Original Article

Evaluation of hemorrhoid laser procedure with anal suture mucopexy and its effectiveness to treat second and third-degree hemorrhoids: A prospective study

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ABSTRACT

Background: The Hemorrhoid Laser Procedure (HeLP) is a good procedure to treat grade II and III hemorrhoids in patients who have failed to respond to nonoperative measures. However, poor resolution of the mucosal prolapse especially with higher degrees of hemorrhoids was noticed in many studies.

Objective: Evaluation of hemorrhoidal laser procedure combined with anal mucopexy (HeLPexx) and report its results on second and third-degree hemorrohoids.

Patients and Methods: This prospective observational study was conducted on 35 patients with second or third-degree piles. Patients were followed from day zero postoperative to 6 months regarding postoperative pain and other postoperative complications such as bleeding, discharge, stenosis, and recurrence.

Results: Postoperative pain was detected by visual analog scale (VAS) score at baseline (day zero postoperative), day 7, week 4, 3, and 6 month postoperative. On day zero the median score was 5, on day 7 the median score was 2, after 1 month the median score was 1, after 3 and 6 months the median score was zero with a significant decrease in pain score in comparison to postoperative pain in excisional hemorrhoidectomy. Only 5 cases complained of recurrence. No cases were detected with perianal fistula or anal stenosis.

Conclusion: This study concluded Hemorrhoid laser procedure with anal suture mucopexy (HeLPexx) is an effective and safe procedure in the treatment of second and third-degree piles, as this technique had a significant decrease in duration of surgery, postoperative bleeding, and pain with no stenosis or fecal incontinence.

Key Words: Anal suture mucopexy, hemorrhoid laser procedure, degree hemorrhoids.

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INTRODUCTION

In the anal canal, hemorrhoids are cushions made of specialized submucosal tissue. Patients often complained from hemorrhoidal tissue prolapse, anal discomfort, itching, discharge (soiling), and painless rectal bleeding[1-3]. Approximately 4% of people worldwide are affected by this disease[4]. Regarding age, the majority of affected individuals range from 45 to 65 years old[5]. The degree of prolapse in the anal canal determines the type of hemorrhoids either internal, external, or mixed[6]. The severity of the hemorrhoids can detect the method of treatment. High-degree hemorrhoids require surgical intervention, although low-grade hemorrhoids can usually be managed conservatively using nonoperative methods[7]. Patients who do not respond to conservative treatments are often shifted to surgical management.

Many therapeutic options are available, including band ligation, hemorrhoidal dearterialization, sclerotherapy, stapled hemorrhoidopexy, Doppler-guided artery ligation, and surgical excision using Milligan–Morgan and Ferguson's procedures[8]. Still, no one approach has been confirmed to be the most effective[9].

Laser hemorrhoidectomy was described as a good minimally invasive procedure in 2009 by Salfi *et al*.[10] and Plapler *et al*.[11]. There are several ways in which hemorrhoidal disorders are treated by laser therapy. One of them is to excise hemorrhoids by using the laser as an energy source. Another method involves utilizing a laser to dematerialize the feeding arterial branches after intraoperative localization of these arteries by Doppler. Using a laser as an energy source, submucosal proteins are denatured during laser hemorrhoidoplasty, causing fibrosis and adherence of mucosa to underlying tissue, preventing prolapse[12].

Using a diode laser, the terminal branches of the superior hemorrhoidal arteries are closed under Doppler guidance as part of the HeLP technique. The main goal of this technique is to lower the vascular input to the hemorrhoidal plexus and maintain hemorrhoidal cushions achieving clinical resolution of hemorrhoid-related symptoms. For

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hemorrhoids with minor mucosal prolapse, it can be a better option than hemorrhoidectomy, hemorrhoidopexy, or hemorrhoidal artery ligation (HAL)[1,4]. However, the presence of major mucosal prolapse may prevent full resolution of symptoms and clinical improvement.

