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Predictive Factors for Recurrence Following Hemorrhoidectomy Using the LEONARDO Laser Technique

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Abstract

Purpose: This study investigates the influence of various factors, including defecation habits, age, gender, and obesity, on the recurrence of hemorrhoids after treatment with the LEONARDO laser technique. Hemorrhoids, a prevalent anorectal condition, often require intervention ranging from conservative management to surgical procedures. Traditional hemorrhoidectomy is associated with postoperative pain and high recurrence rates, whereas the LEONARDO laser technique promises a safer and less invasive alternative.

Methods: A comprehensive analysis was conducted on patients who underwent hemorrhoidectomy using the LEONARDO laser technique. The study focused on assessing the impact of several risk factors, such as defecation habits (with a particular emphasis on obstructive defecation syndrome), age, gender, and obesity, on the recurrence of hemorrhoids. Data were collected over a two-year follow-up period post-surgery.

Results: The findings revealed a significant correlation between certain defecation habits, notably obstructive defecation syndrome, and an increased rate of hemorrhoid recurrence, especially in older female patients. The study also observed that other factors like age, gender, and obesity played a role in the recurrence rates, although the impact of defecation habits was more pronounced.

Conclusions: The results of this study highlight the critical importance of considering individual defecation patterns, particularly obstructive defecation syndrome, in the management and prognosis of hemorrhoids post-LEONARDO laser treatment. These insights can guide clinicians in tailoring postoperative care and counseling to reduce recurrence rates and improve patient outcomes.

Keywords: defecation habit, hemorrhoids, LEONARDO technique, obstructive defecation syndrome.

INTRODUCTION

Hemorrhoids are a common condition in anorectal sites, it is considered the fourth gastrointestinal problem all over the world, and hemorrhoids are mostly symptomatic enlargements for normal anal cushions [1]. Histologically, hemorrhoids are different types of tissues (blood vessels, smooth muscles, connective tissues) located in an anterior or posterior position [2].

Histopathological lesions associated with dilatation and damage of blood vessels and connective tissue or the anorectal area is always associated with inflammatory reactions and hyperplasia which is the characteristic feature of hemorrhoids [3].

Generally, hemorrhoids could be classified into internal, external, and mixed hemorrhoids according to their locations and degree of prolapse. Internal hemorrhoids could be defined according to the site where they occur in the inferior hemorrhoidal venous plexus above a dentate line which is covered by mucosa, while external hemorrhoids are dilated venules of this plexus located below the dentate line and are covered with squamous epithelium meanwhile Mixed (interno-external) hemorrhoids arise both above and below the dentate line [4]. Many risk factors may be associated with an increase in the incidence of hemorrhoids, for example, the pressure that increases in the abdominal region (increase during constipation, obesity, frequent diarrhea, pregnancy, and others) [5].

The stretching and loss of elasticity of small blood vessels that surround the anus and rectum due to increasing abdominal pressure increase the incidence of hemorrhoids and thrombus formation [6].

Management of hemorrhoids is very important, and this management varies according to the severity and duration of occurrence of hemorrhoids. Dietary management and lifestyle changes are important as first-line treatments, besides the use of many topical steroids. Conventional surgery is the final choice in hemorrhoid treatments. Nowadays, new techniques have been developed, based on using laser procedures for hemorrhoid treatment. Laser hemorrhoidectomy became famous due to its advantages related to safety and reduced pain, with low invasion or sphincter injury [7].

A previous study evaluated the advantages after short-term management of hemorrhoids after laser surgery; the investigators found that it had high short-term success rates, and it had been shown that this technique had minor postoperative complications and recurrence [8].

Leonardo Laser is a Diode laser. Its fibre is passed through the natural anal opening, and laser energy is applied to the haemorrhoidal mass. This controlled emission of laser energy reaches the submucosal area, shrinking the haemorrhoidal mass. In addition, fibrotic reconstruction generates new connective tissue which ensures the mucosa adherence to the underlying tissue. This prevents the recurrence of prolapse [9].

