Surg. Gastroenterol. Oncol. 2026;31(1):14-22 DOI: 10.21614/sgo-859

Impact of Seton Fistulectomy versus Laser Fistulectomy on Quality of Life

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ABSTRACT

Objective: This randomized clinical open-label study compares the impact of Seton fistulectomy and Laser fistulectomy on patients' quality of life (QoL) and continence in patients with cryptoglandular anal fistula (AF), using the Short Form-36 Quality of Life, fecal incontinence quality of life (SF-36, FIQL) questionnaire, and Wexner continence score.
Patients and Methods: Fifty patients, aged 18–65 years, with primary or recurrent cryptoglandular AF underwent surgical interventions, including Seton fistulectomy and Laser fistulectomy. Postoperative QoL and continence scores were collected at 1 week, 1, 3, and 6 months postoperatively and compared between the two groups. They were used to assess the impact of both surgical techniques on outcomes.
Results: Significant improvements in QoL were observed at all postoperative time points, with laser fistulectomy showing greater improvements (average QoL change of 83.00) than seton placement (55.00). The Postoperative continence scores also showed significant improvements, but weak correlations were found between continence and QoL scores.
Conclusion: In patients with cryptoglandular anal fistula, laser fistulectomy provides superior early postoperative recovery, including less pain, shorter hospitalization, and faster return to work. In contrast, seton placement is associated with better long-term outcomes, including lower recurrence and higher complete-healing rates. To validate these results, more research with larger sample sizes is required.
Keywords: Anal fistula, laser fistulectomy, continence, quality of life.

INTRODUCTION

Anal fistula is a chronic and often debilitating condition characterized by an abnormal connection between the anal canal and perianal skin. It commonly arises after anorectal abscesses and can cause persistent pain, discharge, and recurrent infections (1).

Because of its recurrent nature and discomfort, effective surgical management is essential not only for resolving the disease but also for restoring a patient's functional wellbeing. The choice of surgical technique significantly influences postoperative outcomes and long-term quality of life (2).

Traditionally, the seton fistulectomy has been a widely used method for treating complex anal fistulas. By placing a seton through the fistula tract, the procedure aims to gradually cut through infected tissue while preserving sphincter integrity (3).

Received: 22.01.2026
Accepted: 13.03.2026

Although effective, seton placement may be associated with prolonged healing time, persistent discomfort, and ongoing drainage, all of which can affect daily activities. These limitations have prompted interest in newer, less invasive alternatives (4).

Laser fistulectomy has emerged as a minimally invasive option that uses radially emitting laser energy to ablate the fistula tract. This technique is designed to minimize tissue damage, reduce postoperative pain, and allow quicker functional recovery. With quicker returns to regular activity and shorter hospital stays, laser therapy has gained popularity, especially among patients seeking less disruptive treatment options (5).

Given the significant differences in invasiveness, healing characteristics, and patient experience between the two procedures, a comparative evaluation is necessary (6). Clinical outcomes such as recurrence rates and complication profiles are important, but patients often place equal or greater value on comfort, ease of recovery, and preservation of continence. Consequently, quality of life has become a central focus in determining the overall effectiveness of fistula treatments.

Therefore, this trial aims to compare the impact of Seton fistulectomy and Laser fistulectomy on patients' quality of life.

PATIENTS AND TECHNIQUES

Study Context

This randomized, open-label clinical study was conducted on 50 patients diagnosed with cryptoglandular anal fistula requiring surgical intervention at Alkarnak International Hospital in Egypt between June 2024 & June 2025, following approval by the Research Ethics Committee of Alkarnak International Hospital (Approval No. Lux med-071225-104).

Study Population

After fulfilling the inclusion criteria, 50 patients, regardless of gender, with confirmed cryptoglandular anal fistulas were included in this study. Patients were treated in a stepwise manner, starting with MRI fistulograph and then moving on to elective surgery.

