

Ligasure Hemorrhoidectomy Versus Milligan Morgan Hemorrhoidectomy Prospective Randomized Study

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Abstract

Background: Hemorrhoidectomy is a frequently performed surgical procedure associated with postoperative pain. The use of Ligasure could result in a decreased incidence of pain and bleeding, as coagulation with high-frequency current has minimal thermal spread and limited tissue damage.

Objective: The research compares Ligasure pile excision with surgical diathermy excision for the treatment of III-IV-grade piles.

Patients and Methods: Eighty patients with pile III or IV degrees were randomized into two groups: Group one (LS) and group two (diathermy). The study evaluates the mean postoperative pain, intraoperative bleeding, and intraoperative time requirement, early and late complications. All patients were followed up for 10-12 months.

Results: The operating time is considerably shortened in Ligasure group (LS); postoperative pain disappears earlier in LS than in diathermy. Additionally, there was less intraoperative bleeding in LS, and short duration hospital stay as compared to diathermy group.

Conclusion: LS is an efficient procedure in degree III or IV pile excision. Therefore, the procedure enhances the use of LS as one of the acceptable modality surgical options for grade III-IV pile.

Keywords: Hemorrhoidectomy, ligasure™ vessel sealing system, milligan morgan technique.

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Introduction

Hemorrhoids, also known as piles, are swollen and symptomatic anal cushions (1). These cushions consist of dense submucosal tissue and are rich in blood vessels. They are a common concern seen in general surgery clinics, as they account for a significant portion of patients and their associated symptoms. Despite their prevalence, the exact cause of hemorrhoids remains unidentified (2,3), common cause for hemorrhoids as general is constipation and may be upper gastrointestinal disorder¹⁶. Typically, these piles are found at the 3, 7, and 11 o'clock positions when the patient is in a lithotomy position, and additional smaller hemorrhoids may be observed between the main piles. Surgical intervention, known as hemorrhoidectomy, is recommended for third and fourth-degree hemorrhoids. It is also considered when second-degree hemorrhoids do not respond to non-operative treatments. Hemorrhoidectomy can be performed using two primary techniques: the open technique, commonly known as the Milligan Morgan operation, and the closed technique, known as the Ferguson technique, which is more

popular in the USA. Both methods involve ligating and excising the hemorrhoids. In the open technique, the anal mucosa and skin are left open to heal by secondary intention, while in the closed technique, the wound is closed primarily. The primary concern associated with hemorrhoidectomy is the pain experienced during the postoperative period (1,4-7). The major factors contributing to this discomfort include the incisions and anal packing made during the surgery, the application of sutures, cauterization, and the potential risk of surgical site infection. (5) To address these challenges, numerous techniques have been employed with the aim of reducing postoperative pain, minimizing bleeding, and mitigating the development of strictures. One of the complications of postoperative surgical excision of haemorrhoids is peri anal fistulae. (15). The Ligasure™ Vessel Sealing System is a bipolar electrothermal hemostatic device designed primarily for use in abdominal surgery. (6, 7). Using a combination of pressure and electrical energy, it ensures complete coagulation of vessels up to 7 mm in diameter. The Ligasure™ system is completely automated and incorporates intelligent sensors that ensure complete coagulation with minimal thermal spread to adjacent tissue (calculated at approximately 0.5–2 mm).⁷ Several randomized studies have been performed to compare Ligasure™ hemorrhoidectomy with various types of conventional hemorrhoidectomies, and the results suggested that Ligasure™ hemorrhoidectomy is a safe, fast, and simple procedure. (8-13). The Ligasure™ Vessel Sealing System is an advanced bipolar electrothermal hemostatic device primarily designed for abdominal

surgery. (5, 6) by utilizing a combination of pressure and electrical energy, it effectively coagulates vessels up to 7 mm in diameter. The system's automation and intelligent sensors ensure thorough coagulation while minimizing thermal spread to surrounding tissue, approximately ranging from 0.5 to 2 mm. Numerous randomized studies have compared Ligasure™ hemorrhoidectomy with conventional techniques, and the results consistently indicate that Ligasure™ hemorrhoidectomy is a safe, efficient, and straightforward procedure. (8-13) Building on these findings, this prospective, randomized study aims to compare the surgical outcomes of hemorrhoidectomy performed using Ligasure™ with conventional diathermy techniques. Other techniques for treating hemorrhoids include the following:

Stapled hemorrhoidopexy (Procedure for Prolapse and Hemorrhoids PPH), Bipolar coagulation, Doppler Guided Hemorrhoidal Artery Ligation (DG-HAL), Hemorrhoidolysis, Laser surgery for hemorrhoids, Photocoagulation, and Atomizing Hemorrhoids. These various methods offer a range of options for managing hemorrhoids, and each may be suitable based on individual patient needs and the surgeon's expertise. The main objectives include comparing the levels of postoperative pain, the duration of the surgical procedure, the extent of bleeding, and the occurrence of postoperative complications between the two techniques. By conducting this investigation, we aim to shed light on the potential advantages and benefits of utilizing the Ligasure device in hemorrhoid surgery.

Patients and Methods

The research was conducted at Shaqlawa Teaching Hospital and Welfare Private Hospital in Hawler city, focusing on patients with grade III and IV hemorrhoids. A total of 80 patients were admitted and enrolled in the study, and they were divided into two groups, each includes of 40 patients. Prior to the operation, all patients were admitted one day in advance and started on a laxative regimen. The surgical procedures were performed under either general or spinal anesthesia, as determined by the anesthetist, with the patients positioned in lithotomy. In the first group, the hemorrhoidectomy was carried out using the Ligasure Device, leaving the mucosal defect open. Conversely, the second group underwent hemorrhoidectomy through the Milligan Morgan technique, involving scissors and the application of 2/0 vicrylR sutures to secure the hemorrhoidal pedicle, with bleeding controlled using monopolar cautery. The study was conducted from April 2022 to April 2023, and its objective was to compare the outcomes of these two different techniques, offering insights into the potential advantages of using the Ligasure Device in hemorrhoidectomy procedures. Patients who had complicated hemorrhoids, previous perianal operations, or other perianal pathologies in addition to hemorrhoids, as well as those with bleeding disorders, were excluded from the study. Data for the study was gathered through patient histories, clinical examinations, including per rectal examinations, and direct interviews conducted during the operation. Information on operation time and blood loss was recorded during the surgical procedure. The patients were further interviewed on the third day and the second week following the operation. To collect the

data effectively, a well-designed questionnaire was used, which included fields such as patient's name, age, sex, history of hypertension and diabetes mellitus, operation duration, volume of blood loss, and any postoperative complications encountered. After the surgery, postoperative pain relief was administered using Tramadol hydrochloride injection at a dose of 50mg IV once daily, followed by maintenance through oral intake of 100mg Diclofenac Sodium (olfen capsule) twice daily. To assess and monitor the pain levels, a visual analogue scale (VAS) was utilized, where patients rated their pain on a scale from 0 (no pain) to 10 (maximum pain), and the results were daily recorded.

Statistical Analysis

The statistical analysis involved presenting clinical data using measures such as means, medians, and proportions. For comparing the two groups, Student t-test and Chi-square test of association were employed. Probability values below 0.05 were considered statistically significant, while values below 0.01 were deemed highly significant. These statistical methods were used to determine the significance of the results, enabling meaningful interpretations and conclusions to be drawn from the data.

Results

Ligasure device for advanced and prolapsed symptomatic hemorrhoids patients (Third and Fourth-degree haemorrhoids)

This study included a total of 80 patients with grade III and IV hemorrhoids who underwent hemorrhoidectomy using the Ligasure device (LS) or the Milligan Morgan technique (MMH) at Shaqlawa Teaching Hospital and

Welfare Private Hospitals from April 2022 to April 2023.

Among the patients, 56 were male, and 24 were female, resulting in a male-to-female

ratio of approximately 2.3:1. The age of the participants ranged from 20 years to 71 years.