Aim

The aim of the present study is evaluation of hemorrhoidal laser procedure combined with anal mucopexy (HeLPexx) and report the clinical and intermediate term results on second and third-degree hemorrohoids.

PATIENTS AND METHODS:

A prospective observational study was done on patients with second or third-degree hemorrhoids, aged 20–60 years old for 1.5 year in general surgery units at El-Demerdash and Ain Shams University Specialized Hospital (ASUSH) starting in June 2022. Exclusions from this study were individuals with first- or fourth-degree hemorrhoids, pregnant females, those with other anorectal conditions (such as fistulas, abscesses, rectal cancer, inflammatory bowel disease, etc), and those with previous anal surgeries.

We started our study with 38 patients, three patients were excluded due to social and travelling circumstances. 35 patients completed the study till its end. All cases signed a consent form and informed about the aim of the study. All participants were subjected to full medical history, complete physical examination and routine preoperative investigations.

Surgical procedure

After induction of anesthesia (either spinal or general), all patients were put in the lithotomy position. Patients were examined under anesthesia to confirm the grade of hemorrhoids and to exclude associated anal pathologies like anal fistula or any masses.

The Ceralas diode laser Biolitic system (Biolitec) was used to perform the laser procedure. To identify each hemorrhoid, an anoscope was inserted into the anal canal, A small incision was done to the skin, about 1 cm from the anal edge, and the laser probe was then inserted inside the pile (Fig. 1a). Using the optic fiber, 5–6 pulses (laser shots) were generated, each lasting for 3 s, followed by a 1 s pause (the pulsed method was used to minimize the damage to the adjacent normal tissues) causing the tissues to shrink down to a depth of ~5 mm as shown in (Fig. 2).

According to the size of the hemorrhoid, the depth of shrinkage can be regulated by the power and duration of the laser beam. After finishing each hemorrhoid, an iced finger was introduced within the anal canal for 0.5 min to decrease the heat effect (Fig. 1b), then continuous running sutures are applied in a proximal to distal fashion using vicryl sutures (Fig. 1c). Laser total dosing is adjusted according to the patient's state and size of the hemorrhoids. External dressing used at the end of the operation.

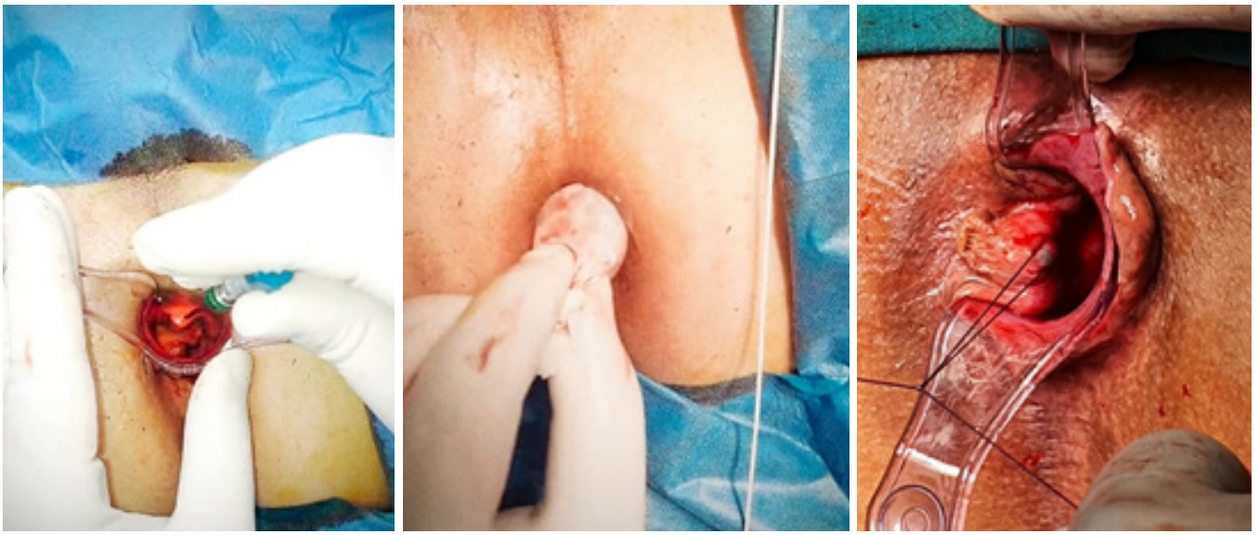
Postoperative, Vital data was monitored every 6 h. Good analgesics were taken. Assessment of urine output was done to detect urinary retention. Patients started on a soft oral diet within 4 h postoperatively. Dressing was removed the same day of surgery or in the morning after surgery and a local external visual examination was done. Patients were asked about anal symptoms such as pain, bleeding. Postoperative pain was evaluated using the visual analog scale (VAS 0–10), where 0–1=no pain, 1.1–3=low pain intensity, 3.1–7=pain of medium intensity, 7.1–9=pain of high intensity, and 9.1–10=strong, and unbearable pain.

