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Article

Examining Complications and Success Rates of Laser Fistula Surgery: An Evidence-Based Approach

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Abstract: The study investigates the effectiveness of laser fistula removal surgery by analyzing its complications and success rates. Despite being a common procedure, there remains a knowledge gap regarding its comprehensive clinical outcomes. A cross-sectional study was conducted on 93 patients who underwent this surgery in various hospitals in Iraq from April 2022 to August 2023. Data on operative times, complications, recovery, and patient satisfaction were collected and analyzed. The findings revealed that the procedure had a high success rate of 90.32%, with minimal complications such as infections (6.45%) and recurrences (2.15%). These results imply that laser fistula removal surgery is a highly effective and safe treatment option that significantly enhances patients' postoperative quality of life and satisfaction, suggesting its broader application in clinical practice.

Keywords: laser fistulectomy, types of anal fistula, complications, quality of life scale

1. Introduction

A health issue known as fistulas has existed since antiquity. Hippocrates, a 460–370 BC Greek physician, described using a cutting seton composed of horsehair and performing a fistulotomy to cure an anal fistula [1]. Surgeons have always had a problem in treating this illness [2–5]. Anterior fistulas in women, which have undergone many surgical procedures, those that do not have a cryptoglandular origin, along with those whose surgical technique necessitates sectioning more than 30% of the lower sphincter apparatus, are all considered complex anal fistulas [6,7,4,8].

Acquiring accurate statistics in the prevalence for anal abscesses is a difficult task. The difficulty can be caused by a variety of causes, two of which are considered extremely significant [9]. First, a significant number of cases end on their own without the need of medical attention [10]. Second, many of diseases are identified and dealt with at the office but are never documented or reported [11].

In most cases of cryptoglandular origin, anorectal fistula (ARF) is the chronic phase of the anorectal abscess [12,13]. When anorectal abscesses have a cryptoglandular origin, they are categorized as primary or nonspecific; when they are linked to other diseases,

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which include but not limited to Crohn's disease, tuberculosis, trauma, prior anorectal surgery, anal as well as rectal cancer, radiation, lymphomas, leukemias, and other causes, they are classified as secondary or specific [14].

Between 90 and 97% of anorectal abscesses are caused by cryptoglandular genesis. Trauma, foreign body accumulation, or fecal matter buildup can all cause obstructions in anal crypts [13, 15]. The path that fistulas take through these areas and their interaction with the anal sphincters are used to categorize them. Parks' categorization system is the one that is used most often in clinical settings [16].

The main symptom is pain, that typically feels like a stabbing and can be so intense that it is impairing [17]. Activities like sitting, walking, coughing, or sneezing may make it worse. In certain instances, a painfully inflamed region may appear along with localized hyperemia and hyperthermia. Fever, rectorrhagia, and transanal suppuration were possible more signs [18]. Unless there are concomitant conditions like diabetes or immunosuppressive states, the overall condition is unaffected. Fournier's gangrene, that can endanger the patient's life, has the potential to occur in these people due to the quick and catastrophic progression of the condition. The most common complaint in situations in which a fistula has already formed is the existence of one or more holes on the anal opening's perimeter through which purulent discharge occasionally or periodically flows [19]. Seldom are gases or feces released via these openings during defecation. Feces and secretions irritate the skin and cause irritation. Usually, the pain is not severe, but if there is some branching and no free drainage, it might get more and more uncomfortable with time. A recurrence of anorectal abscess-like symptoms and signs occurs when the perianal secondary orifices were likewise closed [20].

2. Patients and Methods

This study evaluated the clinical outcomes of laser fistula removal surgery in patients treated at various hospitals in Iraq from April 2022 to August 2023. A cross-sectional design was employed, involving 93 patients who underwent the procedure. Patients' demographic data, including age, sex, body mass index (BMI), comorbidities, smoking status, previous surgeries, and employment and income status, were collected retrospectively. Preoperative assessments involved thorough anorectal examinations, confirmed under sedation, and imaging techniques such as MRI and ultrasound to evaluate the fistula's characteristics. During surgery, all colorectal surgeons adhered to a standardized laser fistulectomy protocol, with individual discretion allowed for the speed of laser retraction.