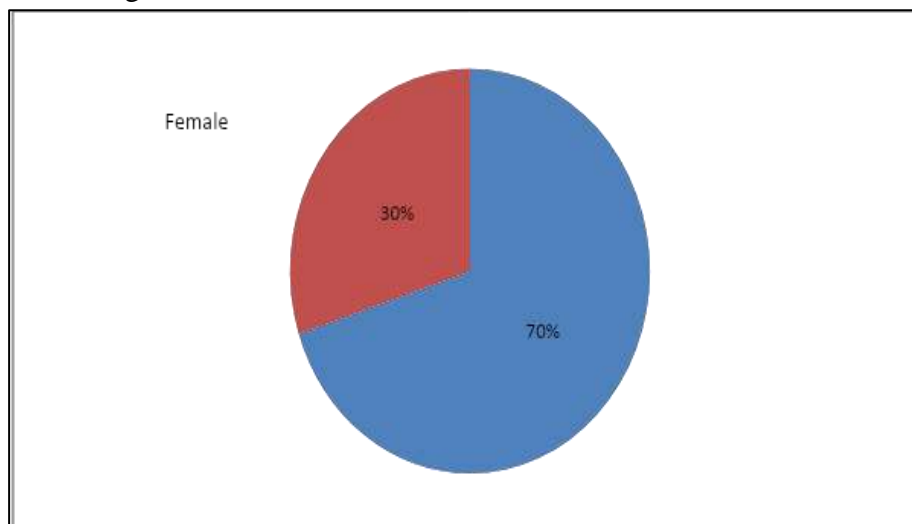


Figure (1): Sex distribution of the studied patients.

Table (1). Clinical characteristics of the studied patients.

	LS group (n=40)	MMH group (n=40)	P value
Age: (years)			
Range	23-70	20-71	0.634
Mean ± SD	39 ± 9.1	38 ± 11.7	NS
Sex			
Male	29	27	0.499
Female	11	13	NS
Grade			
III	25	28	0.300
IV	15	12	NS

Main symptoms of the patients leading to hemorrhoidectomy were bleeding (40%) followed by prolapse (27.5%), pain (25%),

pruritus (5%) and discharge (2.5%) (Figure 2).

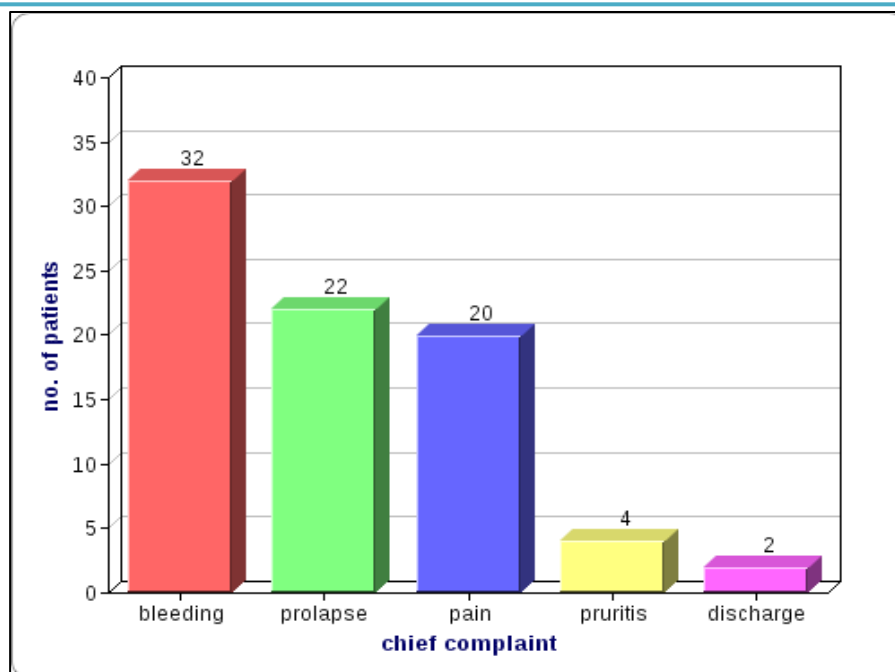


Figure (2): Presentation of the patients.

The duration of the surgical procedure in the LS group was shorter compared to the MMH group, although this difference was not statistically significant. However, the amount of blood loss during the operation was significantly lower in the LS group compared to the MMH group. Regarding postoperative complications, there was no statistically

significant difference between the two groups. (Table 2, Figure 3). The severity of pain was evaluated using a visual analogue scale, and it was found that the LS group experienced significantly lower pain scores during the first 14 days post-surgery. Moreover, the intensity of pain gradually decreased over time in this group. (Table 3, Figure 4).

