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RESEARCH

Assessing quality of life in anal fistula patients after Seton placement using different knot types: Randomized controlled trial

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Abstract

Purpose Perianal fistula is a common disease that significantly affects the quality of life of patients. Several treatment options are available; loose seton is one of the most popular options. Aim of this study was to evaluate the relationships between quality of life and different types of knots used during the application of anal fistula.

Methods Patients who presented with anal fistulas between 2021 and 2024 were included in this study. Patients were divided into 3 groups on the basis of the type of knot used for treatment. In group A, the seton ends were tied in the alpha configuration. In group B, a ring-like seton with overlapping ends was used. In group C, a knotless seton was applied. All patients completed the quality of life assessment with the Anal Fistula Questionnaire at 15, 30, and 90 days after surgery.

Results Sixty-three patients were randomized. A total of 52 men were included. Median age was 43 years. Three patients in group C and five patients in group B experienced complications, including abscess, anal pain, loss of seton, and second fistula. Physical and mental component scores revealed that postoperative quality of life was similar among the three groups.

Conclusion No differences in postoperative quality of life among groups were observed at 15, 30, or 90 days after surgery. Physical and mental component scores of quality of life in patients in Anal Fistula Questionnaire revealed that quality of life improved over time in all three groups.

Clinical trial registration The study was registered at ClinicalTrials.gov (Study ID: NCT05348473, date: 04/29/2022).

Keywords Anal fistula · Questionnaire · Validation · QoLAF-Q

Introduction

Perianal fistula is a very common disease with an overall incidence of 1.69 per 10,000 people in Europe [1]. Perianal fistulas significantly affect quality of life (QoL). The mean incidence of nonspecific fistulas is 8.6 per 100,000 people [2]. Another purpose of seton placement is to increase the success of future operations, such as ligation of the intersphincteric fistula tract (LIFT), laser ablation of the fistula tract (LAFT) and the endorectal advancement flap. Seton placement for 3−6 months before the placement of these surgical methods increases the treatment success rate [3, 4]. The aim of treatment is to create a dry fistula tract and minimize patient's symptoms. Cutting setons generally have more detrimental effect because of the associated pain and discomfort. In contrast, loose setons, especially those constructed from flexible materials, provide more favorable balance between therapeutic efficacy and patient comfort. The ESCP's 2023 recommendation indicates that loose setons may serve as a long-term solution for patients with complex, recurrent fistulas and those at risk of incontinence from invasive procedures [5]. QoL is an important factor in this process. The aim of this study was to investigate the effects of three different seton knot techniques on QoL and perianal comfort.

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Materials and methods

Patients and surgery

This prospective randomized controlled trial was conducted at Ankara University Faculty of Medicine between 2021 and 2024. This randomized controlled trial was reported in accordance with the CONSORT 2025 guidelines. The completed checklist is provided as supplementary material. (ESM-1) Diagnosis was made on the basis of preoperative MRI or examination under anesthesia. Regarding the ESCP guideline recommending MRI in patients with complex fistulas, we planned MRI in cases that were clinically suspected to be complex. Complex anal fistulas are high transsphincteric, suprasphincteric, or extrasphincteric fistulas involving more than 30% of the external sphincter or 50% of the internal sphincter for ESCP guideline [5]. We did not find it necessary to obtain MRI in patients who we were sure had an absolutely transsphincteric fistula during examination. There were Seventy-two patients eligible for the study initially. Nine patients excluded from the study. Three patients had low and one patient had intersphincteric fistula, two patients had Crohn's disease, and two patients had a history of anal surgery. And last patient declined to participate. Sixty-three patients who underwent surgery after being diagnosed with high transsphincteric fistulas were included in the study (Fig. 1). The study was evaluated in accordance with the intention to treat principle. Fistulotomy was not feasible for 63 patients due to their high risk of incontinence and being designated as highly transsphincteric. Patients were allocated into three groups (21 patients per group) via block randomization. Randomization was performed using computer-generated block randomization with a block size of six. Allocation was done openly according to the randomized process. Although the allocation process was open to the investigators, patients were blind to their group during the study. Age, sex, body mass index (BMI) and smoking status were recorded. Imaging results, initial symptoms, primary complaints, and the presence of perianal abscesses at baseline were meticulously documented via a personalized data collection form. Informed consent was obtained from all patients before

