

LigaSure Hemorrhoidectomy versus Excisional Diathermy Hemorrhoidectomy for All Symptomatic Hemorrhoids

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Abstract

Background: Hemorrhoidectomy by LigaSure electrosurgical unit seems to be very effective treatment and results in better surgical outcomes when compared with the conventional excisional hemorrhoidectomy. **Objective:** The aim of this study was to compare the feasibility and the surgical outcomes of LigaSure hemorrhoidectomy with that of conventional diathermy excisional hemorrhoidectomy. **Materials and Methods:** Patients characteristics were comparable in both groups. Ninety six patients with symptomatic mainly grade III and IV piles were randomized for either conventional excisional hemorrhoidectomy (48 patients) or to LigaSure hemorrhoidectomy (48 patients) for the period from April 2014 to July 2016. The surgical outcomes of both procedures including the operative time, intra-operative blood loss, postoperative pain, analgesic requirements, early and late postoperative complications, wound healing, recovery time and return to work, recurrence and patient satisfaction were recorded, compared and evaluated. **Results:** The mean operative time and amount of intra-operative blood loss were significantly lower in LigaSure hemorrhoidectomy group. Postoperative pain and need for parenteral analgesia were comparable in the first 24 -48 hours postoperatively, but they were significantly lower in LigaSure group after the second postoperative day. Faster wound healing and early return to work were obviously noted among patient subjected to LigaSure hemorrhoidectomy. Early postoperative complications were lower in LigaSure group while late complications were comparable in both groups. Lastly, LigaSure group showed high satisfaction rate compared to conventional hexcisional hemorrhoidectomy group. **Conclusion:** LigaSure hemorrhoidectomy is superior and more advantageous in term of operative time, blood loss, post-operative complications, faster wound healing and return to work. It is simple, feasible and easy to learn.

Keywords: Conventional hemorrhoidectomy, diathermy, hemorrhoids, LigaSure

INTRODUCTION

Hemorrhoids or piles are quite common in general surgical practice. More than half of the populations will suffer from hemorrhoids during their lifetime.^[1] All symptomatic piles definitely need surgical excision, especially when conservative measures or nonsurgical interventions failed 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 failed for earlier grades of hemorrhoids or presence of concomitant chronic anal fissure or fistula.^[2] Excision of hemorrhoids is usually associated or results in severe and sometimes intolerable postoperative pain which take about 2–8 weeks postoperatively. Such pain remains the main concern which make some patients reluctant to perform hemorrhoidectomy.^[3,4] 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 postoperative 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.^[4,5]

Recently, the introduction of LigaSure vessels sealing electrosurgical unit for the treatment of piles had gained wide acceptance and popularity.^[4,6] LigaSure vessels unit is an

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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.^[7] 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.

LigaSure electrosurgical unit is multifunctional device due to its ability of grasping, sealing, blunt dissection, and ultimately dividing tissues.^[4,6,8] It is actually a modification of bipolar diathermy which acts by a combination of pressure and radiofrequency, sealing blood vessels up to 7 mm in diameter and providing energy tailored to the tissue impedance with a thermal injury confined to 2 mm over the operative field.^[5,8] The confined thermal dispersion allows the surgeon to perform a relatively bloodless surgery and reduce the anal spasm which responsible for most pain after hemorrhoidectomy. Besides, LigaSure electrosurgical unit stops energy delivery as soon as the tissue sealing is complete.^[8] LigaSure hemorrhoidectomy is considered now superior to conventional diathermy hemorrhoidectomy as it designed specifically to be used in a confined surgical field that necessitate delicate and precise visibility and dissection.^[9]

The main aim of this study was to compare the effectiveness and surgical outcomes of LigaSure hemorrhoidectomy with that of conventional excisional diathermy in term of operative time, blood loss, postoperative pain, early and late postoperative complications, time to return to work and daily activity, recurrence, and finally patient satisfaction about LigaSure hemorrhoidectomy.

MATERIALS AND METHODS

This a prospective, controlled randomized study was conducted for the period from April 2014 to July 2016 including 96 patients (70 males and 26 females) with age ranges from 19 to 82 years, mean 56.8 years) presented with Grade III and IV symptomatic piles were randomized into either open diathermy excisional hemorrhoidectomy (Group A: 48 patients) or to LigaSure hemorrhoidectomy (Group B: 48 patients).

Patients with concomitant anorectal pathology such as anal fissure or fistula, piles secondary to other pathology and those presented with strangulated, thrombosed, and inflamed piles were excluded from this study.