Table (2): Operative time, intraoperative blood loss and complications.

	LS group	MMH group	P value
Operative time: (minutes)			
Range	5 - 27	8 - 30	1.636
Mean ± SD	15 ± 5.8	17 ± 5.7	(NS)
Blood loss: (milliliter)			
Range	2 - 15	5 - 60	<0.001
Mean ± SD	5 ± 3.2	21 ± 12.4	(S)
Complications:			
Urinary retention	1	2	(NS)
Stenosis	1	0	(NS)

Table (3): Pain score (VAS) in the first two weeks in both groups.

LS group	MMH group	P value
Day 1		
Range	4 - 6	7 - 9
Mean ± SD	4.8 ± 0.8	8.1 ± 0.7
		(S)
Day ++3		
Range	3 - 6	6 - 8
Mean ± SD	4.3 ± 1.0	7.2 ± 0.6
		(S)
Day 14		
Range	0 - 2	2 - 4
Mean ± SD	1.5 ± 0.5	3.3 ± 0.7
		(S)

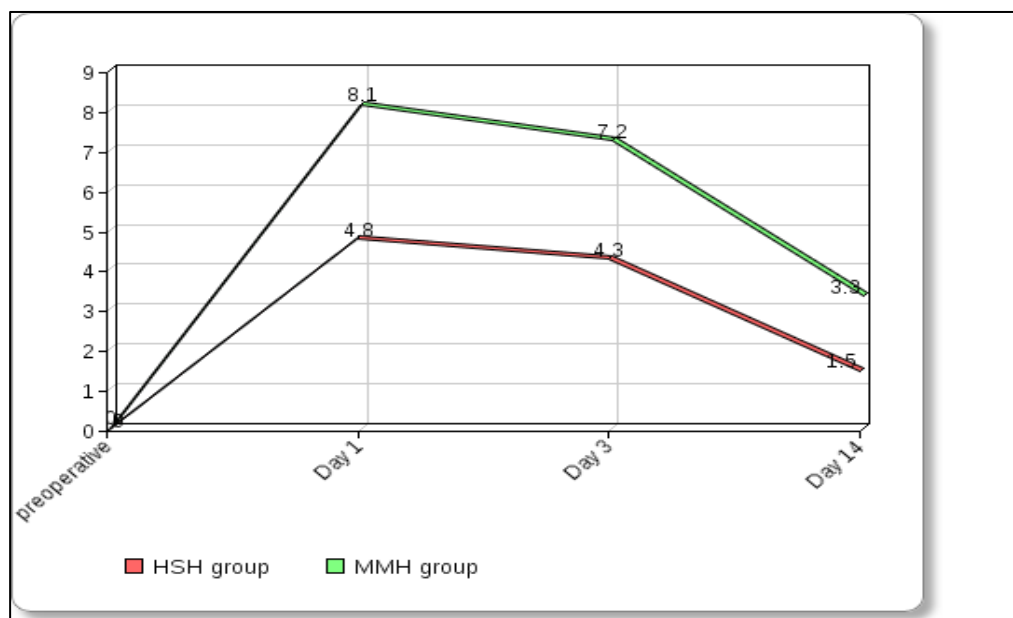


Figure (3): Mean VAS pain scoring among studied groups.

Ligasure device in third degree haemorrhoids patients

Among 53 patients diagnosed as third degree haemorrhoids, 25 patients treated by using ligasure device (LS) and 28 patients treated by

Milligan Morgan open approach (MM), 12 patients treated by (LS) they returned back to work at first week post operative, as compared

by (MM) group returned back to work around 3 weeks post operative, 13 patients treated by LS, returned to work around 10 days postoperative. 20 patients in LS group, they noted mild bleeding at the first 4 day post operatively, 5 patients by LS, no any bleeding, 22 patients treated by MM suffered mild to modertae bleeding at first week post

operative.as showed in figure 4 ,6 patients treated by MM noted mild bleeding postoperative at first week day.