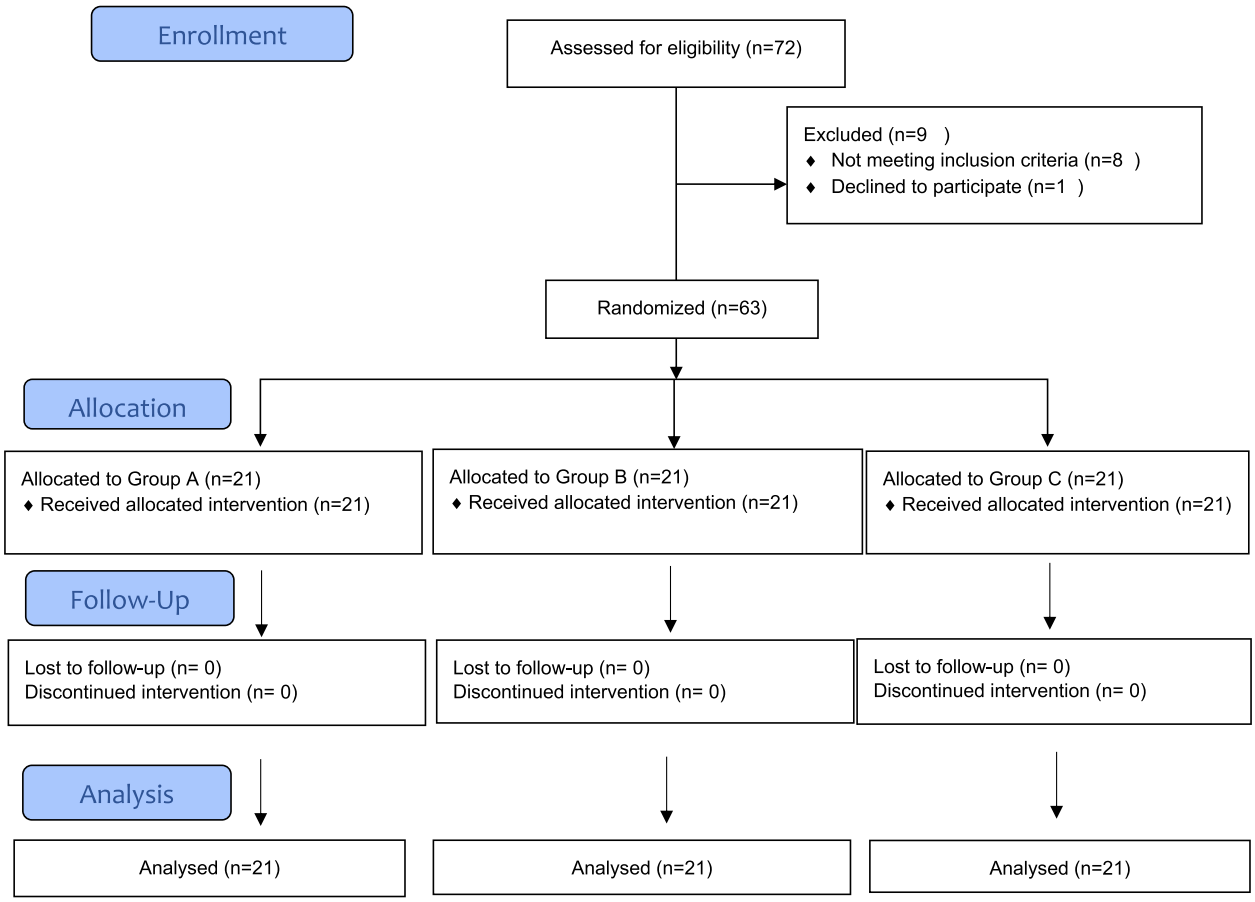


Fig. 1 Flowchart. There was no patient loss during the follow-up and analysis phase

surgery. The QoL in Patients with Anal Fistula Questionnaire (QoLAF-Q) was administered at 15, 30, and 90 days after surgeryIn group A, the seton ends were tied in the alpha configuration, and 2–0 silk suture material was used to knot the seton (Fig. 2). In group B, a ring-like seton with overlapping ends was used, and 2–0 silk suture material was used to knot the seton (Fig. 3). In group C, a knotless seton (SuperSeton® (MediShield B.V. Delft, Netherlands)) was applied (Fig. 4). Setons in all groups are manufactured from medical grade silicone. The setons used in groups A and B are vascular loops that are commonly used.