Methods

Inclusion criteria

- Age from 18 to 65 years.
- Both sexes.
- Diagnosed with cryptoglandular anal fistula requiring surgical intervention.
- Patients are eligible for either Seton fistulectomy or Laser fistulectomy based on clinical evaluation.

Exclusion criteria

- Patients with Crohn's disease, tuberculosis, or malignancy-related fistulas.
- Pregnant or lactating women.
- A multiple-branched fistula was proven in the MRI fistulograph.
- Patients with severe comorbidities contra-indicate surgery.
- Individuals unwilling or unable to complete follow-up assessments.
- Patients with multiple-branched anal fistulas.

Randomization and Blindness

An online randomization program (http://www.randomizer.org) was used to generate a random list, and each patient's code was kept in an opaque sealed envelope. Patients were divided into two groups in parallel at random using a 1:1 allocation ratio: Group A (n=25) (Seton Fistulectomy Group): Patients underwent a conventional surgical technique (seton placement). Group B (n=25) (Laser Fistulectomy Group): Patients underwent Laser fistulectomy using a 1470 nm radial-emitting laser fiber. The laser was operated in continuous mode with a power setting of 10–12 W. The fiber was introduced along the fistula tract and withdrawn slowly at a controlled speed of ~2 mm/s. A total energy of 200–350 Joules was delivered with a linear endo-fistula energy density (LEED) of ~100 J/cm. This study was open-label due to the different techniques used.

All patients were subjected to the following:

1) Demographic data collection (age, sex).
2) Routine Labor history taking and dermatological investigations:
   - Complete Blood Count (CBC), virology, INR, liver function tests, and renal chemistry.
3) Clinical Assessment
   - Physical examination
   - Fistulas were classified according to the Parks classification system into intersphincteric, transsphincteric, suprasphincteric, and extrasphincteric types based on MRI findings and operative assessment.
   - Preoperative investigations, including MRI or endoanal ultrasound if needed.
4) Quality-of-Life Assessment
   - Validated instruments will estimate quality of life:

- SF-36 Quality of Life Questionnaire (general health) (7).
- Fecal Incontinence Quality of Life Scale (FIQL) if continence is affected (8).
- Visual Analog Scale (VAS) for postoperative pain (9).
- Wexner Continence Score for sphincter function (10).

Interventions

Seton Fistulectomy Procedure

In group A, patients will undergo seton fistulectomy under either regional (spinal) or general anesthesia, depending on patient suitability and surgeon preference. After proper positioning-usually lithotomy or prone jack-knife-the external opening of the fistula is identified. A gentle probing instrument is inserted through the external opening to trace and confirm the path of the fistula tract toward the internal opening located inside the anal canal.

Once the tract is clearly defined, a seton material (commonly silk, rubber band, or a specially designed cutting seton) is threaded through the tract. The seton is then tied externally, creating a loop. The purpose of the seton is to allow gradual, controlled cutting through infected tissue while minimizing damage to the anal sphincter muscle.

When a cutting seton is used, the surgeon tightens it periodically during follow-up visits. Each tightening applies incremental pressure that slowly divides the tract and induces fibrosis behind the cut, thereby maintaining sphincter continuity. Over several weeks, the tract gradually transects and eventually heals with minimal risk of incontinence.

Laser fistulectomy procedure

In group B, patients will undergo Laser fistulectomy using a 1470 nm radial-emitting diode laser fiber, which targets water-rich tissue in the fistula tract while preserving surrounding sphincter structures. After administering regional or general anesthesia, the patient is positioned appropriately. The fistula tract is gently curetted to remove debris, granulation tissue, and epithelial lining. This prepares a clean channel for effective laser ablation.

- The laser fiber is inserted into the full length of the fistula tract, beginning at the external opening and extending to the internal opening. Laser energy is then delivered in a controlled manner while the surgeon slowly withdraws the fiber. This technique uniformly distributes energy circumferentially, causing the tract walls to coagulate, collapse, and seal without physically cutting tissue.