AIMS OF STUDY

To analyse the effects of poor defecation habits and other risk factors on the recurrence of hemorrhoids treated by the LEONARDO technique for hemorrhoidectomy.

PATIENTS AND METHODS

Patients' selection

Prospective study for 315 Iraqi patients of both genders. All patients previously suffered from hemorrhoids of different grades, accordingly they underwent

hemorrhoidectomy by using the LEONARDO technique. Patients were collected from two different private hospitals. The duration of the study extended from January 2018 to January 2022

Patients enrolled in this study met the following criteria: age range from 18-65 years, both genders, hemorrhoids grade range from 1-3, no chronic disease like autoimmune disease, diabetes, or any gastrointestinal problems like ulcerative colitis or Crohn disease, and all patients should not have had previous conventional hemorrhoids surgery.

Different anthropometric parameters were recorded before laser hemorrhoidectomy. Anthropometric parameters include (gender, age, body mass index, smoking status, and patient activity besides anorectal functions in whom defecation habit is categorised into mild defecation disorders when the patients did not squeeze for defecation and obstructive defecation syndrome (ODS) when the patient is unable to evacuate their bowels properly and need to strain with bowel movements, multiple unproductive urges, incomplete emptying or sensation of a blockage.

Anorectal evaluation by manometry

To detect any abnormal function and/or coordination between anal and rectal function before surgery, anorectal evaluation by manometry is indicated [10]. This test is based on the measurement of pressure that is responsible for involuntary function during rest or voluntary function during distension or squeeze beside reflexes of anal and rectal during distension and defecation [11]. The examination started by placing a subject in the left lateral position with hips and knees flexed to a 90-degree angle. A catheter was lubricated and then inserted into the rectum. A 3-minute run-in period was allowed for familiarization to give the patient time to relax and the sphincter tone to return to basal levels [12]. The test was carried out with a 60-second recovery interval between each maneuver. Each maneuver was performed 3 times. The following measurements were performed; (1) Anal resting pressure: the subject was instructed to relax and not to move in the left lateral position for 1 minute and anal resting pressure was measured. (2) Anal squeeze pressure: The subject was told to squeeze the anal canal as strongly as possible 3 times with a 60-second rest given between each squeeze. Anal squeeze pressure is an average of 3 maximum squeeze pressures. (3) Endurance squeeze pressure: This pressure was recorded by asking the subject to squeeze the anal canal as tight and long as possible. Hemorrhoid recurrence could be defined as persistent bleeding and/or prolapse at the site where LEONARDO laser management was performed [12].

Statistical Analysis

Qualitative data were represented in frequency and percentage and compared using the chi-square or Fisher's exact test. Quantitative data was represented using standard deviation. Comparison of quantitative data using a t-test to compare different groups, where $p < 0.05$ was considered significant.

RESULTS

In Table 1, in the present study, the number of female patients was higher than the number of male patients (240 vs 75), and the age for all patients ranged from 18 -65 years old. Body mass index for all patients was 31.6 ± 5 (kg/m^2). Defecation habit showed that 239 patients (76%) had mild problems with defecation whilst 76 patients (24%) had obstructive defecation syndrome (ODS). Physical activity was sedentary for

most patients as compared to active patients (82% vs 18%), and 83% were non-smokers. The grade of hemorrhoids was varied;14 patients had hemorrhoid at grade 1, 183 patients had hemorrhoids at grade 2, meanwhile 118 patients were at grade 3. The mean of resting anal tone was 76.9 ± 27 (mmHg), and the mean of maximum squeezing pressure was 177.8 ± 58 (mmHg); meanwhile maximum rectal threshold was 139.1 ± 26 (mmHg). The recurrence of hemorrhoids for all patients showed that 11% of the patients showed recurrence and 89% showed no recurrence.