Fig. 2 Group A: Alpha-configuration knot applied using a blue silicone seton. In group A, the seton ends were tied in the alpha configuration

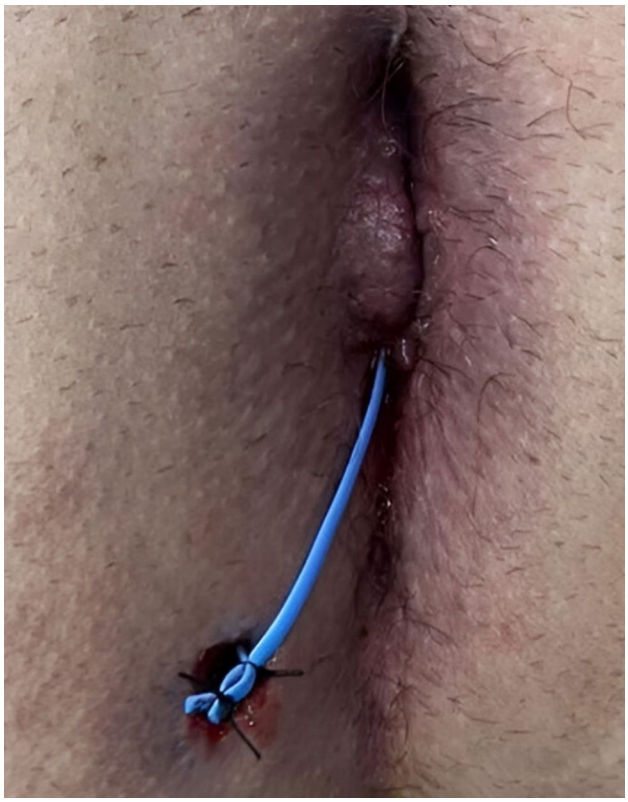


Fig. 3 Group B: Ring-like overlapping knot configuration. In group B, a ring-like seton with overlapping ends was used



Fig. 4 Group C: Knotless silicone seton. In group C, a knotless seton was applied

Ethics approval

Ethical approval for this study was obtained from the Ethics Committee of Ankara University Faculty of Medicine (Approval Code: İ6–417–21). All participants provided written informed consent before enrollment. The study was conducted in accordance with the Declaration of Helsinki.. The study was registered at ClinicalTrials.gov (Study ID: NCT05348473, date: 04/29/2022).

Inclusion and exclusion criteria

Inclusion criteria were as follows: at least 18 years of age and cryptoglandular, high transsphincteric anal fistulas. Exclusion criteria were as follows: Crohn's disease; previous perianal surgery; radiotherapy to the anal area; presence of incontinence and anal cancer; low transsphincteric fistulas feasible to treatment with fistulotomy; or intersphincteric, suprasphincteric, extrasphincteric, anovaginal fistulas.

Primary and secondary endpoints

The primary endpoint was to evaluate the QoL among the 3 groups at 15, 30 and 90 days after surgery. Throughout the intervals between the designated days, patients did not receive any additional medical or surgical interventions. Surgery was only performed on patients who developed a subsequent fistula or abscess. Patients with loss of seton during follow-up had similar seton knots from the same group applied. The secondary endpoints were the presence of reabscesses, secondary fistulas, treatment methods applied after surgery (fistulotomy, LIFT, LAFT, and reseton methods), operation time and presence of incontinence.

Statistical analysis

The study assumed a 10% dropout rate. To ensure adequate precision, the researchers aimed to obtain 25% more PCS score data. Based on a 5% significance level (type I error), 80% power, and an expected standard deviation of 10 points, the required sample size was calculated as 63 participants—21 patients in each group. [6]. The data were analyzed via SPSS 11.5 software. Descriptive statistics are presented as the mean ± standard deviation [median (minimum–maximum)] for continuous variables and as frequency (percentage) for categorical variables. Comparisons between categorical variables were conducted via the chi-square test, and comparisons between continuous variables were conducted via one-way analysis of variance. For repeated

evaluations of time-dependent changes across the groups, repeated-measures analysis of variance was employed. Threshold for statistical significance was $p < 0,05$.

Questionnaires

QoLAF-Q

There are several questionnaires to evaluate QoL for anal fistula. Ferrer-Márquez et al. and Tozer et al. have developed scores to assess the QoL in patients with cryptoglandular anal fistula [7, 8]. The Qolaf-Q, developed by Márquez et al., was chosen since it has been validated for the Turkish population [9].

On the basis of the principle that each disease should have its own score, the QoLAF-Q, which is specific to anal fistulas, was used herein. The QoLAF-Q includes 14 questions, including 7 questions about physical components and 7 questions about mental components. The QoLAF-Q was administered at 15, 30, and 90 days after surgery.