A cutting seton (silk) was used. The seton was tightened at weekly intervals during outpatient follow-up until gradual tract division was achieved.

Pain Intensity (VAS Score)

Pain was measured using the Visual Analog Scale (VAS), a validated tool ranging from 0 to 10: (0 = no pain, 10 = worst imaginable pain).

Patients were shown a straight 10-cm line and asked to mark the point that best represented their pain level at rest and during defecation. The distance from the zero point was recorded in centimeters and documented in the patient's follow-up record.

Postoperative Follow-Up

- Participants were evaluated at 1 week, 1 month, 3 months, and 6 months after surgery. Each follow-up visit included both clinical examination and patient-reported outcome assessments, performed as follows:

Wound healing and discharge

Wound healing will be evaluated through physical examination by the attending surgeon:

- Inspection of the surgical site for signs of granulation tissue, epithelialization, and closure of the tract.
- Assessment for the presence and amount of serous, purulent, or bloody discharge.
- Noting any signs of local infection, such as redness, warmth, swelling, or tenderness.
- In seton cases, additional evaluation of seton tension or need for adjustment may be performed.
- Healing was categorized as complete, partial, or delayed based on standard postoperative criteria.

Continence Level (Wexner Score)

The Wexner Continence Score was used to evaluate sphincter function. Patients answered a structured questionnaire covering:

- Frequency of incontinence to gas.
- Incontinence of liquid stool.
- Incontinence of solid stool.
- Need for pads.
- Lifestyle alterations due to incontinence.

Each item is scored from 0 (never) to 4 (always). Total scores range from 0 (perfect continence) to 20 (complete incontinence).

Quality-of-Life Scores (SF-36, FIQL)

Two validated questionnaires measured quality of life:

A. SF-36 (Short Form-36 Health Survey)

Patients will complete a self-administered questionnaire covering eight domains:

- Physical functioning.
- Role limitations (physical).
- Role limitations (emotional).
- Vitality.
- Mental health.
- Social functioning.
- Pain.
- General health perception.

Each domain is scored from 0 to 100, with higher scores indicating better quality of life.

B. FIQL
(Fecal Incontinence Quality of Life Scale)

This questionnaire assesses the quality of life specifically affected by incontinence:

- Lifestyle.
- Coping/behavior.
- Depression/self-perception.
- Embarrassment.

Each section uses a Likert-type scale, and scores were calculated according to the standard FIQL scoring manual.

Ethical Consideration

The ethical committee of the faculty of medicine at Luxor University endorsed the examination. An official consent letter was obtained from the authorities. Every member is a volunteer. Following a thorough explanation of the study's purpose and assurances of confidentiality, all participants signed a written consent form.

Sample Size Calculation

The sample size calculation was done by G*Power 3.1.9.2 (Universitat Kiel, Germany). We performed a pilot study (5 cases in each group), and we found that the mean (± SD) of fecal incontinence quality of life scale was 3.7 ± 0.26 in laser surgery group and 3.32 ± 0.43 in seton placement group. The sample size was based on the following considerations: 1.13 effect size, 95% confidence limit, 95% power of the study, group ratio 1:1, and three cases were added to each group to overcome dropout. Therefore, we recruited 25 patients in each group.

Statistical Analysis

Statistical analysis was done by SPSS v26 (IBM Inc., Chicago, IL, USA). The Shapiro-Wilk test and histograms were used to evaluate the normality of the data distribution. Quantitative parametric variables were displayed as mean and standard deviation (SD) and compared between the two groups using an unpaired Student's t-test. Quantitative nonparametric data were displayed as median and interquartile range (IQR) and will be analyzed using the Mann-Whitney test. Qualitative variables were displayed as frequencies and percentages and analyzed using the Chi-square test or Fisher's exact test. A two-tailed P value ≤ 0.05 was considered statistically significant.