Table (1): Anthropometric and manometric values for the patients

Parameter	N=315	Value
Gender	Male	75 (23%)
	Female	240 (77%)
Age (years)	42.52±14.5 (18-65)	
Body mass index (kg/m^2)	31.6±5 (19-40)	
Defecation habit	Mild problem	239 (76%)
	ODS	76 (24%)
Physical activity	Active	57 (18%)
	Sedentary	258 (82%)
Smoking status	Yes	54 (17%)
	No	261 (83%)
Hemorrhoid Grade	1	14 (4%)
	2	183 (58%)
	3	118 (37%)
Resting anal tone (mmHg)	76.9±27 (35-132)	
Maximum squeeze pressure (mmHg)	177.8±58 (129-339)	
Maximum rectal threshold (mmHg)	139.1±26 (112-210)	
Fate	Recurrence	37 (11%)
	No recurrence	279 (89%)

- The number of patients
- Numerical data was expressed as mean± standard deviation (min-max); meanwhile, categorical data was expressed as frequency (per cent).
- ODS: obstructive defecation syndrome
- The normal value of resting anal tone was 88-132 mmHg, the normal value of maximum squeeze pressure was less than 210 mmHg, the maximum rectal threshold was less than 115 mmHg,

Table (2) shows a significant relationship between the age and recurrence of hemorrhoids ($p < 0.05$), beside the recurrence showed an increase with the increase of age in which the age range from 18-24 years, the recurrence was 0%, this percentage was increased to 3% when the age range 25-45 years, moreover the recurrence became 34% at age range 45-65 years. The same table shows a significant relationship between the gender of the patients and the recurrence of the hemorrhoids, with the recurrence in females more than males (30% vs 7%), respectively. Defecation habits showed a significant relationship when compared between defecation habit and recurrence of

hemorrhoids, in this table it has been seen that the patients with obstructive defecation syndrome (ODS) were higher as compared with patients with mild habit problems (39% vs 4%). The patients' body mass index shows no significant relationship compared to recurrence (p>0.05). Smoking and physical activity showed no significant relationships with hemorrhoid recurrence (*p >0.05*).

Table (2): The relationships between different anthropometric parameters and the recurrence of hemorrhoids

			Recurrence	No Recurrence	*P-value*
Age (years)	18-24	20.6±1.5	0 (0%)	24 (100%)	1.06
	25-45	37.6±5.8	3 (3%)	114 (97%)	
	45-65	55.7±7.1	34 (20%)	140 (80%)	
gender	male	75	7 (9%)	68 (91%)	2.52
	female	240	30 (12%)	210 (88%)	
Defecation habit	mild	237	9 (4%)	230 (96%)	5.29
	ODS	78	30 (39%)	46 (61%)	
Body mass index (kg/m^2)	19-24	23.4±1.1	5 (10%)	44 (90%)	0.129
	25-29	25.5±1.3	8 (12%)	60 (88%)	
	30-34	33.4±1.2	9 (10%)	81 (90%)	
	35-40	35.4±0.8	15 (14%)	93 (86%)	
Smoking status	yes	50	8 (16%)	42 (84%)	0.26
	no	265	30 (11%)	235 (89%)	
Physical activity	Active	57	8 (14%)	49 (86%)	0.404
	sedentary	258	48 (19%)	210 (81%)	

- The number of patients
- Numerical data was expressed as mean± standard deviation; meanwhile, categorical data was expressed as frequency(percent).
- ODS: obstructive defecation syndrome

Table (3), shows a significant relationship between the grade of the hemorrhoids and their recurrence of it (p<0.05), beside it has been seen that recurrence increased with the increase of grade value, at the same time there is a significant relationship between the recurrence of hemorrhoids and resting anal tone, maximum rectal threshold (p <0.05). Patients with abnormal rectal threshold were higher than patients with a normal rectal threshold (13 % vs 2%). In the same table, in spite of the fact that there is no significant relationship between maximum squeezing pressure and the recurrence of hemorrhoids, the percentage of patients with abnormal maximal squeezing pressure is higher than the percentage of normal (34% vs 2%).

