: إستئصال البواسير جراحياً بالطريقة التقليدية هو إجراء شائع، ولكنه يمكن أن يؤدي للعديد من المضاعفات بعد العملية مثل آلام ما بعد الجراحة وإحتباس البول وضيق فتحة الشرج وحدوث النزيف أثناء أو بعد العملية، لذا، فإن إستخدام التقنية المتقدمة ثنائية القطب لصهر الأنسجة (ليجاشور) يؤدي لتخفيض مستوى الألم بعد العملية وكذلك باقي المضاعفات حيث أنه يتميز بإنخفاض مستوى الحرارة المنتشرة وتحم الأنسجة.

الهدف من البحث: المقارنة بين إستئصال البواسير جراحياً بالطريقة التقليدية أو من خلال إستخدام التقنية المتقدمة ثنائية القطب لصهر الأنسجة.

المرضى و طرق البحث: تم إجراء هذه الدراسة بمستشفيات جامعة الأزهر (مستشفى الحسين الجامعي ومستشفى باب الشعرية الجامعي) على ستين مريضاً مصابون بالبواسير من الدرجة الثالثة والرابعة وذلك في الفترة من يناير 2020 وحتى سبتمبر 2020 حيث تم تقسيمهم الى مجموعتين متساويتين: **المجموعة الأولى** تم علاجهم بإستئصال البواسير بالطريقة التقليدية (ميلجيان-مورجان)، و**المجموعة الثانية** تم علاجهم عن طريق إستئصال البواسير بواسطة التقنية المتقدمة ثنائية القطب لصهر الأنسجة (جهاز الليجاشور).

نتائج البحث: إستئصال البواسير بالليجاشور مقارنةً مع إستئصال البواسير التقليدي يتميز بوقت أقل و فقد دم أقل أثناء العملية الجراحية، أما بالنسبة

لآلام بعد العملية فقد وجد أن شدة الألم تقل بشكل ملحوظ بالمقارنة بالطريقة التقليدية، كمان أن تعافى المريض وعودته لأنشطة الحياة العادية كان أسرع بالمقارنة بالطريقة التقليدية، بينما لم يكن هناك فرقاً يُعَدُّ به إحصائياً بين إستئصال البواسير بواسطة جهاز الليجاشور وبين الطريقة التقليدية فيما يتعلق بحدوث المضاعفات مثل ضيق فتحة الشرج أو حدوث إرتجاع للأعراض مرة أخرى.

الاستنتاج: إستئصال البواسير من الدرجة الثالثة والرابعة بواسطة جهاز الليجاشور بالمقارنة مع إستئصال البواسير التقليدى هى طريقة آمنة وبسيطة وفعالة.

الكلمات الدالة: إستئصال البواسير بواسطة الليجاشور، البواسير، مليجيان مورجان، إستئصال البواسير جراحياً.