Patients in both groups of hemorrhoidectomy were submitted to the same preoperative routine evaluation. Although the majority of our patients has primary piles, sigmoidoscopy was offered for all patients elder than 60 years looking for and ruling out any rectal or colonic pathology. Anal sphincter complex continence was assessed for all patients in this study depending on the Wexner continence score.

Detailed and complete explanation of both procedures was offered to all patients preoperatively including the possible complications, recurrence rate, and time average to return to normal daily activity; then, informed consent was obtained

from each particular patient. The choice of procedure whether excisional diathermy or LigaSure one was done randomly by asking the patient to choose a sealed envelope including the type of the procedure.

All procedures were conducted as ambulatory-basis operations in private day-case clinic. Bowel preparations in the form of simple liquid diet and laxative suppository night before surgery were advised for all patients. Premedications consisting of 5mg/ 2ml midazolam and 75 mg diclofenac or tramadol intramuscular injection were given to all patients prior surgery. All patients in this study were operated on by the same surgeon either under local perianal block (majority, 85 patients) or under spinal or general anesthesia (only 11 patients). Operative time of both types of hemorrhoidectomy, postoperative pain immediately after surgery (within 4–6 h), day 1, day 3, 1 week, and 3 weeks after surgery was recorded and assessed depending on visual analog scale (VAS) of 0–10 score both during the rest and postdefecation.

Amount of intraoperative blood loss, early postoperative complications (such as bleeding, urine retention, wound breakdown and infection, soiling and incontinence) and late complications (such as anal stenosis and recurrence) were also traced and recorded during the follow-up period of 6–9 months. Measurement of convalescent period and time taken by patients to return to the work in both types of hemorrhoidectomy as well as patient satisfaction was studied and compared.

Patients after giving premedications were placed in the lithotomy position with few elderly and frail patients were placed in prone jackknife position.

Patients in Group A (48 patients), conventional open hemorrhoidectomy was done. The procedure started by digital rectal examination and dilatation of anal sphincters followed by identification and grasping of pile masses by two pairs of long Kelly artery forceps. V-shape incision at the mucocutaneous junction the made. Dissection and separation of piles off the underlying anal sphincters using monopolar and bipolar diathermy then was undertaken. The procedure is completed by ligation and excision of piles masses using 2 /0 Vicryl sutures. Skin and mucosal bridge between dissected piles are always preserved to prevent postoperative anal stenosis. The wound left open to heal by secondary intention.

Patients in the Group B (48 patients), the procedure started as in the Group A with digital examination and dilatation of anal sphincters, followed by grasping of the hemorrhoidal mass with 2 Kelly clamps at the mucocutaneous junction and the internal mucosal component. The procedure starts then with dissection and excision of piles masses by coagulation and sealing the vascular pedicle using either the LigaSure vessels sealing open small jaw or precise hand-piece forceps of Valleylab Covidien type, which provide integrated coagulation mechanism of both the soft tissues and blood vessels. The hemorrhoidal masses then excised and cut along the line of coagulation using a fine well-tipped scissor with no transfixion needed and without

any blood loss. The wounds produced after this procedure is quite small and left open.

At the end of procedures in both groups, homeostasis is checked and ensured followed by dressing of operative sites externally by sterile dressing soaked with xylocaine jelly with no dressing inside the anal canal. All patients were monitored and checked 1 h, 2 h, and discharged 4–6 h postoperatively. Before sending to home, instructions of warm sitz bath were given to all patients in the same evening, twice daily after that and after each bowel motion. The patient was put on analgesics and antibiotic (optional) and stool softener before discharge. Operative time of both procedures, amount of intraoperative blood loss, postoperative pain and analgesic requirement, early and late postoperative complications, patient return to work, and patient satisfaction about each procedure were recorded and analyzed.

RESULTS

A total of 96 patients presented with Grade III and IV symptomatic hemorrhoids were randomly subjected to either conventional diathermy open excision by monopolar diathermy (48 patients) or to hemorrhoidectomy by LigaSure vessels sealing electrosurgical unit (48 patients).

Patients ages range from 19 to 82 years, mean 56.8 years. Patients in both groups were identical for age (mean age for conventional diathermy group 55.9 year and 57.2 years for LigaSure group). The majority of our patients were male (70 male and 26 female). Anal continence was assessed preoperatively using Wexner continent score. Almost all patients were continent (Wexner score 0–2). The duration of symptoms, severity (degree), and the number of piles need to be excised were comparable between the two groups, and there were no statistical differences. Patients' characteristics and the main symptoms are summarized in Table 1.

