



## Research Article

### Comparison of Open Hemorrhoidectomy Versus Ligasure Hemorrhoidectomy

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#### Abstract

**Background:** In recent years different techniques for hemorrhoidectomy have been introduced. Ligasure hemorrhoidectomy is a new technique associated with minimum procedure related complications.

**Objective:** To compare the surgical outcomes of ligasure and open conventional hemorrhoidectomy.

**Methods:** 52 patients having 3rd or 4th degree hemorrhoids were included in the study. After randomly dividing the subjects into two groups, half of the cases were operated by ligasure and the other half by open hemorrhoidectomy. Surgical outcome of both the procedures was compared. Different parameters to assess the outcome were; per-operative and post-operative bleeding, procedure time, post-operative pain, retention of urine, fecal incontinence, anal stenosis, hospital stay and wound healing.

**Results:** Intraoperative and post-operative bleeding was significantly decreased in patients with ligasure Hemorrhoidectomy (P-value <0.001 and 0.4164 respectively). Post-operative pain (P-value < 0.001) and frequency of urinary retention were also markedly low in comparison. Short procedure time (P value < 0.001) short hospital stay, and early wound healing (P value = 0.0278) were other advantages of ligasure surgery compared to conventional method.

**Conclusion:** Ligasure hemorrhoidectomy leads to better results and less post-operative complications as compared to open conventional hemorrhoidectomy.

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#### Introduction:

Hemorrhoids, the symptomatic anal cushions, are the commonest cause of per rectal bleeding. About 50% population will suffer from hemorrhoids during their lifetime, with peak prevalence between 45 and 65 years of age<sup>1</sup>. Patients usually present with complaint of painless bleeding per rectum and something coming out of rectum<sup>2</sup>. Hemorrhoids are categorized into four grades depending upon the size and extent of prolapse of hemorrhoidal cushions. Grade I and II are usually milder with no or minimal

prolapse of tissue and these are usually managed conservatively or with minimally invasive procedures like band ligation. For Grade III and IV hemorrhoids having varying degrees of prolapsed mucosa, surgery<sup>1</sup> is the final treatment. Numerous surgical procedures are practiced for the treatment of hemorrhoids including open, closed and stapled hemorrhoidectomy but all of these have certain risks<sup>3</sup>. The common problem with all these surgical options is hemorrhage, which may be primary or secondary. Second important complaint is post-operative pain and complications related to pain like urinary

retention and constipation<sup>4</sup>. Also, patients have to be carefully followed up in the first few weeks after surgery to assess for adequate wound healing or to look for fecal incontinence which is more frequently associated with the open technique<sup>5</sup> or anal stenosis which is a documented complication of closed and stapled hemorrhoidectomy<sup>6</sup>. Some authorities believed that Ferguson-closed hemorrhoidectomy was a gold standard approach<sup>7</sup> but this is now being put to test with newer and technologically improved surgical gadgets and technique<sup>8</sup>.

With the advent of newer technology, further research to find out a better technique for hemorrhoidectomy, is in progress. In recent years, Ligasure has been introduced which has facilitated the surgeon's work as testified by various national and international researchers. Ligasure is a vessel sealing electrosurgical unit which is in effect an improved form of bipolar diathermy<sup>5</sup>. It uses pressure and radiofrequency to seal the blood vessels up to 7mm in diameter. It is considered safer relative to diathermy as the spread of energy is only up to 0.5 to 2mm. Its use in hemorrhoid surgery is considered safe<sup>1</sup> and it does not need any special skill either as was the case with stapled hemorrhoidectomy. Nonetheless, Ligasure is an expensive device and its availability is still a problem. Bakhtiar et al found that use of ligasure reduced blood loss and pain scores but increased operative time and suggested further trials to elaborate advantages associated with use of ligasure<sup>3</sup>.

Aim of this study was to compare the conventional hemorrhoidectomy with ligasure hemorrhoidectomy in terms of both operative and post-operative complications as well as feasibility.

## Methods:

This study was conducted at the Department of Surgery, Madinah Teaching Hospital, Faisalabad. Sample collection was started in September 2018 and continued till April, 2019. Patients were followed up for 1 year. A total of 52 patients with 3<sup>rd</sup> and 4<sup>th</sup> degree hemorrhoids were included in this study. The sample size was calculated with formula based on hypothesis test for two population proportions (one sided test)<sup>3</sup>. All patients ranged between the age of 18 to 70 years. The patients with concomitant perianal disease like Fistula in Ano or secondary hemorrhoids were excluded from this study.

Patients were randomly divided into two groups by lottery method. In Group A patients, Hemorrhoidectomy was conducted by open technique and Group B patients underwent hemorrhoidectomy by ligasure. All the patients received rectal enema and prophylactic antibiotics before surgery which was performed under spinal anesthesia in all patients by consultant surgeons. Patients were placed in lithotomy position and examination under anesthesia was carried out to assess the position and degree of hemorrhoids. Manual anal sphincter stretching was done upto 4 fingers. Hemorrhoids were then delivered while mucocutaneous junction and apex of hemorrhoids were held by two artery forceps.