Follow-up visit after 1 week, 1, 3, and 6 months was done to evaluate bleeding, discharge, recurrence, discomfort or pain, stenosis, and impact on quality of life.

Statistical analysis

Version 23 of the Statistical analysis was done using IBM SPSS statistics for windows, Version 23.0. Armonk, NY: IBM Corp (IBM SPSS) was used to enter, edit, and review the data. When the quantitative data were determined to be nonparametric, they were given as the median and inter-quartile range (IQR), and when they were parametric, as the mean, standard deviations, and ranges.

Qualitative variables were also shown as percentages and numbers. The χ^2 test was used to compare groups based on qualitative data. The Independent t-test was used to compare two groups using quantitative data and a parametric distribution. The Mann–Whitney test was used to compare two groups using quantitative data and a nonparametric distribution. The allowable margin of error was set at 5%, while the confidence interval was set at 95%. Thus, the following *p-value* was deemed significant: *P* greater than 0.05 indicates no significance. Significant is *P* less than 0.05. *P* less than 0.01 indicates very significant.



A B C

Fig. 1: Laser catheter within pile (A), Iced finger within anal canal to decrease heat effect (B), Anal suture mucopexy using continuous vicryl sutures (C).

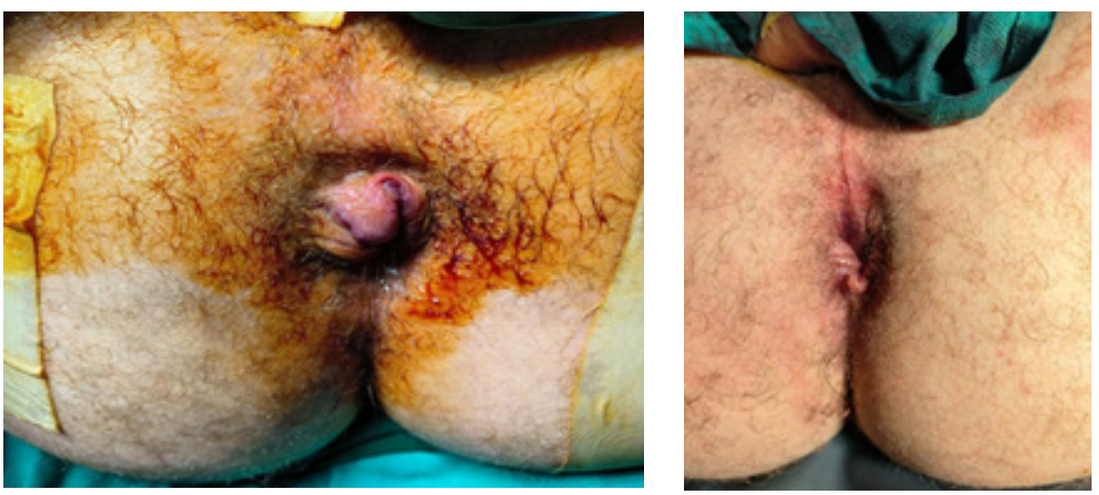


Fig. 2: Pre and post hemorrhoid laser procedure with anal suture mucopexy procedure.