RESULTS

In a randomized, open-label clinical study, 62 patients were assessed for eligibility; 8 did not meet the criteria, and 4 refused to participate. The remaining patients were randomly divided into two equal groups (25 patients in each). All allocated patients were followed up and analyzed statistically (*fig. 1*).

The mean ± SD value of age was 49.27 ± 11.79. The majority of the patients were males (80%), while 10 (20%) were females. Intersphincteric fistulas were the most prevalent form (76%). Regarding fistula presentation, it was a primary in 45 (90%) patients and recurrent in 5 (10%) patients (*table 1*).

Table 1 - Distribution of demographic data in the studied cases

	(n=50)
Age (years)	49.27 ± 11.97
Sex	
Male	40 (80%)
Female	10 (20%)
Type of fistula	
Intersphincteric	38 (76%)
Transsphencteric	8 (16%)
Suprasphincteric	4 (8%)
Site of external opening	
6 o'clock	30 (60%)
12 o'clock	12 (24%)
3 and 9 o'clock	8 (16%)
Type of presentation	
Primary presentation	45 (90%)
Recurrent presentation	5 (10%)

Data are represented as mean ± SD or frequency (%).

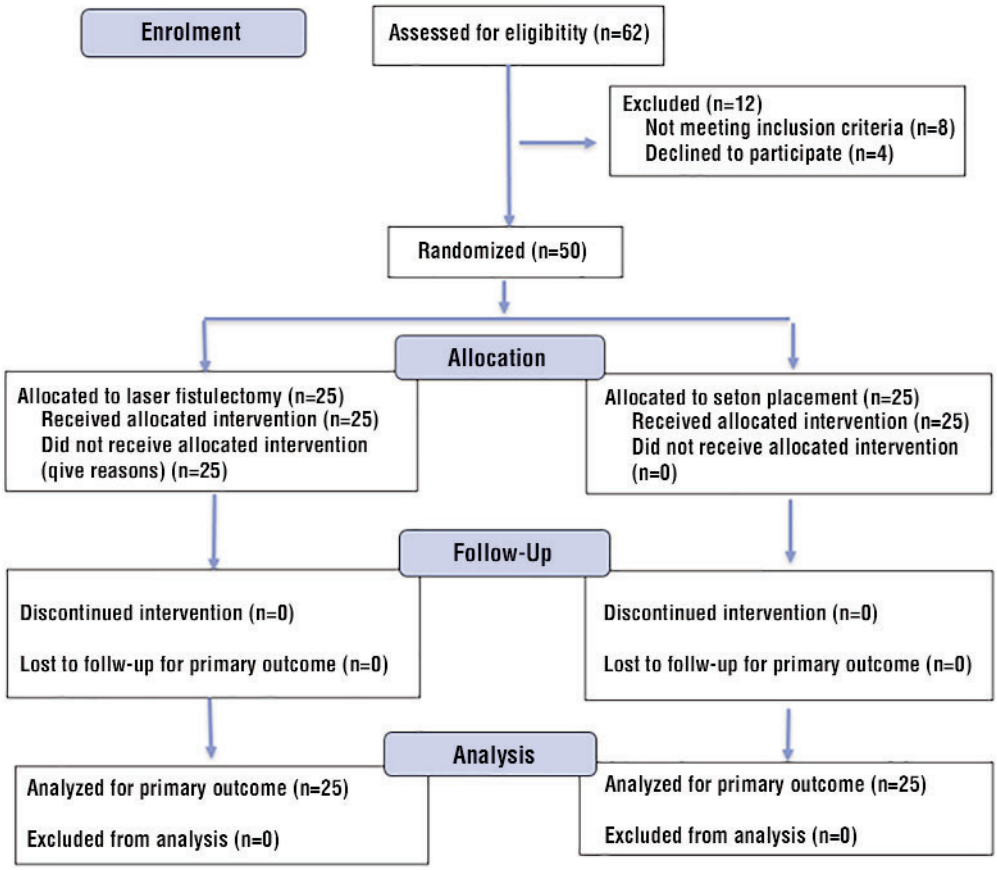

Figure 1 - CONSORT Flow Diagram of the study

Baseline SF-36, FIQL, and Wexner scores were comparable between the laser surgery and seton placement groups, with no statistically significant differences observed (*table 2)*.