After 6 months follow up ,18 patients in MM group diognosed as anal stenosis required revision surgery for anal stenosis, and only 5 patients in LS group diagnosed as anal stenosis, they required simple anal dilatation.

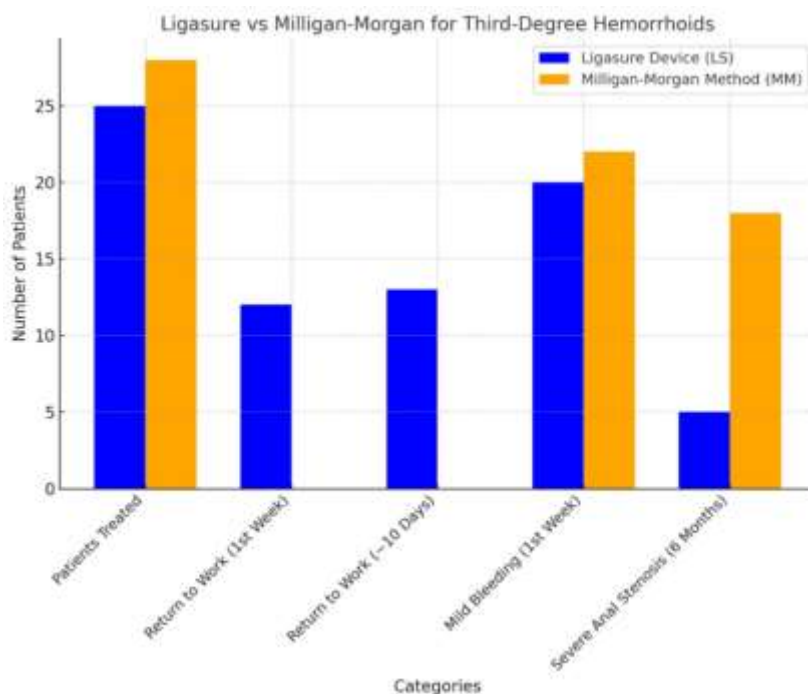


Figure (4): Ligasure versus milligan-morgan for third degree haemorrhoids patients.

Ligasure device for fourth degree haemorrhoids

Among 27 patients diagnosed as fourth degree haemorrhoids,15 patients treated by Ligasure device (LS),12 Patients treated by Milligan Morgan method (M M), 10 patients in LS group ,returned back to work 7 days post operative,as compared by MM group returned back to work around 3 weeks post operative.

Only 2 patients in LS group noted post operative bleeding in first week post operatively. Around 4 patients treated by MM method, noted bleeding post opertively required intervention.as showed in figure 5 After 6 month follow up , 5 patients in LS group and 7 patients in MM group noted severe anal stenosis, required surgical intervention.

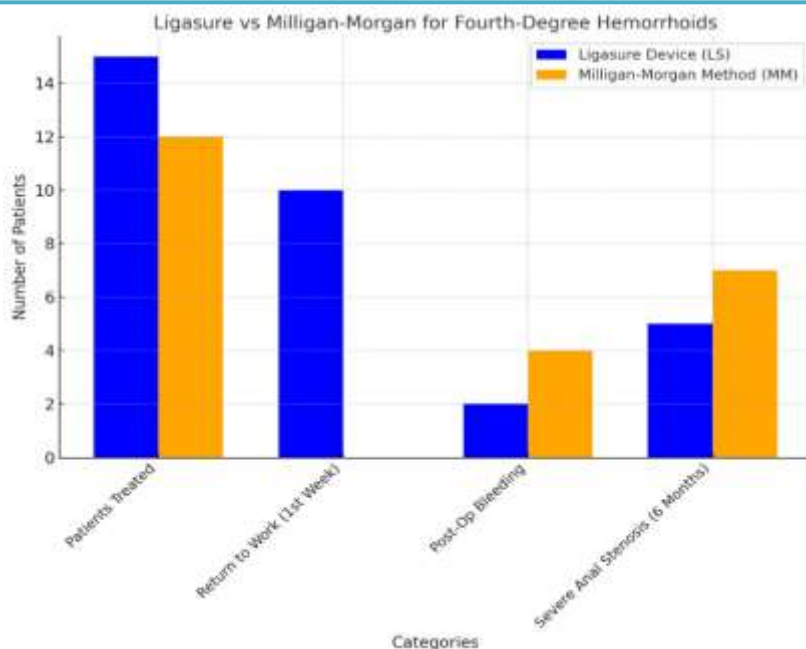


Figure (5): Ligasure versus milligan-morgan for fourth degree haemorrhoids patients.