RESULTS:

Thirty-five consecutive patients with grade II and III hemorrhoids [mean age 37.77 years (range 23–60)] operated by HeLPexx technique. Further demographic data and medical history are displayed in (Table 1). Every patient had a long history of progressive anal symptoms and failed on previous medical treatment. According to Table 1, The main symptoms were anal bleeding with prolapse that detected in 25 (71.4%) patients, prolapse alone in six (17.1%) patients, and discomfort in four (11.4%) patients. The average operation took 15 to 30 min. (Table 2) shows that 11 (31.4%) patients underwent general anesthesia and 24 (68.8%) patients underwent spinal anesthesia. Seven patients had intraoperative bleeding that required a hemostatic suture. During the first two days following surgery, six (17.1%) patients experienced urine retention, which was managed with a urinary catheter for 2 days. No patient was missed in the follow-up visits. At baseline (the first postoperative day), day 7, week 4, 3, and 6 month, the mean postoperative pain VAS score (which is based on a score of 0–10; 0=no pain and 10 the worst degree of pain) was evaluated. The median VAS score was 5 on the first postoperative day, 2 on the seventh day, 1 at the end of the first month, and zero on the third and sixth months, with a significant decline in the pain score. For postoperative pain, patients used paracetamol and/or nonsteroidal anti-inflammatory medications (NSAIDs). Five (14.3%) patients had bleeding between 3 and 14 days after surgery. One of these patients underwent conservative management after being readmitted to the hospital on the sixth postoperative day. On the first 10 days following surgery, three patients reported feeling incomplete evacuations. No surgery or blood transfusion was necessary for any of the patients, and all postoperative problems were managed conservatively. Following surgery, there was a statistically

significant improvement in all of the symptoms (bleeding, pain/discomfort, impact on quality of life, and prolapse). There was no significant change in fecal incontinence reported. No patients reported having anal stenosis, but five patients reported recurrence within six months that needs periodic monitoring for possibility of second stage hemorrhoidectomy. (Tables 3, 4) gives an overview of the clinical outcomes.

Finally we did a comparative relation between postoperative complications (pain, bleeding, recurrence, discharge) and pre, intraoperative parameters to detect if these parameters can affect postoperative complications. This relation showed that preoperative and intraoperative parameters does not affect postoperative complications reported in (Tables 5–8).

Table 1: Preoperative assessment of the studied patients

	Total number=35 [n (%)]
Sex	
Female	15 (42.9)
Male	20 (57.1)
Age (years)	
Means	37.77±11.06
Range	23–60
Medical history	
No	24 (68.6)
Yes	11 (31.4)
Diabetic	3 (8.6)
Hypertensive	4 (11.4)
Asthmatic	2 (5.7)
IHD	2 (5.7)
Complaint	
Bleeding with prolapse	25 (71.4)
Prolapse only	6 (17.1)
Anal pain/discomfort	4 (11.4)
Piles degree	
2ND degree	19 (54.3)
3RD degree	16 (45.7)

Table 2: Intraoperative assessment of the studied patients

	Total number=35 [n (%)]
Type of Anasethesia	
Spinal	24 (68.6)
General	11 (31.4)
Surgery duration(min)	
Median (IQR)	20 (18–25)
Range	15–30

Table 3: Follow-up of visual analog scale score (pain) at baseline, day 7, week 4, 3, and 6 month.