Table (3): The relationships between different manometric parameters and recurrence of hemorrhoids

			Recurrence	No Recurrence	P-value
grade	1	14	0 (0%)	14 (100%)	3.94
	2	183	17 (9%)	166 (91%)	
	3	118	21 (18%)	97 (82%)	
Resting anal tone Normal tone range(88-132mmHg)	Normal tone	105.1±14.9	13 (11%)	108 (89%)	1.77
	Abnormal tone	59.6±16.1	24 (12%)	170 (88%)	
Maximum squeeze pressure Normal range (less than 210 mmHg)	Normal pressure	148.3±13.3	4 (2%)	237 (98%)	0.3444
	Abnormal pressure	284±19.6	25 (34%)	49 (66%)	
Maximum rectal threshold Normal range (less than 115 mmHg)	Normal threshold	111.65±1.6	1 (2%)	40 (98%)	0.028
	Abnormal threshold	142.9±6.9	36 (13%)	237 (87%)	

- Number of patients
- Numerical data was expressed as mean± standard deviation, meanwhile categorical data was expressed as frequency(percent).
- The normal value of resting anal tone was 88-132 mmHg, the normal value of maximum squeeze pressure was less than 210 mmHg, the maximum rectal threshold was less than 115 mmHg,

DISCUSSION

Hemorrhoids are common diseases that sometimes require surgical interventions; about 10% of hemorrhoid cases need to be removed or treated by surgical interventions. Most cases of hemorrhoids are symptomatic but about 4.4% are asymptomatic [13]. Medical and/or surgical interventions for hemorrhoids depend majorly on hemorrhoid prolapse degree and its location. Generally, when the hemorrhoids reach advanced grade III, or IV hemorrhoids, surgical excision is recommended [14,15]. Recurrence is a major problem associated with hemorrhoids in which patients' remission after treatments or surgery is sometimes followed by unexplained relapse [16].

In Table 2, the effect of gender as a risk factor for hemorrhoid recurrence showed that the recurrence in females was higher as compared to males after LEONARDO laser surgery. No previous study focused on the effect of gender on the recurrence of hemorrhoids after LEONARDO LASER therapy, but studies have been done on people with conventional surgery for hemorrhoidectomy; those studies showed that the recurrence in males is higher than in females [17].

In the present study, it was found that the age of patients plays a vital role in the recurrence of hemorrhoids after LEONARDO surgery, in which there is a direct relationship between age and recurrence of hemorrhoids. This finding in LEONARDO laser surgery agrees with a previous study in which increasing age had a direct influence on recurrence after conventional surgery [18].

Defecation habits play an important role

as a risk factor in the recurrence of hemorrhoids. In the present study, there was a significant relationship between defecation habit and recurrence of hemorrhoids after LEONARDO hemorrhoidectomy. This finding completely agreed with previous studies in which poor defecation habits were correlated with high risk of relapse after hemorrhoidectomy of conventional surgery, and this was accompanied by increased age of patients, as seen in the present study. The description of defecation habits is very complicated because many factors (even psychological factors) affect it. So, the ODS severity index is used to evaluate patient defecation habits [19].

ODS has different clinical signs like uneasily evacuated motion, abdominal strain, frequent use of laxatives or an enema to defecate, feelings of incomplete evacuation, perineal pain, and rectal discomfort [20].

In the present study, neither smoking nor physical activity showed a significant relationship as compared to recurrence after LEONARDO hemorrhoidectomy, this finding completely disagreed with another study in which authors found that smoking and a sedentary lifestyle increased the incidence of hemorrhoid recurrence after conventional hemorrhoid surgery but not laser hemorrhoidectomy [21]. Generally, physical activity increases blood circulation all over the body and increases blood circulation in the abdominal region with an increase in bowel movements, which in turn decreases the incidence of hemorrhoids, improves remission, and decreases recurrence and vice versa. Exercise, including walking, swimming, and any exercise that increases the strength of abdominal muscles, had beneficial effects. BMI had no significant relationship as compared to the recurrence of hemorrhoids after laser hemorrhoidectomy; this finding was counteracted by another study in which their finding was based on conventional surgery rather than laser hemorrhoidectomy in which they found that increasing BMI and body fat caused an increasing recurrence of hemorrhoids, some pathophysiologic mechanisms such as increased intra-abdominal pressure, venous congestion, and chronic inflammation have been hypothesized to contribute to hemorrhoidal disease development in the obese patients [22].