The primary endpoint was the successful closure of the fistula tract, defined by the absence of leakage, complete symptom relief, and primary healing. Secondary endpoints included the incidence of postoperative complications, such as infections, fecal incontinence, and pain, which were monitored during follow-up visits at ten days, two months, five months, and ten months post-surgery. Pain levels were measured using a visual analog scale (VAS), and patient quality of life was assessed in terms of physical, psychological, social, and daily activity aspects. Statistical analyses were conducted to evaluate the outcomes, with a focus on operative time, intraoperative bleeding, ICU admissions, hospital stay length, and overall success rates. This comprehensive approach ensured a robust evaluation of the effectiveness and safety of laser fistula removal surgery, contributing valuable insights into its clinical application and patient benefits.

3. Results

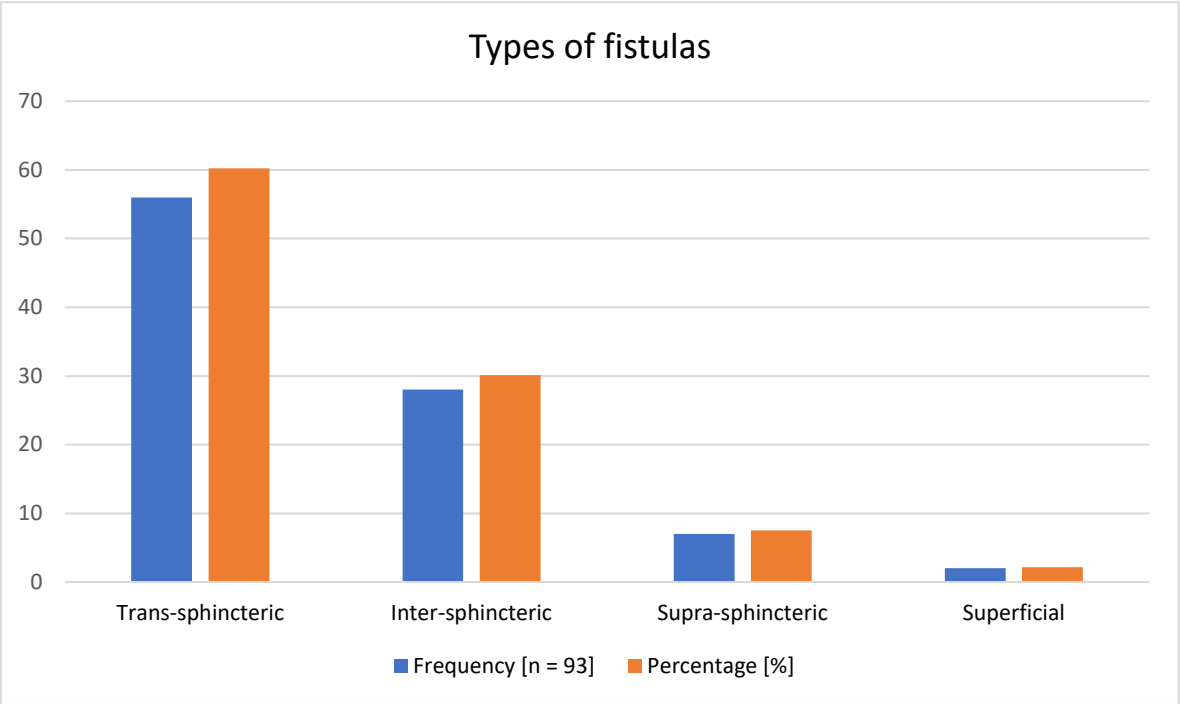
Table 1. Demographic and preoperative data of patients