In Group A patients, incision was made with knife and hemorrhoidal tissue was separated from internal sphincter fibers by using monopolar diathermy and the pedicle was transfixed with catgut number 1 suture above the dentate line, whereafter hemostasis was secured and anal pack placed.

In Group B patients, dissection of hemorrhoidal tissue and coagulation and division of pedicle was all done by using ligasure instrument. After securing hemostasis, rectal pack was placed.

The duration of surgery was noted by an operation theatre nurse ---- from painting to placement of anal pack after completion of procedure.

Per-operative bleeding was noted by counting the number of gauze pieces (4 x 4); one blood-soaked gauze being considered equal to 5ml blood loss. All patients received injectable antibiotics viz. Ciprofloxacin and Metronidazole. For pain relief, patients received injectable ketoralac 30mg thrice a day, in the first 24 hours after surgery.

Post-operative bleeding and frequency of urinary retention was assessed and recorded in all patients. Post-operative pain was recorded on day 1, 2 and 7 according to Verbal Numeric Rating Scale<sup>9</sup> whereby subject is asked to rate pain from 0 to 10 with 0 being no pain to 10 being the worst pain.

Post-operative need of injectable analgesics on second postop day along with the total duration of hospital stay of patients was also noted. Patients were discharged on 1st or 2<sup>nd</sup> post-operative day when they were freely mobile, taking regular meals, passed

flatus or stool and pain was controlled by oral analgesics. On discharge, they were prescribed analgesics, and laxatives along-with ispaghul husk for constipation and sitz bath.

Patients were called for follow up on 7<sup>th</sup> postoperative day for assessment of pain and then 14<sup>th</sup> postoperative day to assess wound healing. Presence of healthy granulation tissue in absence of pus discharge, pain or increased anal tone was considered as satisfactory wound healing. All patients were followed up for a period of 1 year to look for anal stenosis and incontinence.

Frequency distributions and percentages were calculated for all qualitative variables in the study. Chi-square test was applied to determine the significance of association between the variables. ANOVA and

repeated measure ANOVA tests were applied for calculating the results regarding duration of surgery and post-operative pain respectively. 95% confidence interval was calculated. P-values of less than 0.05 were considered significant. Statistical analysis was consequently performed using R software version 3.6.1.

### Results:

A total of 52 patients (25 females and 27 males) were included in this study. The gender related distribution of sample was statistically insignificant. (P-value = 0.076). The youngest patient was 18 years old while the oldest being 70 yrs old. Age distribution is shown in Table 1 below:

**Table 1: Surgery and Age Group**

Surgery	Age					
	16-25	26-35	36-45	46-55	56-65	66-75
Open	2	11	5	4	4	0
Ligasure	3	6	6	6	2	3

P-value = 0.3233

Among our study population, 36 patients had 3<sup>rd</sup> degree hemorrhoids out of whom 20 were operated by employing ligasure technique and 16 by open technique. 16 patients had 4<sup>th</sup> degree hemorrhoids out of whom 6 were operated by ligasure technique and 10 by open technique.

(P value = 0.781)

As regards the duration of Surgery, the mean operative time for Group A patients was 41.32 min while for Group B, it was 24.73 min. (P-value < 0.001).

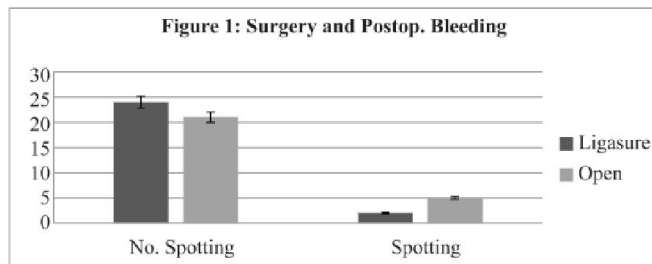
As for complications, superior results of ligasure group were seen considering intraoperative bleeding as shown in Table 2. However, post-operative bleeding did not differ significantly between the two groups (Fig 1). Post-operative pain was recorded on verbal numeric rating scale 0 - 10 on day 1, 2 and 7 of surgery and results are given in table 3. There is a markedly decreased post-operative pain in patients

with ligasure hemorrhoidectomy. Need of parenteral analgesia on day 2 of surgery was seen in 11 (42%) patients having open hemorrhoidectomy while in only 2 patients (7.7%) having been operated with ligasure. Moreover, female patients have significantly less pain than male patients.(P-Value = 0.03). Retention of urine took place in early postop period in 6 (23.07%) patients in group A as compared to 1 (3.84%) in group B patients. Post-operative hospital stay in group A patients was recorded as 2.30 days on average as compared to 1.11 in group B patients. (P-value < 0.000)

**Table 2: Surgery and Per-operative Blood Loss**

Surgery	Blood Loss (ml)		
	5-10	11-20	20-above
Open	0	1	25
Ligasure	8	14	4

P-value < 0.001



P-value = 0.4164

**Table 3: Post-operative pain**

Day	Day 1	Day 2	Day 7
Open	7.2 ± 1.2	4.7 ± 1.7	2.0 ± 1.8
Ligasure	3.4 ± 1.7	1.1 ± 0.9	0.5 ± 0.6

P-value < 0.001

As for wound healing, out of 26 patients in the ligasure group, 25 were having satisfactory wound healing noted by presence of granulation tissue on 14th post-operative day while 18 patients in Group A were found having granulation tissue two weeks after surgery. The statistical difference between results of the two groups was significant (P-value = 0.0278). None of the patients developed anal stenosis or incontinence in either group. 5 of these patients didn't come for follow up beyond 3 months.