Pain	Baseline	Day 7	Week 4	3 month	6 month	Test-value	*P* value	Significance
Median(IQR)	5 (4–6)	2 (2–3)	1 (0–1)	0 (0–1)	0 (0–1)	133.065‡	0.000	HS
Range	2–9	1–6	0–3	0–3	0–3			

P value greater than 0.05: Nonsignificant; *P value* less than 0.05: Significant; *P value* less than 0.01: highly significant.
‡: Friedman test.

Table 4: Other postoperative complications

	Total number=35 [n (%)]
Postoperative urinary retention	
No	29 (82.9)
Yes	6 (17.1)
Postoperative bleeding	
No	30 (85.7)
Yes	5 (14.3)
Postoperative discharge	
No	28 (80)
Yes	7 (20)
Return to daily activities (days)	
Mean±SD	10.94±3.49
Range	5–20
Postoperative stenosis	
No	35 (100)
Yes	0
Recurrence	
No	30 (85.7)
Yes	5 (14.3)

Table 5: Relation between some preoperative, intraoperative data and postoperative bleeding

	Postoperative bleeding				
	No	Yes			
	Number= 30 [n (%)]	Number= 5 [n (%)]	Test value	*P* value	Significance
Age					
Means	38.63±10.47	32.60±14.33	1.134•	0.265	NS
Range	23−60	24−58			
Sex					
Female	12 (40.0)	3 (60.0)	0.700*	0.403	NS
Male	18 (60.0)	2 (40.0)			
Medical history					
No	21 (70.0)	3 (60.0)	0.199*	0.656	NS
Yes	9 (30.0)	2 (40.0)			
Medical history					
No	21 (70.0)	3 (60.0)			
Diabetic	3 (10.0)	0			
Hypertensive	3 (10.0)	1 (20.0)	3.354*	0.500	NS
Asthmatic	1 (3.3)	1 (20.0)			
IHD	2 (6.7)	0			
Piles degree					
2nd degree	15 (50.0)	4 (80.0)	1.554*	0.213	NS
3rd degree	15 (50.0)	1 (20.0)			
Surgery duration					
Median (IQR)	20 (20–24)	23 (18–30)	–0.549‡	0.583	NS
Range	15−30	15−30			

P value greater than 0.05: nonsignificant; *P value* less than 0.05: Significant; *P value* less than 0.01: highly significant.
*: χ^2,Chi-square test.
•: Independent t-test.
‡: Mann–Whitney test.

Table 6: Relation between some preoperative, intraoperative data and postoperative discharge

	Postoperative discharge				
	No	Yes			
	Number= 28 [n (%)]	Number= 7 [n (%)]	Test value	*P* value	Significance
Age					
Mean±SD	36.21±10.56	44.00±11.60	–1.713•	0.096	NS
Range	23−58	29−60			
Sex					
Female	11 (39.3)	4 (57.1)	0.729*	0.393	NS
Male	17 (60.7)	3 (42.9)			
Medical history					
No	19 (67.9)	5 (71.4)	0.033*	0.856	NS
Yes	9 (32.1)	2 (28.6)			
Piles degree					
2nd degree	15 (53.6)	4 (57.1)	0.029*	0.865	NS
3rd degree	13 (46.4)	3 (42.9)			
Surgery duration					
Median (IQR)	20 (18–25)	22 (20–22)	–0.376‡	0.707	NS
Range	15−30	18−30			

P value greater than 0.05: nonsignificant; *P value* less than 0.05: significant; *P value* less than 0.01: highly significant.
*: χ^2 Chi-square test.
•: Independent t-test.
‡: Mann–Whitney test.