The mean operative time for conventional excisional hemorrhoidectomy group was 23.6 min compared to 16.4 min for LigaSure hemorrhoidectomy group. The difference was statistically significant ($P < 0.001$).

The amount of intraoperative blood loss as measured by weighing the gauze before and after being soaked with blood was significantly higher in the conventional diathermy hemorrhoidectomy group compared to relatively bloodless LigaSure hemorrhoidectomy group (20–50 ml vs. 0–5 ml). Since both procedures are ambulatory day-case surgery, all patients in both groups were discharged to home 4–6 h after the operation, and thus, there was no significant difference in respect to hospital stay.

Management of pain in both procedures was started before surgery by giving patients premedication consisting of intramuscular NSAID in the form of diclofenac 75 mg and short-acting midazolam 5 mg in 2 ml. Since surgery on a very sensitive anoderm is associated with postoperative pain, all patients in this study were put on painkillers postoperatively.

The need for analgesia and evaluation of postoperative pain using VAS score were recorded and studied. There was no significant difference in VAS score and the need for parental analgesia in the first 48 h after surgery, (VAS for excisional hemorrhoidectomy was 4.6 vs. 4.1 for LigaSure hemorrhoidectomy). The VAS scores and analgesic requirements after 48 h till the 3 weeks postoperatively were significantly less in the LigaSure group compared to conventional group. VAS scores for LigaSure group in the 3rd, 7th, 14th, 21st, and 28th were 3.1, 2.6, 2.1 and 1.6, 0.8, respectively, compared to conventional group scores 4.8, 4.2,

Table 1: Patients characteristics and their clinical presentations

Patients characteristics and symptoms	Group A (48 patients)	Group B (48 patients)
Age	55.9	57.2
Duration of symptoms (months)	8.6	9.6
Prolapsed hard lump	36	40
Bleeding	3	32
Pruritus and itching	17	15
Pain	8	11
Mucus discharge	7	8
Wexner continence score	0–2	0–2

Table 2: Postoperative pain scores (visual analog scale) among patients in both groups

Postoperative pain scores (VAS)	Conventional group	LigaSure group
0–2 nd day	4.6	4.1
3 rd day	4.8	3.1
7 th day	4.2	2.6
14 th day	3.9	2.1
21 st day	2.8	1.6
28 th day	1.9	0.8

VAS: Visual analog scale

Table 3: Surgical outcomes among patients in both groups

Surgical outcomes	Conventional haemorrhoidectomy	LigaSure hemorrhoidectomy
Operative time (min)	23.6	16.4
Operative blood loss (ml)	20–50	0–5
Hospital stay (h)	4–6	4–6
Postoperative pain scores	3.7	2.4
Bleeding postoperative	2	0
Urine retention	3	0
Wound healing	8.6	19.5
Incontinence	1 (temporary)	0
Return to work (days)	7–10	14–21
Anal stenosis (%)	4 (8.3)	3 (6.25)
Recurrence	0	0
Patient satisfaction (%)	77	87.5
Overall complications	16.6	6.25

3.9, 2.8, and 1.9 for the same periods. The differences were significant ($P < 0.01$) Table 2.

Regarding the incidence of early postoperative complications, bleeding occurred in two patients (4.2%), urine retention in three patients (6.25%), infection and wound breakdown in three patients, (6.25%), temporary incontinence to flatus in one patient (2%) in conventional hemorrhoidectomy group, while in the LigaSure hemorrhoidectomy group, bleeding, wound infection, and incontinence were not observed in any patient, while urine retention in one patient (2%). It is worthwhile to mention that 11 patients (22.9%) in the conventional group suffered from seepage and perianal soiling, a finding which not observed in any patient subjected to LigaSure hemorrhoidectomy. There was statistically significant faster-wound healing in the LigaSure hemorrhoidectomy (8.6 days vs. 19.5 days for conventional hemorrhoidectomy). Consequently, the time required to the daily work and normal daily activity was quite shorter in the LigaSure group (7–10 days vs. 14–21 days).

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. Patients' satisfaction about the two types of hemorrhoidectomy was another important concern in this study. The majority of the patients underwent LigaSure hemorrhoidectomy were satisfied about their operations with overall satisfaction rate recorded was 87.5%, 42/48 patients (excellent in 26 patients, good in 15 patients, accepted in five patient, and bad in one patient) compared to 77% 37/48 patients for conventional diathermy hemorrhoidectomy (excellent in 16 patients, good in 20 patients, accepted in nine patients, and bad in three patients). The surgical outcomes of both procedures are summarized in Table 3.