Postoperative pain, hospital stay, and return to work were better in patients treated with the laser technique than in those treated with seton placement, as shown in *table 3*.

Healing Outcomes

At three months postoperatively, complete healing

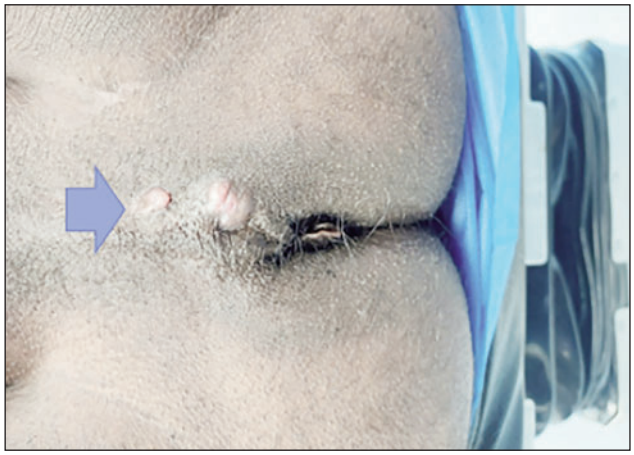

Figure 2 - External opening of perianal fistula in one of our studied patients (blue arrow)

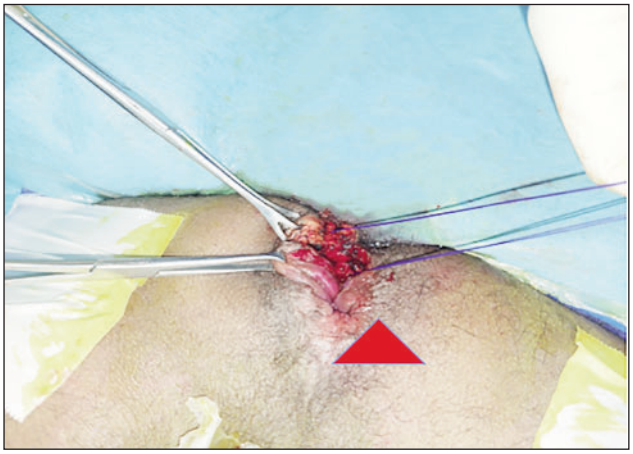

Figure 3 - Intraoperative photograph, seton placement in intersphincteric fistula in one of our studied patients(red triangle)

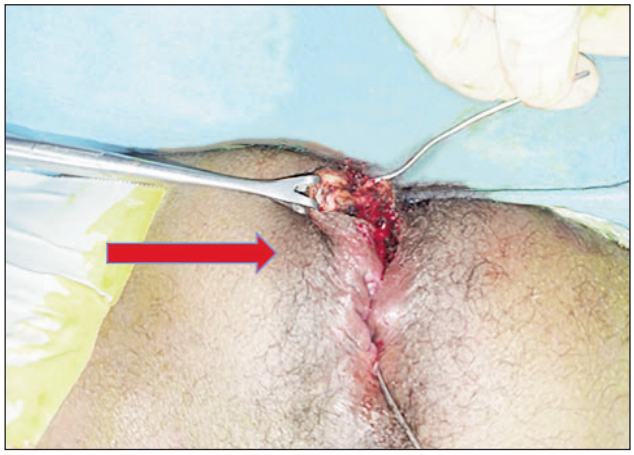

Figure 4 - Intraoperative photograph of probe insertion during tracking of trans-sphencteric fistula in one of our studied patients(red arrow)

was observed in 22 (88%) patients in the seton placement group and 20 (80%) patients in the laser surgery group. Although this difference did not reach significance (p = 0.702), it suggests a clinically meaningful trend favoring seton placement – likely attributable to more thorough tract excision and lower rates of residual disease.