Discussion

Typically, grade I and grade II hemorrhoids are managed using medical therapy or procedures such as rubber band ligation, which induces tissue fibrosis. These less invasive approaches generally lead to reduced pain, quicker recovery, and the convenience of being performed in a clinic setting, allowing patients to resume their normal daily activities sooner (1). On the other hand, for grade III and grade IV hemorrhoids, hemorrhoidectomy is considered the most appropriate and preferred treatment option. This surgical procedure is well-suited for addressing more advanced hemorrhoids and achieving effective results. The current study focused solely on grade III and IV hemorrhoids, deliberately avoiding the variability introduced by operating on lower grades. Additionally, patients with coexisting anorectal conditions like fissures or fistulas, as well as those who had previous perineal operations, were excluded to ensure

homogeneity in both groups. Interestingly, the male-to-female ratio in the study was 2.3:1. This higher number of male patients was attributed to the fact that many female patients declined surgery conducted by male doctors. The surgical operation duration was observed to be shorter in the LD group compared to the MMH group, although this difference did not reach statistical significance. It is believed that the reduced need for achieving hemostasis in the LD group contributed to a quicker procedure. By maintaining a consistent study focus and considering potential confounding factors, this research offers valuable insights into the effectiveness of the treatment options for grade III and IV hemorrhoids. The Ligasure Device provides an exceptional approach to achieving bloodless dissection of vascular tissue. Its remarkable hemostatic capabilities enable efficient excision of hemorrhoidal tissue without the requirement

to manage bleeding from numerous sites. While the Ligasure Device may take slightly longer than electrocautery to divide the hemorrhoidal tissue, it is crucial to avoid any undue traction on the surgical cut margins to prevent bleeding. The key to success lies in the careful application of the device, ensuring minimal tissue tension during the procedure. The primary drawback of surgical hemorrhoidectomy is the postoperative pain, which can be attributed to various factors such as the incision made during the procedure, sutures application, cauterization, and the potential risk of surgical site infection. The Ligasure device presents an ideal solution for hemorrhoidectomy due to its localized coagulation capability with minimal lateral thermal injury, extending only up to 2 mm deep. In comparison, studies examining thermal injuries caused by other methods revealed that monopolar electrocautery induced lateral thermal damage up to 15 mm deep, bipolar electrocautery resulted in injuries up to 9 mm deep, and CO2 laser caused injuries up to 4 mm deep. By utilizing the Ligasure device, surgeons can achieve effective hemostasis while minimizing tissue damage, offering a promising approach to mitigate postoperative pain and improve patient outcomes. In this study, there was a notable reduction in postoperative pain among patients in the LD group, validating the initial concept that avoiding lateral thermal injury significantly translates to lower postoperative pain. Furthermore, the absence of sutures in the LD group may also contribute to the decreased pain experienced by patients. Several previous studies have examined the impact of LD and other surgical techniques on

postoperative pain. Rowsell et al. found that LD resulted in less postoperative pain and intraoperative blood loss compared to bipolar scissor hemorrhoidectomy and scissor excision. (13) Sayfan et al. compared the same surgical procedures as Thorbeck et al. and concluded that LD is an effective method for hemorrhoidectomy, with no significant difference in postoperative pain and operation time when compared to other approaches (5,8). Additionally, Franklin et al. compared LD and electrocautery hemorrhoidectomy using the closed technique in all patients, and they observed that LD offered quicker operating times, less blood loss, and reduced postoperative pain (10). The study did not find any significant difference in the incidence of postoperative complications between the two groups. However, one patient with circumferential hemorrhoids developed anal stenosis after LD, requiring surgical correction under general anesthesia by the third week after the initial operation. Fortunately, the patient reported near-complete resolution of their condition later on. Despite its benefits, the significant drawback of the Ligasure Device, like many new technologies, is the additional expense incurred. The disposable handpiece of the coagulating shears model alone costs approximately \$100, representing a direct addition to the procedure's cost. Additionally, the generators used in the process are relatively expensive, costing approximately \$10,000 each.