DISCUSSION

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 excisional diathermy hemorrhoidectomy. Results found that LigaSure hemorrhoidectomy when compared with conventional hemorrhoidectomy, is simple, safe, and very effective treatment modality. It characterized by bloodless submucosal dissection, less operative time, less postoperative pain and less overall postoperative complications, besides, excellent surgical outcomes.

Results also found that the operative time and the amount of intraoperative blood loss were significantly less in the LigaSure group. These findings were consistent with the that obtained by Bakhtiar *et al.*,^[10] who found that the mean operating time, the mean blood loss, and overall pain score were less in that patient underwent hemorrhoidectomy by LigaSure technique.

Pattana-Arun *et al.*^[11] found that LigaSure hemorrhoidectomy is superior to closed hemorrhoidectomy in terms of decreasing the time of operation, but the postoperative complications were comparable.

Gentile *et al.*^[12] 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. Altomare *et al.*^[13] recorded that LigaSure hemorrhoidectomy resulted in significant decrease in operating time, but no difference in the incidence of postoperative bleeding.

Although the VAS scores were comparable in both groups of hemorrhoidectomy in early postoperative period in our study, analgesic requirement and postoperative pain control were significantly less after 48 h in LigaSure group. These findings can be explained by the fact that all patients in both groups were covered adequately by good and potent analgesia in addition to the use of long-acting bupivacaine as a local anesthetic agent in the majority of the patients. Pain score by VAS from the 3rd to 14th day postoperatively was significantly less in LigaSure group. Pain after the 3rd week decreased in both groups similarly. These results were consistent with the results obtained by several authors.^[14]

Nienhuijs and de Hingh^[15] 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, patients tolerance, and without any adverse effect on the surgical outcomes and postoperative complications. Milito *et al.*^[16] recorded (in their study which compared between hemorrhoidectomy with LigaSure vs. conventional excisional techniques) showed 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.

The usage of LigaSure vessels 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^[17] 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.

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. Same findings were also observed by several authors.^[12,13,18]

Mastakov *et al.*^[19] 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. Gentile *et al.*^[12] recorded anal stenosis in one patient only out of 25 patients treated by LigaSure technique. Wang *et al.*^[20] also reported anal stenosis in one patient in their series of 42 patients while 4 patients developed anal stenosis by study of Filingeri *et al.*^[21]

Wound healing in present study was significantly faster in LigaSure group patients than those in conventional group (11.6 days vs. 19.5 days). This means that return to the work and daily activity was faster in LigaSure group. Several authors^[4,12,22] reported faster wound healing and short convalescent period after LigaSure hemorrhoidectomy while other researches^[9,20] showed no difference in healing time (6 weeks) and time off work between LigaSure and conventional excisional techniques.

The follow-up period of this study was 6–9 months. The complications, which looked for during the follow-up period, were incontinence, recurrence, and persistent pain, or bleeding. Anal incontinence and recurrence of piles were not observed in any patient in both groups in our study. Same findings were observed in similar studies.^[20,22] Longer follow-up period was recorded in similar studies. Palazzo *et al.*^[23] of 15 months and Jayne *et al.*^[14] of 36 months tracing the long-term complications, found that although LigaSure hemorrhoidectomy resulted in earlier wound healing, it did not affect the late complications such as incontinence and recurrence.

Peters *et al.*^[24] found that LigaSure is effective as conventional hemorrhoidectomy for long-term symptoms control. They suggested that LigaSure technique is the preferred operation for patients with compromised internal sphincter such as multiparous women and elderly patients since less radical excision with LigaSure procedure is achieved. Muzi *et al.*^[25] demonstrated that LigaSure hemorrhoidectomy is simple, reducible, with reduced postoperative pain, fast wound healing, low complication rate, and fast return to work. Xu L *et al.*^[26] compared the LigaSure versus Ferguson hemorrhoidectomy and they showed that LigaSure hemorrhoidectomy is superior to Ferguson hemorrhoidectomy in the short-term outcomes.

Patients satisfaction among patients was significantly higher in LigaSure group than in conventional hemorrhoidectomy since it results in less postoperative pain, faster wound healing and early return to work and daily activity, and postoperative complications are similar or even less than that

of conventional hemorrhoidectomy including the recurrence rate and incontinence. Lawes *et al.*^[27] showed that patients satisfaction and continence score 1 year postoperatively are comparable for LigaSure and open conventional hemorrhoidectomy.

CONCLUSION

Compared with conventional excisional hemorrhoidectomy, 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. It is simple, safe, and easy to learn procedure. 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.

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Conflicts of interest

There are no conflicts of interest.

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