Am J Transl Res 2025;17(9):6755-6766
www.ajtr.org /ISSN:1943-8141/AJTR0165220

Original Article

Combined Parks Seton placement and transanal sphincterotomy improves outcome and reduces recurrence in high-position complex anal fistula

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Received April 10, 2025; Accepted August 7, 2025; Epub September 15, 2025; Published September 30, 2025

Abstract: Objective: To assess the clinical efficacy of combined Parks Seton placement and transanal sphincterotomy for high-position complex anal fistula and identify factors influencing postoperative recurrence. Methods: This retrospective study included 186 patients with high-position complex anal fistula treated between January 2018 and January 2023. Ninety-six patients received combined Parks Seton placement and transanal sphincterotomy (combined group), while 90 underwent only Parks Seton placement (control group). Clinical outcomes were compared based on surgical time, blood loss, wound healing time, functional recovery, and recurrence rate. Pearson correlation analysis identified risk factors for recurrence. Results: The combined group showed significantly improved outcomes in surgical time, blood loss, wound healing time, and scar area (all $P < 0.001$). Functional recovery and SF-36 quality of life scores were also significantly better (both $P < 0.05$). The total effective rate in the combined group was higher ($P = 0.003$), while the recurrence rate was lower ($P < 0.001$). Correlation analysis revealed that diabetes, treatment plan, postoperative bleeding score, disease duration, scar area, and pain score were significantly associated with recurrence (all $P < 0.05$). Multivariate analysis identified diabetes ($P < 0.001$) and disease duration ($P = 0.001$) as significant risk factors for recurrence, while treatment protocol, scar area, pain score, and bleeding score showed weaker or non-significant associations (all $P > 0.05$). Conclusion: Combined Parks Seton placement and transanal sphincterotomy effectively treat high-position complex anal fistula, reducing recurrence while preserving sphincter function. Diabetes, longer disease duration, larger scars, and early postoperative pain/bleeding are significant risk factors for recurrence.

Keywords: High-position complex anal fistula, parks seton placement, transanal sphincterotomy, clinical efficacy, recurrence

Introduction

High-level complex anal fistulas represent some of the most challenging cases in anorectal surgery. These lesions often extend deeply, branch unpredictably, and resist self-healing, all of which worsen patients' daily lives. Their complexity arises from their path through the anal sphincter and surrounding tissues, creating a delicate balance between complete fistula resolution and the risk of compromising continence [1, 2]. Perhaps most frustrating is their tendency to recur, leading to prolonged suffering for patients and escalating healthcare costs that affect families [3].

While conventional treatments, such as Seton placement and sphincterotomy, can offer relief in simpler cases, they often fail in more complex situations - especially when multiple tracts or high trans-sphincteric paths are involved [4]. In these cases, resolving the issue with a single procedure often results in either recurrence or postoperative sphincter dysfunction [5]. This underscores the urgent need for more effective solutions that not only ensure healing but also protect anal continence, reducing long-term patient distress.

Recently, surgeons have begun combining two promising techniques for these challenging cases: Parks' Seton and transsphincteric inci-

https://doi.org/10.62347/YZJZ7206

sion [6, 7]. This strategy works as a two-step approach. The Parks' Seton serves as a slow-cutting drain, gradually removing infected tissue and reducing the risk of recurrence. The trans-sphincteric incision, in turn, allows for careful division of the sphincter muscle, minimizing damage and improving outcome [7, 8]. This staged approach - first drainage and infection control, followed by precise incision - aims to optimize healing while safeguarding continence. Although some clinical studies suggest benefits of this combined approach, the evidence remains inconclusive. Many of these studies involved small patient cohorts, inconsistent methodologies, or data from single institutions, making it difficult to draw broad conclusions [9, 10]. More robust data from a wider patient population are needed to confirm safety and efficacy.

This study aimed to evaluate the clinical effectiveness of combining Parks' Seton and trans-sphincteric incision for the treatment of high anal fistula. By comparing this innovative method with conventional treatments, we seek to assess key outcomes such as operation time, intraoperative blood loss, healing rates, and recurrence. Additionally, to identify factors contributing to recurrence, we conducted a multivariate analysis focusing on critical clinical variables, such as diabetes history, duration of the condition, and postoperative scar size. Our goal was not only to assess the feasibility of this new technique but also to offer a more lasting, functional solution for patients who have long struggled with this condition.

What distinguishes this work is its thorough examination of a dual-modality surgical strategy that integrates effective drainage while prioritizing sphincter preservation - an innovative approach that could significantly reduce postoperative infection, recurrence, and functional impairment. This method offers a hopeful prospect for patients, aiming to enhance recovery while preserving quality of life. Moreover, identifying risk factors for recurrence may allow for more personalized treatment planning. Taken together, these findings aim to provide clear clinical guidance for managing high anal fistula and establish this combined technique as a viable alternative to traditional surgical methods.