Wound Infection

The frequency of wound infection was notably lower in the laser group (2/25, 8%) than in the seton placement group (9/32, 28%). This difference reached statistical significance (p = 0.037) and supports the minimally invasive nature of laser treatment in reducing postoperative morbidity.

Anal Incontinence

No cases of anal incontinence were reported in the laser surgery group (0 patients), whereas two (8%) patients in the seton placement group experienced mild fecal incontinence. Although this difference was not statistically significant (p = 0.489), it remains notable given its potential impact on patients' quality of life.

Anal Stenosis

No cases Anal stenosis were reported in the laser surgery group, and one (4%) patient reported in the surgery group. Although this difference was not statistically significant (p= 1), it underscores the tissue-preserving advantage of laser treatment.

Table 2 - Baseline comparison of SF-36, FIQL, and Wexner scores in the studied patients

	Laser surgery (n=25)	Seton placement (n=25)	p value
SF-36 total score	53.08 ± 5.96	51.72 ± 6.33	0.438
FIQL score	2.88 ± 0.33	2.8 ± 0.82	0.652
Wexner score	9.6 ± 2.38	10.12 ± 0.88	0.311

*: Significantly as p value ≤ 0.05. The tests used were the Chi-squared test and the unpaired t-test.

Table 3 - Primary endpoints among the studied cases

Primary outcomes	Laser fistulectomy (n=25)	Seton placement (n=25)	p value
Mild pain (VAS 1-3)	18 (72%)	8 (32%)	0.005
Hospital stay (days)	1.5 ± 0.5	2.8 ± 1.2	<0.001
Return to work (days)	4.96 ± 0.91	9.96 ± 0.74	<0.001

Data are represented as mean ± SD or frequency (%). VAS: Visual Analog Scale. The tests used were the Chi-squared test and the unpaired t-test.

Table 4 - Secondary outcome in the studied patients

	Laser surgery (n=25)	Seton placement (n=25)	p value
Healing within 3 months	20(80%)	22(88%)	0.702
Wound infection	2(8%)	9(28%)	0.037*
Incontinence	0(0%)	2(8%)	0.489
Anal stenosis	0(0%)	1(4%)	1
Recurrence rate	5(20%)	2(8%)	0.417

*: Significantly as p value ≤ 0.05. The test used was Fisher's Exact Test.

Recurrence Rate

Recurrence occurred in 5 (20%) patients in the laser surgery group and 2 (8%) in the seton placement group. While the difference approached statistical significance (p= 0.417), the trend suggests a higher likelihood of recurrence following laser treatment, possibly due to limited excisional clearance of complex tracts (*table 4)*.

Quality of Life Assessment

Regarding quality-of-life scores, psychological wellbeing, physical health, and social wellbeing were significantly higher in the laser surgery group than in the seton surgery group, whereas body pain ratings were markedly lower in the laser surgery group than in the seton surgery group (p<0.001) (*table 5)*.

Wexner score measurements were notably lower in the laser surgery group compared with the seton surgery group (p < 0.001) (*table 6)*.

Table 5: Descriptive analysis of quality of life in the studied patients (n=50)

	Laser surgery (n=25)	Seton surgery (n=25)	p value
Psychological wellbeing	85(80 - 90)	54(52 - 57)	<0.001*
Physical health	86(77 - 90)	52(48 - 55)	<0.001*
Social wellbeing	81(79 - 87)	50(46 - 53)	<0.001*
Body pain rating	51(46 - 57)	83(76 - 86)	<0.001*

Data are presented as median (IQR). The test used was the Kruskal-Wallis Test.