Jorge-Wexner Incontinence Score (JWIS)

The Jorge–Wexner Incontinence Score is the most straightforward and commonly used measure of incontinence. The questionnaire consists of five questions: three questions about anal incontinence (gas, liquid, and solid), one question about coping mechanisms (pad wear), and one question about lifestyle (alteration). Respondents were instructed to rate the frequency of stool loss, the frequency of use of coping behavior, and the frequency of lifestyle alterations on a score ranging from 0 to 4 (0 = never, 1 = rarely, 2 = sometimes, 3 = usually, 4 = always). Total score of the instrument ranges from 0 (no incontinence) to 20 (complete incontinence). Sufficient continence is indicated by scores of 8 and below. In this study, the JWIS was used to assess the incidence of anal incontinence. The JWIS has been validated in Turkish by Çam et al. [10], who reported a Cronbach's alpha coefficient of 0.816, thus confirming the reliability of this questionnaire in Turkish. Patients completed the JWIS at 15, 30, and 90 days after surgery. Additionally, all participants completed the JWIS before surgery; no cases of fecal incontinence were detected.

Results

Group A included 19 males, group B included 16 males, and group C included 17 males. Overall, the sample included 11 females and 52 males. The average ages were 42.7 ± 12.4 years for Group A, 43.7 ± 13.4 years for Group B, and 43.4 ± 12.7 years for Group C. The average BMI was 27.8 ± 5 kg/m^2 for Group A, 27.2 ± 5.6 kg/m^2 for Group B, and 27.9 ± 3.8 kg/m2 for Group C, thus yielding an average BMI of 27.6 kg/m^2 for the entire sample. There were no significant differences in age or BMI between the groups ($p > 0,05$). Among the 63 patients, 34 did not use tobacco. There was also no significant difference in tobacco use between the groups ($p > 0,05$) (Table 1).

Table 1 Demographic and descriptive data

Variables	A, n (%)	B, n (%)	C, n (%)	*P* value
n:	21	21	21	
Sex				
Male	19 (90.5)	16 (76.2)	17 (81)	–
Female	2 (9.5)	5 (23.8)	4 (19)	–
Age, mean ± SD	42.7 ± 12.4	43.7 ± 13.4	43.4 ± 12.7	0.968
BMI, mean ± SD	27.8 ± 5	27.2 ± 5.6	27.9 ± 3.8	0.892
Preoperative imaging	12 (57.1)	11 (52.4)	8 (38.1)	0.438
Smoking	11 (52.4)	9 (42.9)	9 (42.9)	0.774
Distance between fistula external opening and anal verge, mean ± SD	1.9 ± 0.5	2.2 ± 0.6	2.3 ± 0.9	0.197
Average duration of surgery	11.3	10.6	10.1	
Symptoms at admission				
Abscess	11 (52.4)	7 (33.3)	7 (33.3)	–
Discharge	8 (38.1)	12 (57.1)	14 (66.7)	–
Pain	1 (4.8)	1 (4.8)	0 (0)	–
Bleeding	1 (4.8)	1 (4.8)	0 (0)	–

Data are frequencies and percentages

n: Patient Number

SD: Standard Deviation

BMI: Body Mass Index

Preoperatively, MRI records were available for 12 patients in group A, 11 in group B, and 8 in group C. The distance between the anal verge and the external opening was measured for all patients, with averages of 1.9 ± 0.5 cm for group A, 2.2 ± 0.6 cm for group B, and 2.3 ± 0.9 cm for group C. The average duration of surgery was 11.3 min for group A, 10.6 min for group B, and 10.1 min for group C; there was no significant difference between the groups ($p > 0{,}05$). The main symptoms in all groups were abscess, discharge, pain, and bleeding (Table 1).

During the three-month follow-up period while the patients were awaiting second-stage surgery, there were no complications in group A; in group B, 3 patients developed secondary abscesses, and 2 patients developed a second fistula; and in group C, the seton spontaneously dislodged in 2 patients, while 1 patient experienced severe pain (Table 2). Patients who developed abscesses underwent drainage, and a similar seton was placed according to allocated group. An extra seton was placed in those who had a separate fistula tract. Similar setons from the same group were applied to patients with seton loss. One patient with intermittent pain in the C group underwent fistulotomy after three months of medical treatment.