Table 7: Relation between some preoperative, intraoperative data and postoperative recurrence

	Recurrence				
	No	Yes			
	Number= 30 [n (%)]	Number= 5 [n (%)]	Test value	*P* value	Significance
Age					
Mean±SD	36.67±10.75	44.40±11.74	–1.472•	0.150	NS
Range	23−60	29−58			
Sex					
Female	14 (46.7)	1 (20.0)	1.244*	0.265	NS
Male	16 (53.3)	4 (80.0)			
Medical history					
No	20 (66.7)	4 (80.0)	0.354*	0.552	NS
Yes	10 (33.3)	1 (20.0)			
Piles degree					
2nd degree	16 (53.3)	3 (60.0)	0.077*	0.782	NS
3rd degree	14 (46.7)	2 (40.0)			
Surgery duration					
Median (IQR)	20 (18–25)	22 (22–23)	–0.692‡	0.489	NS
Range	15−30	18−25			

P value greater than 0.05: nonsignificant; *P value* less than 0.05: significant; *P value* less than 0.01: highly significant.
*: χ^2 Chi-square test.
•: Independent t-test.
‡: Mann–Whitney test.

Table 8: Relation between some preoperative, intraoperative data and postoperative pain

	VAS score at baseline				
	Median (IQR)	Range	Test value	*P* value	Significance
Sex					
Female	5 (4−6)	2−9	–0.273‡	0.785	NS
Male	5 (4−6)	3−8			
Medical history					
No	5 (4−6)	2−9	–0.600‡	0.548	NS
Yes	5 (4−6)	3−8			
Medical history					
No	5 (4−6)	2−9			
Diabetic	5 (3−8)	3−8			
Hypertensive	5 (5−6)	4−6	1.554‡‡	0.817	NS
Asthmatic	6 (5−6)	5−6			
IHD	4 (3−5)	3−5			
Piles degree					
2nd degree	5 (4−6)	2−8	–0.542‡	0.587	NS
3rd degree	5 (4−6)	2−9			

P value greater than 0.05: nonsignificant; *P value* less than 0.05: Significant; *P value* less than 0.01: highly significant.
‡: Mann–Whitney test.
‡‡: Kruskal–Wallis test.

DISCUSSION

Hemorrhoids are common anal disorders defined as symptomatic enlargement and abnormally downward displacement of anal cushions associated with degenerative alteration of supportive tissue within the anal cushions, vascular hyperplasia, and hyper perfusion of hemorrhoidal plexus[12]. Procedural intervention is advised when medical treatment is ineffective in treating hemorrhoidal disease symptoms. Using a variety of procedures, the external and internal components of the hemorrhoidal tissue are excised during the standard surgical operation. The anoderm or anorectal mucosa may or may not be closed[13].

The gold standard treatment for hemorrhoidal disease is still surgical hemorrhoidectomy, whether performed by open (Milligan–Morgan) or closed (Ferguson) approach; but this procedure is associated with up to 15% of postoperative discomfort and difficulties, as well as a high frequency of residual symptoms[14].

A novel minimally invasive method for treating advanced hemorrhoidal disease is laser hemorhoidoplasty (LHP)[15].

LHP is used for the delicate treatment of advanced hemorrhoids. Endoluminal laser coagulation was applied to hemorrhoidal vessels under anesthesia. Since the energy of the laser beam is applied solely only in hemorrhoidal vessels, no damage was done to the anoderm and mucosa (the surrounding healthy tissue)[10,16].

This approach eliminates the need for foreign materials (surgical sutures and buckles), which lowers the possibility of postoperative stenosis (narrowing) of the anal canal and significantly reduces postoperative discomfort[17].

Healing and recovery are great, fast, and almost undetectable due to the lack of incisions, exposed wounds, and sutures[11].

Maloku *et al*.[18], report that following a hemorrhoidal procedure with the LHP, the average postoperative pain score on day 1 (VAS) was 2.2 (SD ± 0.3) in a research including 200 patients. On the other hand, following hemorrhoidal procedure with the excisional hemorrhoidectomy (EH) technique, the mean pain score was 4.5 (SD±0.8).