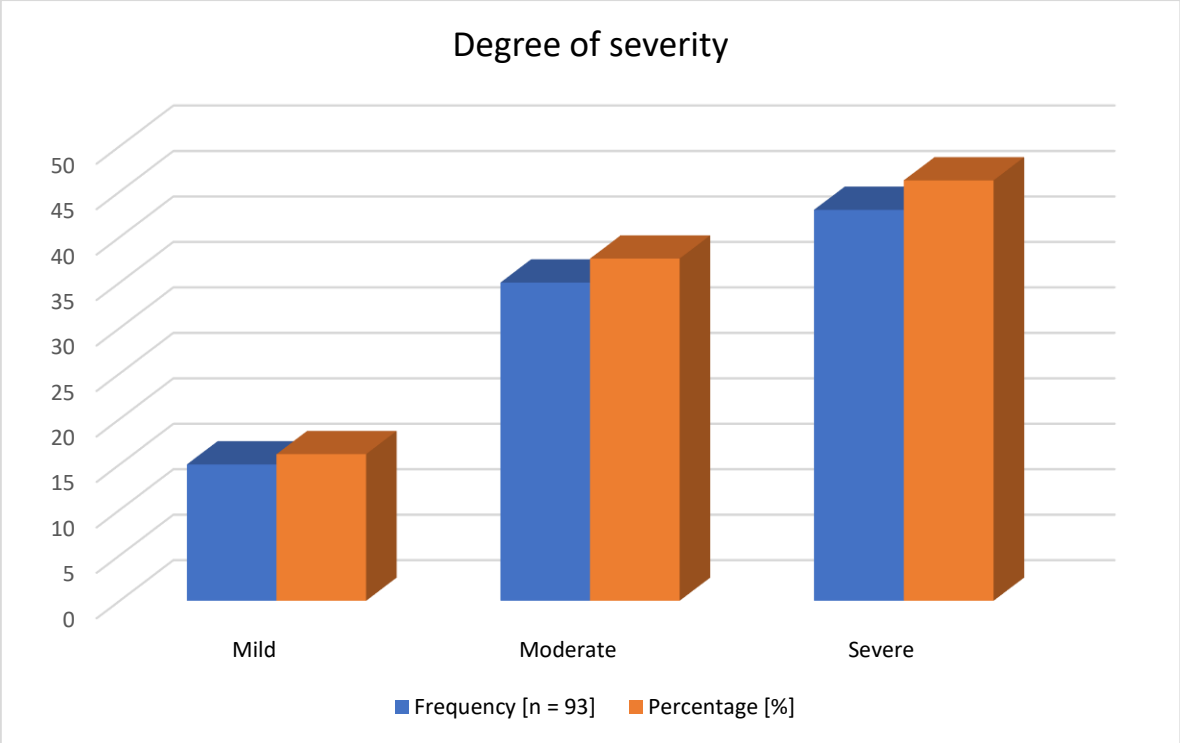
Features	**Frequency [n = 93]**	**Percentage [%]**
Age		
20 – 30	40	43.01%
31 – 40	30	32.26%
41 - 50	23	24.73%
Gender		
Male	57	61.29%
Female	36	38.71%
BMI, Kg/m2		
< 29.5	23	24.73%
≥ 29.5	70	75.27%
Medication used		
Yes	34	36.56%
No	59	63.44%
Previous surgery		
Yes	36	38.71%
No	57	61.29%
Comorbidities		
Yes	63	67.74%
No	30	32.26%
Hypertension	58	62.37%
Diabetes	33	35.48%
Anemia	9	9.68%
Kidney diseases	14	15.05%
Smoking		
Yes	35	37.63%
No	58	62.37%

Fistula		
Recurrent fistula	80	86.02%
Primary fistula	13	13.98%
Employment status		
Employed	63	67.74%
Un – employed	30	32.26%
Income status, $		
< 830	45	48.39%
830 - 1020	36	38.71%
> 1020	12	12.90%

Table 2. Identify laboratory findings of patients who underwent laser Fistula Surgery

Items	**Laser Group**
WBC (x109/L)	13.4 ± 1.2
Hemoglobin (g/dL)	12.6 ± 0.9
Platelets (x109/L)	246.78 ± 32.15
Blood glucose level (mg/dL)	93.88 ± 15.20


Types of fistulas
70
60
50
40
30
20
10
0
Trans-sphincteric
Inter-sphincteric
Supra-sphincteric
Superficial
Frequency [n = 93]
Percentage [%]


Degree of severity
50
45
40
35
30
25
20
15
10
5
0
Mild
Moderate
Severe
Frequency [n = 93]
Percentage [%]