Patients underwent surgery at various times following the first 3-month follow-up period. These surgeries constitute the final treatment method for some patients after repeated seton revisions. The final status of the patients was recorded at the end of the first year. Accordingly, In group A, 3 patients still had seton, 17 patients underwent fistulotomy, and 1 patient underwent LIFT. In group B, 7 patients had seton, 12 patients underwent fistulotomy, 1 patient underwent LIFT, and 1 patient underwent LAFT. In group C, 2 patients had seton, 15 patients underwent fistulotomy, 3 patients underwent LIFT, and 1 patient underwent LAFT (Table 3). At the end of one year, 12 patients still had setons. Eleven of the 12 patients were continued with seton because they were not found suitable for operations such as fistulotomy, LIFT, LAFT or flap. The last patient continued on seton due to a heart attack throughout the follow-up period. Postoperative continence status was assessed via the JWIS. Patients were assessed preoperatively and at 6 months postsurgery. No patient had anal incontinence before surgery. At the 6th month, there were 61 patients with scores of 8 or below, and the average JWIS was 1.2 (Table 4). JWIS score was 9 in 2 patients. Mean JWIS score at the end of the 6th month was 0.8 in group A, 2.09 in group B, and 0.7 in group C. Additionally, no significant difference in continence score was observed between patients who received different types of seton knots.

Table 2 Complications

Parameter	Group A	Group B	Group C	*p*-value
Number of patients (n)	21	21	21	–
Abscess	0 (0%)	3 (14%)	0 (0%)	0.12
Second fistula	0 (0%)	2 (10%)	0 (0%)	0.24
Loss of seton	0 (0%)	0 (0%)	2 (9.5%)	0.21
Severe anal pain	0 (0%)	0 (0%)	1 (4.8%)	0.33
Patients with ≥ 1 complication	0 (0%)	5 (24%)	3 (14%)	0.09

n: Patient Number

Table 3 Second-stage surgery

Groups	A, n(%)	B, n(%)	C, n(%)	A + B + C n(%)
n	21	21	21	63
Fistulotomy	17 (80.9)	12 (57.1)	15 (71.4)	44 (69,8)
Re-seton	3 (14.3)	7 (33.3)	2 (9.5)	12 (19)
LIFT	1 (4,8)	1 (4,8)	3 (14.3)	5 (7,9)
LAFT	–	1 (4,8)	1 (4,8)	2 (3,3)

LIFT: Ligation of the intersphincteric fistula tract

LAFT: Laser ablation of fistula tract

n: Patient Number

Postoperative questionnaires were administered three times for all patients: at 15, 30, and 90 days after surgery. The Physical Component Summary (PCS) and Mental Component Summary (MCS) scores significantly changed across the three different time points in all groups ($p < 0{,}001$ for both the PCS and the MCS) (Table 5). Repeated-measures ANOVA further confirmed that both PCS and MCS scores significantly improved over time within each group ($p < 0.001$), indicating progressive postoperative recovery, although intergroup differences remained statistically insignificant.

As the mean QoLAF-Q score increased, the individual's discomfort also increased. Therefore, lower QoLAF-Q scores indicate higher QoL. There was no significant difference in the MCS score between the groups. The MCS scores on the 15th postoperative day were 12.27 ± 4.9 for Group A, 13.27 ± 6 for Group B, and 11.34 ± 3.6 for Group C ($p = 0{,}45$). At 30 days after surgery, the MCS scores were 9.53 ± 3.9 for Group A, 11.00 ± 5.1 for Group B, and 10.98 ± 4.3 for Group C ($p = 0{,}48$). At 90 days after surgery, the MCS scores were 8.91 ± 3.5 for Group A, 10.49 ± 4.5 for Group B, and 10.01 ± 3.9 for Group C ($p = 0{,}42$) (Table 5).

The PCS and MCS scores revealed that patients in all three groups had improved QoL at the end of the three-month period. However, no significant difference in QoL was found between the groups. There were no significant differences in PCS scores between the groups. In the first month, the difference in PCS scores between group A and group C was marginally significant ($p = 0, 08$). On the 15th day after surgery, the PCS scores were 9.37 ± 2 in group A, 9.85 ± 2.6 in group B, and 9.82 ± 2.3 in group C ($p = 0{,}76$). At 30 days after surgery, the PCS scores were 8.04 ± 1.7 in

Table 4 Wexner score

Patients	≤8			>8			JWIS (Mean)
(*n* = 63)	A	B	C	A	B	C	
Days							
Preoperative	21	21	21	0	0	0	–
6th month	21	19	21	0	2	0	1.2

n: Patient Number

JWIS: Jorge Wexner Incontinence Score

Table 5 PCS and MCS

Parameter	Group A	Group B	Group C	Total	*p*-value
QoLAF-Q Physical Component Score (PCS)					
15 days	9.37 ± 2	9.85 ± 2.6	9.82 ± 2.3	9.68 ± 2.3	0.76
30 days	8.04 ± 1.7	8.54 ± 1.8	9.28 ± 1.7	8.62 ± 1.8	0.08
90 days	7.63 ± 1.2	8.19 ± 1.4	7.96 ± 1.6	7.93 ± 1.4	0.44
QoLAF-Q Mental Component Score (MCS)					
15 days	12.27 ± 4.9	13.27 ± 6	11.34 ± 3.6	12.29 ± 4.9	0.45
30 days	9.53 ± 3.9	11.00 ± 5.1	10.98 ± 4.3	10.5 ± 4.4	0.48
90 days	8.91 ± 3.5	10.49 ± 4.5	10.01 ± 3.9	9.81 ± 3.9	0.42