The average VAS score 4 weeks after surgery was 0.2 (SD ± 0.1) in the LHP group and 0.8 (±0.2 SD) in the EH group. After 8 weeks, the same values were found. According to our study, postoperative pain was substantially less in the LHP group than in the EH group (*P value < 0.001*).

Eskandaros and Darwish[19] showed that in a study with 80 patients, the time required to return to regular

daily activities, the length of hospital stay, and the surgical time differed significantly between LHP and EH in favor of the laser approach (*P value <0.001*).

Hassan and El-Shemy[20] reported that in a study conducted on 40 patients, one case complained of recurrent/residual hemorrhoids postoperative in the open surgical hemorrhoidectomy group and another case of anal stenosis within the same group, with no corresponding cases reported in the LHP group. In contrast to our study, in EH group 8 (26.7%) cases had recurrent/residual hemorrhoids (internal and external components) that needed second-stage hemorrhoidectomy. 4 (13.3%) cases in LHP group had recurrent/residual hemorrhoids, 2 (6.7%) cases developed anal stenosis in EH group. No cases were reported with stenosis in LHP group.

Maloku *et al*.[21] in a study conducted on 40 patients revealed that early postoperative pain is lower in the LHP group compared with the group that underwent excisional hemorrhoidectomy.

Many studies have reported on the effectiveness of the HeLP treatment in treating symptomatic hemorrhoids[22–24]. Poor resolution of the mucosal prolapse especially with higher degree hemorrhoids is one of the outcomes that may be seen postoperative. HeLPexx was done to solve this issue. This hemorrhoidal problem can be cured with the addition of suture mucopexy. The superior hemorrhoidal arteries' terminal branches are sealed to treat vascular impairment that causes arterial overflow, whereas running sutures are done to treat mucosal prolapse caused by connective tissue impairment within piles. Less postoperative discomfort, and a quick recovery period that allows a quick return to normal activities, are advantages of HeLPexx. The procedure can be customized to each patient regarding the number of mucopexies depending on the degree of prolapse. Preserving the anal anatomy is an additional benefit of nonexcisional treatment. No statistically significant changes in fecal incontinence and constipation were detected.

In January 2020, study similar to our research was done on 170 patients with grade III hemorrhoids. Median length of follow-up was 36 (range 12–72) months. Postoperative morbidity included urinary retention [7 (4.1%) patients], bleeding not requiring transfusion [one (0.6%) patient]. The mean postoperative pain VAS score at 1 week postoperatively was 1.8±1.1 (range 0–5) and 12 (7%) patients used pain medications for more than 1 week postoperatively while none of the patients reported any pain by the end of the third week postoperatively. The Hemorrhoid Symptoms showed a statistically significant improvement in all items. Recurrent symptoms were reported in 12 (7%) patients who required further treatment[25].

In our study, we performed HeLPexx procedure which is laser hemorrhoidoplasty with anal suture mucopexy using vicryl suture to decrease recurrence and tissue prolapse. We followed our patients for 6 months after the procedure for assessment of pain and other anal symptoms such as bleeding, discharge, stenosis, discharge, and recurrence. Postoperative pain was detected by VAS score at baseline (day zero postoperative), day 7, after 1st, 3rd, and 6th month. On day zero postoperative the median score was 5, on day 7 the median score was 2, after 1 month the median score was 1, then after 3 and 6 months the median score was zero with a significant decrease in pain score in comparison to postoperative pain in excisional hemorrhoidectomy. Only five cases complained of recurrence for routine follow-up for the possibility of second-stage hemorrhoidectomy. No cases were detected with perianal fistula or anal stenosis that may be a complication of excisional hemorrhoidectomy.

CONCLUSION

From this study we concluded HeLPexx is effective method and safer than EH in treatment of second and third degree piles, as this technique had significant decrease in duration of surgery, postoperative bleeding and pain with no stenosis or effect on fecal continence.

CONFLICT OF INTEREST

There are no conflicts of interest.

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