Table 6 - Analysis of incontinence score (Wexner score) between the two studied groups

	Laser surgery (n=25)	Seton placement (n=25)	p value
1 week	8.04±1.65	11.92±1.8	<0.001*
1 month	6.12±1.05	10±1.76	<0.001*
3 months	3.56±1.42	7.08±1.22	<0.001*
6 months	1.88±1.48	4.88±1.01	<0.001*

Data are presented as mean ± SD. Test used was the unpaired t-test.

Table 7 - Analysis of the fecal incontinence quality of life scale between the two studied groups

	Laser surgery (n=25)	Seton placement (n=25)	p value
Life style	3.6(3.3 - 4)	2.8(2.6 - 3.7)	<0.001*
Coping	3.7(3.3 - 4)	2.7(2.6 - 3.7)	<0.001*
Depression	3.7(3.6 - 4)	2.9(2.6 - 3.8)	0.006*
Embrassment	3.6(3.3 - 4)	3.1(2.7 - 3.4)	<0.001*

Data are presented as median (IQR). The test used was the Kruskal–Wallis Test.

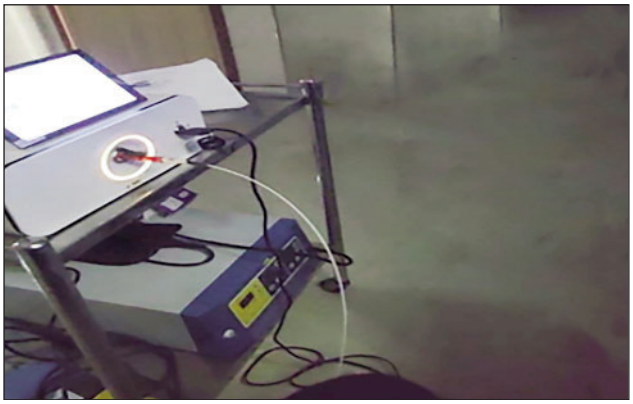

Figure 5 - Laser equipment and laser fiber used in our study

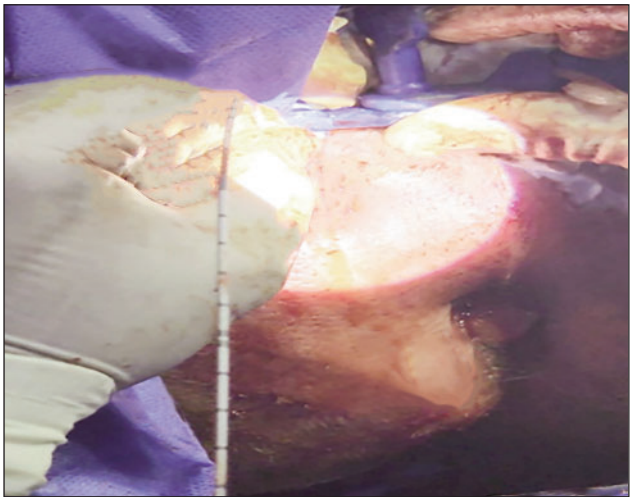

Figure 6 - Intraoperative photograph of laser anal fistula ablation in one of our studied cases

Fecal incontinence quality of life scale, including lifestyle, coping, depression, and embarrassment, was significantly higher in the laser surgery group than the seton surgery group ($p < 0.05$) (*table 7)*.

DISCUSSION

AF is one of the most common anal conditions in which the patient persistently suffers from pain and perianal discharge, which makes the patient's QoL impaired. Different methods have evolved to describe this effect; however, most commonly used tools were nonspecific for AF.

Ferrer-Marquez and colleagues developed an AF-specific questionnaire to assess the impact of AF. It is not surprising that AF, as a disease, affects QoL; furthermore, its surgery may improve or worsen this impact. Some authors correlated the patient's QoL with incontinence, while others did not. This study aimed to compare the impact of Seton fistulectomy and Laser fistulectomy on patients' quality of life using the validated QoL-AF questionnaire and continence scores (11-14).