In the present study, maximum anal tone and maximum rectal threshold show a significant relationship when compared to recurrent hemorrhoids after laser hemorrhoidectomy. This study also showed that the differences in the recurrence between normal and abnormal anal tone are very low but the abnormally high rectal threshold is associated with higher recurrence rate than the normal rectal threshold patients regarding recurrence after hemorrhoidectomy. This finding is in line with a previous study in which the abnormal anal tone and the abnormal rectal threshold being higher than normal is correlated to recurrence of hemorrhoids after conventional hemorrhoid surgery [23].

CONCLUSIONS

The present study conclusively demonstrates that defecation habits, alongside factors like gender and age, play an important role in the recurrence of hemorrhoids post-hemorrhoidectomy. Patients with obstructive defecation syndrome exhibit a notably higher incidence of relapse following the LEONARDO laser technique for hemorrhoidectomy. This finding is critical, as it correlates with lower patient satisfaction regarding laser treatment. These results

underscore the need for a more tailored approach to treating haemorrhoids, considering individual defecation patterns, especially in cases of obstructive defecation syndrome, to effectively manage and reduce the likelihood of recurrence post-surgery.

Recommendations

Furthermore, detailed trials focusing on minimally invasive laser techniques success rates and factors that decrease relapse.

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العوامل التنبؤية لعودة ظهور البواسير بعد استئصالها باستخدام تقنية الليزر ليوناردو

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الملخص

الخلفية والاهداف: تهدف هذه الدراسة إلى التحقيق في تأثير العديد من العوامل، بما في ذلك عادات التبرز، العمر، الجنس، والسمنة، على عودة ظهور البواسير بعد العلاج بتقنية الليزر ليوناردو. البواسير هي حالة شائعة في منطقة الشرج والمستقيم، وغالبًا ما تتطلب التدخل العلاجي الذي يتراوح بين العلاج التحفظي والإجراءات الجراحية. يرتبط استئصال البواسير التقليدي بألم ما بعد الجراحة ونسبة عالية من عودة ظهور البواسير، بينما تعد تقنية الليزر ليوناردو بديلاً أكثر أمانًا وأقل توغلاً.

منهجية الدراسة: تم إجراء تحليل شامل على المرضى الذين خضعوا لعملية استئصال البواسير باستخدام تقنية الليزر ليوناردو. ركزت الدراسة على تقييم تأثير العديد من عوامل الخطر، مثل عادات التبرز (مع التركيز بشكل خاص على متلازمة التبرز الانسدادي)، العمر، الجنس، والسمنة، على عودة ظهور البواسير. تم جمع البيانات على مدار فترة متابعة استمرت لمدة عامين بعد الجراحة.

النتائج: أظهرت النتائج وجود علاقة كبيرة بين بعض عادات التبرز، وخاصة متلازمة التبرز الانسدادي، وزيادة نسبة عودة ظهور البواسير، خاصة لدى المريضات الأكبر سناً. كما لوحظ أن عوامل أخرى مثل العمر، الجنس، والسمنة كان لها دور في معدلات عودة ظهور البواسير، رغم أن تأثير عادات التبرز كان أكثر وضوحاً.

الاستنتاجات: تسلط نتائج هذه الدراسة الضوء على الأهمية الكبيرة لمراعاة أنماط التبرز الفردية، وخاصة متلازمة التبرز الانسدادي، في إدارة وتوقع عودة ظهور البواسير بعد العلاج بتقنية الليزر ليوناردو. يمكن أن تساعد هذه النتائج الأطباء في تخصيص الرعاية ما بعد الجراحة وتقديم التوجيه المناسب للمرضى لتقليل معدلات عودة البواسير وتحسين النتائج الصحية للمرضى.

الكلمات الدالة: عادات التبرز، البواسير، تقنية ليوناردو، متلازمة التبرز الانسدادي