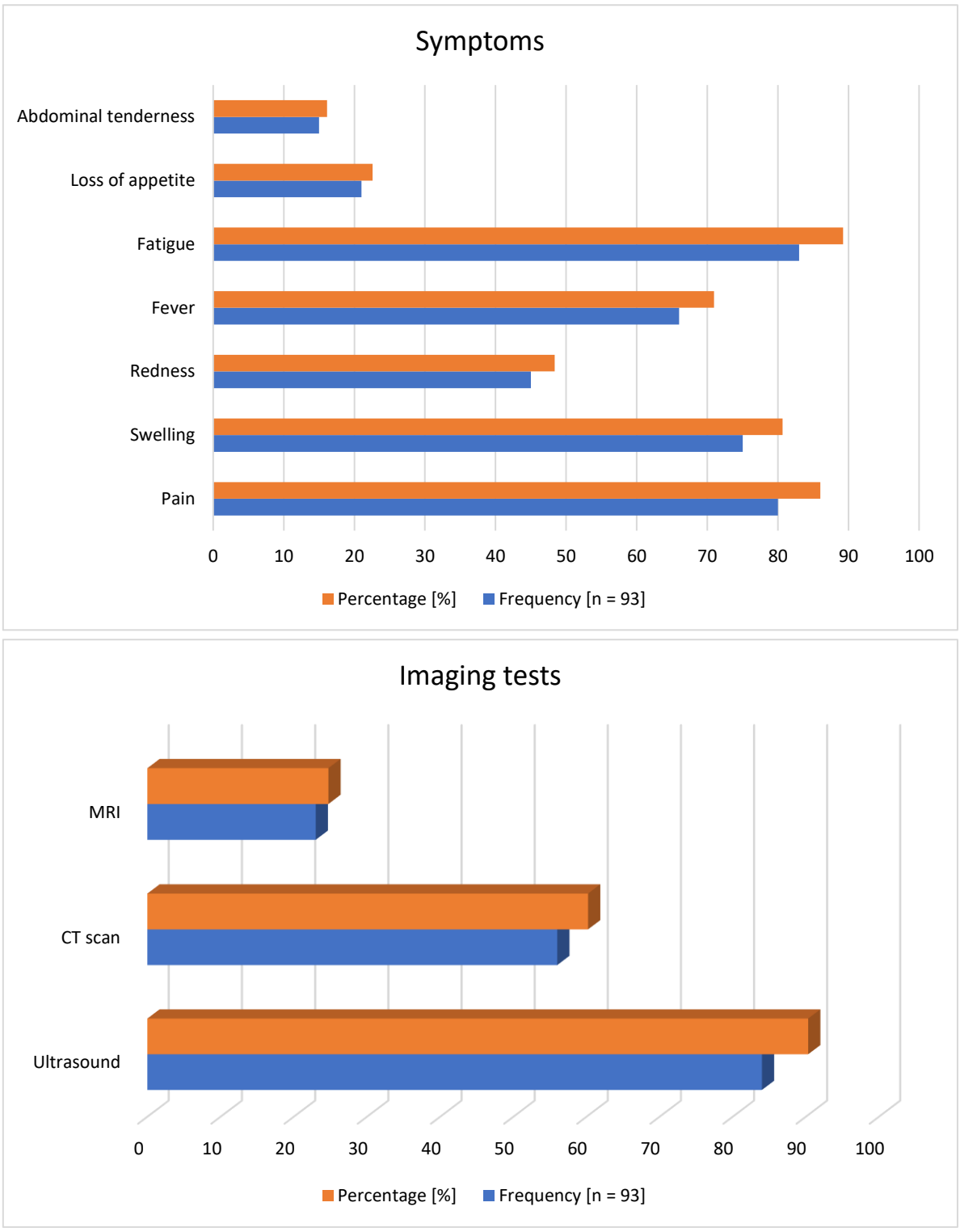


Figure 1. Determining patients' data who were diagnosed in the hospital

Table 3. Enrol operative outcomes of patients who underwent laser Fistula Surgery