group A, 8.54 ± 1.8 in group B, and 9.28 ± 1.7 in group C ($p = 0{,}08$). At 90 days after surgery, the PCS scores were 7.63 ± 1.2 in group A, 8.19 ± 1.4 in group B, and 7.96 ± 1.6 in group C ($p = 0{,}44$) (Table 5).

Discussion

Currently, there is no consensus regarding the optimal approach for treating anal fistulas because of their complex anatomy. Removing the entire fistula tract is crucial, but it is important not to compromise fecal continence. Therefore, a balance must be maintained between recurrence and continence in every fistula surgery. The seton is still the most common and safest surgical method for treating particularly complicated fistulas in long-term therapies. Despite the increase in treatment options, managing complex anal fistulas can be challenging.

The application of a loose seton plays a critical role in treatment management, but living with a seton over the long term can impair QoL [11]. The knot tends to migrate toward the opening of the fistula tract, and when this migration occurs, it can be quite uncomfortable for patients. The goal of this study was to evaluate the relationships between different methods and postoperative QoL. Wong et al. [12] reported that conditions such as fecal incontinence and sepsis had the most significant impact on QoL among patients undergoing anal fistula surgery; however, the results revealed that patients considered that psychological health, independent activity, and pain had more severe effects on QoL. Therefore, our study places greater importance on evaluating QoL by concentrating on pain and physical and mental components, especially among patients who continue to live with a loose seton over the long term, on the basis of different knot methods. An increase in QoL was observed, and fecal continence was preserved in the long term among patients with setons.

After a three-month follow-up period, no significant differences in the QoLAF-Q scores were observed between the groups. Postoperative QoL increased across the three follow-up time points in all groups. Significant differences were observed in both the PCS and MCS scores ($p < 0{,}05$). Relatedly, Schrader et al. [13] reported satisfactory results in terms of QoL assessed over a 55-month follow-up after fistulotomy following loose seton placement, with low rates of recurrence and incontinence. In our study, we also showed that after seton placement, fistulotomy rates were high (nearly 70%) in all groups.

Riss et al. [14] demonstrated that the knotless design of the Comfort® seton causes less skin irritation than traditional setons do, thereby enhancing postoperative QoL. In our study, the QoL at 90 days after surgery in group C was worse than that in group A and better than that in group B on the basis of the PCS and MCS scores. However, these differences were not statistically significant.

Vial et al. [15] examined 448 patients and reported that preserving the internal anal sphincter intraoperatively during seton placement for anal fistulas significantly reduced postoperative fecal incontinence without substantially increasing recurrence rates. Therefore, the long-term placement of a loose seton can be considered a sphincter-preserving method. No patients exhibited postoperative

fecal incontinence in our study. Recurrent abscesses and fistula formation could damage sphincter functions. The higher incidence of secondary fistula formation and abscess complications in Group B may be the source of the increased JWIS values observed in this group at the 6-month follow-up.

Other studies have explored differences in QoL between traditional setons and knotless setons [16, 17]. Kelly et al. [18] evaluated patient tolerance and drainage with a loose seton in 200 participants and reported that most patients tolerated the seton well and that the fistula was successfully treated in all patients. Only 4% of patients showed poor tolerance, and standard questionnaires did not assess perianal comfort; therefore, there were no data related to QoL. In our study, groups were classified according to the type of knots used in surgery, and QoL was evaluated postoperatively via a validated questionnaire. No other prospective studies have evaluated the impact of the three different seton knot methods on QoL.

Verkade et al. [19] examined patients with complex perianal fistulas and compared the loss of setons between knotless setons and knotted setons. The knotless seton group had a significant rate of seton loss (28%). The authors recommended focusing on the closure mechanism of the seton [19]. In the study conducted by Verkade et al. [19], out of 217 knot-free setons, only 10 were supersetons, and the rest were identified as comfort setons according to information provided by the retailer. In our study, two patients (9.5%) in group C reported seton loss during follow-up despite the use of supersetons. These results support the findings of Stellingwerf et al., who reported that the prevalence of seton loss over a 3-month follow-up period was 12.7% [16].