Our study revealed that patients in the laser group experienced significantly less postoperative pain, with 72% reporting mild pain (VAS 1–3) compared with 32% in the seton group, shorter hospital stay, and an earlier return to work, indicating reduced short-term morbidity and faster functional recovery. This came in line with Hashim et al. (15), who reported a lower post-operative pain score in the laser group compared with seton placement in patients who underwent perianal fistula. Also, Patel et al. found that the laser group showed significant advantages in postoperative pain, with 35 patients (70%) reporting only mild pain, compared with 15 patients (30%) in the open surgery group ($p<0.01$). Hospital stay was shorter in the laser group (1.5 ± 0.5 days) compared to the open group (3.8 ± 1.2 days; $p<0.001$), and return to normal activity

was quicker (4.96 ± 0.91 vs. 9.96 ± 0.74 days; p<0.001).

In the present study, recurrence was observed in 5 patients (20%) undergoing laser surgery, compared with 2 patients (8%) in the seton placement group. Earlier studies reported more favorable results for laser-based interventions. This is supported by Hashim et al. (15), who reported a higher recurrence rate in the laser group (30.5%) compared with the seton placement group (4.4%) in patients undergoing perianal fistula surgery.

Tümer et al. (16) demonstrated better healing times and reduced postoperative morbidity with laser techniques. Lalhruaizela et al. (17) also noted favorable outcomes using endofistula laser ablation in low-complexity tracts. These reports underline the benefit of laser in early recovery phases, especially in simple fistulas.

However, anatomical complexity significantly influences surgical outcomes. The classification proposed by Parks et al. (18) remains a reliable framework for stratifying fistula types and guiding treatment strategies. In our study, laser treatment failed to achieve adequate control in complex presentations, likely because it is limited in its ability to address secondary tracts and associated abscesses. This is agreed with Sluckin et al. (19) who, in a multicenter retrospective study, found no significant advantage of laser fistulectomy over conventional methods, particularly in transsphincteric and suprasphincteric tracts.

First, a significant improvement in QoL was observed postoperatively, with patients showing marked improvements at all follow-up points (1 week, 1, 3, and 6 months).

The Kruskal–Wallis Test demonstrated statistically significant improvement in QoL scores.

These results suggest that endoscopic laser interventions for cryptoglandular AF have a profound and sustained positive impact on patient QoL, highlighting the importance of timely and effective surgical treatment, which coincides with the data reported by Kristo et al. (20), who reported significant improvement in the patients with loose seton, and Litta et al. (13), who observed substantial improvement of QoL following laser fistulectomy.

Continence scores, as measured by the Wexner and FIQL scales, also showed non-statistically significant improvements postoperatively between the two studied groups, which may be related to improvements in soiling and a decrease in the number of pads, which worsen incontinence scores.

However, weak statistical correlations between continence and QoL scores suggest that, while continence is an important outcome, it may not be the sole determinant of patient-reported QoL. Other factors, such as pain, discomfort, and postoperative complications, may contribute more significantly to patients' perceptions of their health and recovery.

CONCLUSION

In patients with cryptoglandular anal fistula, laser fistulectomy was associated with significantly improved early postoperative outcomes, including reduced pain, shorter hospital stay, and earlier return to work when compared with seton placement. However, these advantages were offset by less favorable definitive outcomes, as evidenced by a higher recurrence rate and a lower complete-healing rate in the laser group. Accordingly, while laser fistulectomy offers clear benefits in short-term recovery, seton placement remains associated with superior long-term healing outcomes.

Limitations of the Study

This study is limited by its relatively small sample size, short follow-up period, and single-center design, which may restrict the generalizability of the findings. Laser Fistulectomy is more effective than seton placement in improving QoL postoperatively. Further studies with larger sample sizes, including more patients who underwent endoscopic laser surgery, may be required to validate these findings, particularly regarding the impact of fistula type and presentation on long-term outcomes.

Conflicts of Interest

The researcher assert that he has no conflict of interest.

Sources of Funding

No specific grants were awarded to support the current investigation.

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