### Discussion:

In recent years, different techniques have been introduced to perform hemorrhoidectomy. Many studies have been carried out to assess the best operative treatment for hemorrhoids but so far none has been found to be gold standard, each having their own positive and negative points<sup>10</sup>. Conventional surgical procedures are being practiced since a long time for the management of 3<sup>rd</sup> and 4<sup>th</sup> degree hemorrhoids. These procedures include Milligan-Morgan open hemorrhoidectomy<sup>3</sup> and Ferguson technique closed hemorrhoidectomy<sup>11</sup>. Both are infested with a number of complications like post-operative pain, preoperative and post-operative bleeding and retention of urine in early post-operative period or anal stenosis later on<sup>12</sup>. There is also a small risk of fecal incontinence. Patients usually need 2 to 4 weeks for complete recovery<sup>4</sup>.

Another method used over last few years is stapled hemorrhoidopexy. Although incidence of post-operative pain is less with this procedure, it is an exp-

ensive method and is marked with recurrence of hemorrhoids specially in 4<sup>th</sup> degree hemorrhoids<sup>13</sup>. Another alternate used in recent studies is Caiman<sup>14</sup> and Vojant<sup>15</sup> devices which use radiofrequency for operating hemorrhoids. However, cost and availability of equipment is an issue.

With the introduction of ligasure in surgery, better results and less post-op complications have been observed. In our study, we have noted that the operative time has significantly decreased in case of ligasure hemorrhoidectomy (24.73 min on average in ligasure hemorrhoidectomy as compared to 41.32 min in open hemorrhoidectomy)<sup>13</sup>. Similar findings were noted by Haksal MC et al in their study<sup>1</sup>.

In our study, incidence of Per-operative and post-operative bleeding was also found less in ligasure hemorrhoidectomy. Only 4 patients (15.4%) had bleeding of more than 20ml as compared to 25 patients (96%) in open hemorrhoidectomy. These findings are supported by the study carried out by Bakhtiar et al who found that per-operative blood loss was significantly less in ligasure group<sup>3</sup>. However, some researchers have cited use of ligasure as an independent risk factor for delayed post-hemorrhoidectomy bleeding<sup>2</sup>. Lee K et al<sup>2</sup> found increased chances of post-operative bleeding associated with use of ligasure hemorrhoidectomy. However further studies are required to support their findings.

Post-operative pain is one major early complication of open conventional surgery leading to urinary retention and constipation in a few patients. In our study, average pain measured on verbal numeric rating scale was noted in Group A as 7.2, 4.7 and 2.0 on 1, 2 & 7 day of surgery, while average pain measurement in Group B was 3.4, 1.1 & 0.5 respectively. This finding is consistent with other studies<sup>3,4</sup>. However, different pain scales have been used in different studies. Need for parenteral analgesia on day 2 of surgery was also much low in ligasure hemorrhoidectomy (2 Vs 11 patients) than in conventional surgery. Incidence of urinary retention in early post-operative period was 1 (3.9) in Group B while 5 (20.2) in Group A.

Post-operative hospital stay and early return to work was also decreased with use of ligasure for hemorrhoidectomy. In our study, average stay of group B patients was 1.11 days as compared to 2.30 in group



A patients. This is also comparable with other studies conducted<sup>16</sup>.

Reverting to wound healing, on 14th postop day, 25 (96%) patients in group B had satisfactory healing while 18 (70%) in group A had healing with granulation tissue. Chen C et al followed patients for 2 years and found results similar to those found in our work<sup>15</sup>. We did not have any patients of inflammatory bowel disease in our study. However, researchers have found that wound healing in those patients is also quite satisfactory after operative management of hemorrhoids<sup>17,18</sup>.

Our study has proven the benefits of ligasure over conventional methods in various aspects. The impact on operative time, procedure related hemorrhage and pain is quite evident. In order to detect its ability to reduce the incidence of post-operative anal stenosis, further study with larger sample size and longer follow-up may be required. Also, ligasure has a significant impact on procedural cost, although a remarkable reduction in operative time, blood loss and other complications outweigh the extra financial burden.

### Conclusion:

Ligasure hemorrhoidectomy is a much better procedure for 3<sup>rd</sup> and 4<sup>th</sup> degree hemorrhoids compared to open hemorrhoidectomy, as it is technically simpler to perform, involves less operative time, operative hemorrhage and post-operative pain with shorter hospital stay.

**Ethical Approval:** Given

**Conflict of Interest:** The authors declare no conflict of interest

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