The study was conducted in a homogeneous group and included patients with only high transsphincteric fistulas, which can be considered one of the strengths of the study. On the basis of an 80% power analysis, the study was conducted with a sample size of 63 patients. One of the strengths of the study is that the desired sample size of 63 patients was achieved. In a study of 44 patients, Kristo et al. [20] compared conventional knotted setons with Comfort® setons and reported that the latter setons were superior in terms of postoperative QoL. However, the lack of randomization was a limiting factor in their study, which can be considered a potential source of bias. To counteract this, the current study used block randomization. Patients with complex fistulas underwent MRI according to ESCP guidelines. MRI was omitted in patients with clinically evident transsphincteric fistulas to prevent unnecessary costs and treatment delays. Although misclassification bias is a possibility, multiple surgeons examined the patients to avoid this bias.

This study had several limitations. Surgeon satisfaction scores, ease of application and cost-effectiveness of the methods were also not assessed. Furthermore, the study was conducted at a single center. Multicenter trials can be used to evaluate a new technology more efficiently; in some cases, these trials may provide a practical means of recruiting sufficient subjects to achieve the goal of the study within a reasonable time frame. However, it may be possible to conduct the study in a single center to avoid disrupting the standardization of surgical technique and patient follow-up with different researchers. Surgeons were not blinded due to the necessity of knowing the assigned seton technique, which was acknowledged as a study limitation. Participants were informed that a seton will be inserted but blinded to the specific procedure performed. The statistician and data analyst were blinded to group allocation, indicating a strength of the study. Our study evaluated early-term outcomes, and the 90-day follow-up period may be considered a limitation. However, there is no clarity regarding the follow-up period in the literature. Although age, BMI, and smoking status were similar, other factors such as tract length, pain level, or prior abscess were not analyzed as covariates. These could independently influence QoL and are acknowledged as study limitations. Although the current study intentionally used the same medical-grade silicone material to isolate the effect of knot configuration, future studies may investigate the impact of different seton materials (e.g., silk, rubber, or nylon) on quality-of-life outcomes.

Given that patients with Crohn's disease might require prolonged seton treatment, it is recommended that another study be conducted among these patients. The long-term outcomes of second-stage procedures could be examined in future research. Larger prospective studies are needed to further delineate the role of the relationship between QoL and the type of binding agent in the treatment of fistulas.

Conclusion

Differences were observed between the three groups on days 15, 30, and 90; however, these differences were not statistically significant within this sample size. Treatment with loose setons improved QoL in all groups. Additional studies may also help determine the difference between groups with increased subgroup patient numbers. Future research should focus on comparing the various methods of seton binding utilized in clinical practice. This comparison should specifically evaluate the impact on QoL, particularly in patients with Crohn's disease, over an extended follow-up period.

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Author contribution Kerem Ozgu, Burak Kutlu, and Derya Gokmen contributed to the study conception, design, data acquisition, and analysis. Kerem Ozgu, Burak Kutlu, Mehmet Ali Koc, Siyar Ersoz, and

Cihangir Akyol contributed to drafting and revising the manuscript for important intellectual content. Cihangir Akyol, Mehmet Ali Koc, Kerem Ozgu, and Burak Kutlu supervised the study and approved the final version of the manuscript.

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Data availability Authors have not shared data online to protect the privacy of participants. Data is stored in a closed system that authors can access. Data available from the corresponding author upon reasonable request.

Declarations

Competing interests The authors declare no competing interests.