Variables	**Frequency [n = 93]**	**Percentage [%]**
Operative time, min	1.58 ± 0.42	
Intraoperative bleeding		
Yes	4	4.30%
No	89	95.70%
Blood loss, mL	89.26 ± 15.95	
ICU admission		
Yes	1	1.08%
No	92	98.92%
Length of stay in hospital, days	2.73 ± 0.25	
Success rate %		
Excellent	84	90.32%
Good	7	7.53%
Bad	2	2.15%
Mortality rate		
Yes	0	0%
No	93	100%
Complications		
Yes	12	12.90%
No	81	87.10%
Infection	6	6.45%
Bleeding	3	3.23%

Fistula recurrence	2	2.15%
Pain	0	0%
Urinary retention	1	1.08%
Difficulty passing stool	0	0%

Table 4. Assessment of pain level of patients after laser Fistula Surgery by VAS scale during follow–up at ten days, two months, five months, and ten months

Follow–up time	**Pain scores**
Ten days	3.68 ± 0.52
Two months	2.16 ± 0.17
Five months	1.57 ± 0.03
Ten months	0.62 ± 0.02

Table 5. Assessment of general health of patients in terms of severity of fistula recurrence and quality of life in the patients after laser Fistula Surgery

Items	**Number of patients [n = 93]**	**Percentage [%]**
Severity of fistula recurrence, N [%]		
None	85	91.40%
Mild	5	5.38%
Moderate	2	2.15%
Severe	1	1.08%
Overall quality of life (mean ± SD)		
Physical aspect	94.39 ± 2.56	
Psychological aspect	88.29 ± 1.55	
Social and emotional aspects	87.75 ± 4.44	

Dailly activity	92.28 ± 5.24

4. Discussion

According to an American study, treating fistulas can be challenging due to their intricate anatomy, relationship to sphincters, as well as potential complications including incontinence and recurrence [21]. Although certain surgical methods can reduce the risk of recurrence, others may increase the risk in incontinence. Surgeons operating on fistulas require a thorough understanding about the region's anatomical along with physiological structure and have experience with the procedure [22].

According to another investigation, the primary goal of treatment is to repair the fistula while minimizing harm to the sphincter muscles that are connected to it. Due to this raises the risk of incontinence, aggressive surgical approaches may decrease an opportunity of recurrence, but surgeons must be highly skilled in fistula surgery and have a firm understanding of the anatomical and physiological makeup of the area. Fistula surgery works through impacting the synthesis of ATP (adenosine triphosphate), improving the production of proteins, and modulating cytokines, which assures the closure of the lumen using diode laser power [23]. Research indicates that the previously mentioned method is a successful way of accomplishing complete lumen closure without injuring the sphincter muscles, which will ultimately result in the lumen's occlusion and shrinking [24]. Because of this, its hits don't penetrate deeper than 2-3 mm into the tissue, which lowers the possibility of perforations or harm, especially to the sphincter muscles. As a result, there is little danger of it becoming loose since the muscles that support the fistula tract are intact [25].

The laser ablation approach entails closing the internal hole with a flap or main suture, cleaning the canal using brushes and mechanical instruments, and removing the exterior incision for drainage [26]. Although certain studies have mentioned the closing of the internal hole, others have not discovered it. Anal fistulas are responding favorably with laser ablation treatment, particularly when further intervention is used [27]. Wilhelm et al.'s study showed that the first cure rate of success in laser ablation treatment remained at 64.1%.

However, this number increased to 85% with secondary laser therapy as well as recurred intervention. This data supports the hypothesis that laser ablation therapy might be a good first treatment choice for people with anal fistulas [28]. Bakhtawar and Usman identified many risk factors for recurrence, including the fistula's architecture, the surgeon's expertise level, using the incorrect technique, and receiving insufficient postoperative care as well as follow-up [29].

5. Conclusion

The study concludes that laser fistula removal surgery is a highly effective and safe treatment for anal fistulas, demonstrating a high success rate of 90.32% and low complication rates, including infections (6.45%) and fistula recurrence (2.15%). These findings highlight the procedure's significant benefits in enhancing patients' postoperative quality of life, pain management, and overall satisfaction. The study implies that laser fistula removal surgery should be considered a preferred treatment option in clinical practice. However, further research is warranted to explore long-term outcomes and optimize surgical techniques to further reduce complications and improve success rates.

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