Conclusions

The results of this study support the use of the Ligasure device for hemorrhoidectomy, as it has been demonstrated to be an easy, safe, Patients who underwent the LD group experienced a highly significant reduction in postoperative pain compared to those in the MMH group, indicating its potential to enhance the post-surgical recovery experience. Additionally, the LD group showed significantly less blood loss during the operation.

Recommendations

Based on the favorable outcomes observed in this study, we recommend the adoption of the Ligasure device for hemorrhoidectomy procedures, especially in cases where minimizing postoperative pain and reducing blood loss are essential goals. Surgeons and medical staff should receive proper training and education to ensure proficiency in using the Ligasure device effectively and safely. However, considering the high cost associated with the LD procedure, it is advisable for healthcare institutions to carefully assess the economic feasibility and benefits before incorporating this technology into routine practice. Comparative cost-effectiveness studies may provide valuable insights to guide decision-making. Future research should also focus on long-term patient outcomes and quality of life assessments to further validate the benefits of using the Ligasure device in hemorrhoid surgery.

Source of Funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical Clearance: The patient selection and data-gathering methods were authorized by the Ethical Committee of Hawler Medical

University's College of Medicine. The patients provided written informed permission for the surgical operation, research participation, and publishing of the results and any accompanying photos. The study adhered to the ethical criteria set by the institutional and national research committees, as well as the 1964 Helsinki Declaration. (Document no. 2024AMA813).

Conflict of Interest: Non

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استئصال البواسير بطريقة ليجاشور مقابل استئصال البواسير بطريقة ميليجان

مورجان

دراسة عشوائية مستقبلية

أحمد مصطفى أحمد^١

الملخص

خلفية الدراسة: العملية استئصال البواسير بشكل شائع كإجراء جراحي مصاحب لآلام ما بعد العملية. يمكن أن يؤدي استخدام جهاز Ligasure إلى تقليل حدوث الألم والنزيف نتيجة تسديد الأوعية بواسطة تردد العالي، مما يسفر عن انتشار حراري ضئيل وتحد من التجر النسيجي.

اهداف الدراسة: يقوم البحث بمقارنة استئصال البواسير باستخدام جهاز Ligasure مع استئصالها بواسطة الانقاذ الجراحي لعلاج البواسير من الدرجة الثالثة أو الرابعة.

المرضى والطرائق: تم اختيار ثمانون مريضاً يعانون من بواسير من الدرجة الثالثة أو الرابعة إلى مجموعتين: المجموعة الأولى باستخدام Ligasure والمجموعة الثانية باستخدام الحث الجراحي. يقوم الدراسة بتقييم المتوسط للألم بعد العملية ونزيف أثناء العملية والوقت اللازم للعملية والمضاعفات المبكرة والمتأخرة. تم متابعة جميع المرضى لفترة تتراوح بين (١٠-١٢) شهرًا. **النتائج:** تمت عملية الجراحية أربعين مريضاً باستخدام الحث الجراحي، وأربعين مريضاً باستخدام Ligasure. تقلصت الوقت اللازم للعملية بشكل كبير في Ligasure، واختفى الألم بعد العملية في وقت أبكر في Ligasure مقارنة بالحث الجراحي. بالإضافة إلى ذلك، كان هناك أقل نزيف أثناء العملية في Ligasure.

الاستنتاجات: الاستنتاجات Ligasure هو إجراء فعال في استئصال البواسير من الدرجة الثالثة أو الرابعة لذا، يعزز الإجراء استخدام Ligasure كإحدى الخيارات الجراحية المقبولة للبواسير من الدرجة الثالثة أو الرابعة، على الرغم من أنه أكثر تكلفة من العملية الانقاذ الجراحي.

الكلمات المفتاحية: استئصال البواسير، نظام إغلاق الأوعية الدموية TM Ligasure، تقنية Milligan Morgan

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