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References

1. García-Olmo D, Van Assche G, Tagarro I, Diez MC, Richard MP, Khalid JM et al (2019) Prevalence of anal fistulas in Europe: systematic literature reviews and population-based database analysis. Adv Ther 36:3503–3518. https://doi.org/10.1007/s12325-019-01117-y
2. Niyogi A, Agarwal T, Broadhurst J, Abel RM (2010) Management of perianal abscess and fistula-in-ano in children. Eur J Pediatr Surg 20:35–39. https://doi.org/10.1055/s-0029-1241878
3. Lee YY, Choi SK, Kim SJ, Lee KY, Hur YS, Ahn SI et al (2002) The clinical effect of sphincter-preserving modified loose seton technique in complex anal fistula. J Korean Soc Coloproctol 18:156–162
4. Ertem M, Gok H, Ozveri E, Ozben V (2014) Application of advancement flap after loose seton placement: a modified two-stage surgical repair of a transsphincteric anal fistula. Ann Coloproctol 30:192–196. https://doi.org/10.3393/ac.2014.30.4.192
5. Reza L, Gottgens K, Kleijnen J, Breukink S, Ambe PC, Aigner F et al (2024) European Society of Coloproctology: guidelines for diagnosis and treatment of cryptoglandular anal fistula. Colorectal Dis 26(1):145–196. https://doi.org/10.1111/codi.17006
6. Faul F, Erdfelder E, Lang AG, Buchner A (2007) G*power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 39:175–191. https://doi.org/10.3758/BF03193146
7. Ferrer-Márquez M, Espínola-Cortés N, Reina-Duarte A, Granero-Molina J, Fernández-Sola C, Hernández-Padilla JM (2017) Design and psychometric evaluation of the Quality of Life in Patients with Anal Fistula Questionnaire. Dis Colon Rectum 60:1083–1091. https://doi.org/10.1097/DCR.0000000000000877
8. Iqbal N, Alrubaiy L, Hart A, Siviter R, Wilson L, Tozer P (2024) The development of a cryptoglandular anal fistula quality of life scale (AF-QoL). Colorectal Dis 26(4):716–725. https://doi.org/10.1111/codi.16917
9. Koç MA, Özgü K, Gökmen D, Sevinç MŞ, Ersöz Ş, Akyol C (2023) Validation of the Turkish version of the Quality of Life in Patients with Anal Fistula Questionnaire. Turk J Colorectal Dis 33:124–130. https://doi.org/10.4274/tjcd.galenos.2023.2023-11-1
10. Cam C, Selcuk S, Asoglu MR, Tug N, Akdemir Y, Ay P et al (2011) Validation of the Wexner scale in women with fecal incontinence in a Turkish population. Int Urogynecol J 22:1375–1379. https://doi.org/10.1007/s00192-011-1464-6
11. Galis-Rozen E, Tulchinsky H, Rosen A, Eldar S, Rabau M, Stepanski A et al (2010) Long-term outcome of loose seton for complex anal fistula: a two-centre study of patients with and without Crohn's disease. Colorectal Dis 12:358–362. https://doi.org/10.1111/j.1463-1318.2009.01796.x
12. Wong S, Solomon M, Crowe P, Ooi K (2008) Cure, continence and quality of life after treatment for fistula-in-ano. ANZ J Surg 78:675–682. https://doi.org/10.1111/j.1445-2197.2008.04616.x
13. Schrader L, Brandstrup B, Olaison G (2023) Slowly cutting, loose seton ligature and staged fistulotomy for healing of idiopathic perianal fistula and influence on anal continence. Langenbecks Arch Surg 408:352–360. https://doi.org/10.1007/s00423-023-03005-0
14. Riss S, Bachleitner-Hofmann T, Stift A (2014) The comfort drain: a new device for treating complex anal fistula. Tech Coloproctol 18:1133–1135. https://doi.org/10.1007/s10151-014-1216-y
15. Vial M, Parés D, Pera M, Grande L (2010) Faecal incontinence after seton treatment for anal fistulae with and without surgical division of internal anal sphincter: a systematic review. Colorectal Dis 12:172–178. https://doi.org/10.1111/j.1463-1318.2009.01810.x
16. Stellingwerf ME, Bak MTJ, de Groof EJ, Buskens CJ, Molenaar CBH, Gecse KB et al (2020) Knotless seton for perianal fistulas: feasibility and effect on perianal disease activity. Sci Rep 10:16693. https://doi.org/10.1038/s41598-020-73737-2
17. Horeman-Franse T (2022) Regarding "loss of seton in patients with complex anal fistula: a retrospective comparison of conventional knotted loose seton and knot-free seton" by Verkade et al. Tech Coloproctol 26:843–844. https://doi.org/10.1007/s10151-022-02637-6
18. Kelly ME, Heneghan HM, McDermott FD, Nason GJ, Freeman C, Martin ST et al (2014) The role of loose seton in the management of anal fistula: a multicenter study of 200 patients. Tech Coloproctol 18:915–919. https://doi.org/10.1007/s10151-014-1186-0
19. Verkade C, Zimmerman DDE, Wasowicz DK, Polle SW, de Vries HS (2020) Loss of seton in patients with complex anal fistula: a retrospective comparison of conventional knotted loose seton and knot-free seton. Tech Coloproctol 24:1043–1046. https://doi.org/10.1007/s10151-020-02254-1
20. Kristo I, Stift A, Staud C, Kainz A, Bachleitner-Hofmann T, Chitsabesan P et al (2016) The type of loose seton for complex anal fistula is essential to improve perianal comfort and quality of life. Colorectal Dis 18(Suppl 3):O194-200. https://doi.org/10.1111/codi.13335

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