Materials and Methods

Sample size calculation

Based on the study by Elshamy et al. [11], the sample size was calculated using the following parameters $(n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times (p_1(1 - p_1) + p_2(1 - p_2))}{(p_1 - p_2)^2})$: Zα/2 = 1.96, Zβ = 0.84, p1 = 0.952, and p2 = 0.681. The calculation indicated a need for 27.94 participants per group, which was rounded to 28 per group. Thus, a total of 56 patients across both groups were required.

General data

This retrospective study included 186 patients with high-position complex anal fistulas treated between January 2018 and January 2023. Of these, 96 patients received combined Parks Seton placement and transanal sphincterotomy (combined group), while 90 underwent traditional Parks Seton placement alone (control group). The study was approved by the medical ethics committee of the Affiliated Hospital of Shaanxi University of Chinese Medicine.

Inclusion and exclusion criteria

Inclusion criteria: adult patients aged 18-75 years diagnosed with high-position complex anal fistulas based on clinical manifestations and imaging (e.g., rectal contrast studies, MRI), with lesions located above the anal sphincter; disease duration exceeding 3 months; persistent symptoms such as purulent discharge and anal pain; and complete clinical data.

Exclusion criteria: patients with severe cardiac, hepatic, or renal insufficiency; malignancies; other serious systemic conditions contraindicating surgery; immunodeficiencies (e.g., HIV or ongoing immunosuppressive therapy); acute abscesses or severe infections prior to surgery; and pregnant or breastfeeding women.

Treatment plan

All patients underwent preoperative evaluation using rectal MRI and perianal imaging to confirm the diagnosis and map the fistula anatomy, including any associated abscesses. In the combined group, surgery was performed in two stages. First, Parks Seton placement was performed after accurately locating the fistula tract, with the seton threaded for drainage and

infection control. Second, a transanal sphincterotomy was carried out under direct vision, carefully excising the fistula portion traversing the sphincter while preserving sphincter integrity and minimizing rectal tissue damage. Postoperative management included standard wound care, pain control, and infection prevention. Follow-up care involved regular perianal examinations and MRI scans to monitor wound healing and detect early recurrence. Patients received home care instructions covering dietary modifications, activity restrictions, and gradual return to normal activities.

Clinical data collection

Patient data were extracted from electronic medical records and outpatient follow-up documentation, including baseline demographics (age, sex, BMI, disease duration), medical history (diabetes, hypertension), lifestyle factors (smoking status, alcohol consumption), and surgical metrics (operative time, blood loss, wound healing duration, scar area). Patient outcomes were evaluated using established scoring systems: anal function was assessed with the Wexner score, pain severity was quantified by the visual analogue scale (VAS), surgical site bleeding was tracked using the wound bleeding score, and health-related quality of life was measured by the Short Form - 36 (SF-36) questionnaire. Treatment success was defined as complete symptom resolution along with full wound healing. Suspected recurrence was confirmed through MRI. All data were cross - checked for accuracy while strict patient confidentiality protection was ensured.

Anal continence, evaluated by the Wexner Score, assessed control over urges, defecation frequency, and incontinence on a 0-20 scale (higher scores indicate poorer function), with measurements taken preoperatively and at 1 and 3 months postoperatively [12]. Patients rated pain severity using the VAS Score on a 0-10 scale (10 representing the most severe pain), and these ratings were recorded on postoperative days 1, 3, and 7 [13]. The wound bleeding score tracked surgical site bleeding on a 0-4 scale (higher scores signify a greater need for intervention), with recordings made on postoperative days 1, 3, and 7 [13]. Quality of life, as measured by the SF-36, assessed physical and mental health as well as social functioning on a 0-100 scale (higher scores mean better health), and preoperative scores were compared to results at 3-month postoperative follow-ups [14].

Clinical efficacy was categorized into four levels: cure was defined as complete resolution of symptoms along with full wound epithelialization; significantly effective meant marked symptom improvement combined with near-complete wound healing; effective referred to partial symptom relief coupled with incomplete wound healing; and ineffective indicated no improvement or symptom aggravation along with poor wound healing [15]. The total effective rate was calculated using the formula: (total cases - ineffective cases)/total cases × 100%. Recurrence was defined as the reappearance of symptoms such as anal swelling, pain, or purulent discharge within 1 year after surgery, and the diagnosis was confirmed by perianal MRI.

Outcome measures

Primary outcomes included comparison of clinical efficacy and analysis of factors associated with postoperative recurrence between the two groups. Secondary outcomes included comparisons of baseline characteristics, operative time, intraoperative blood loss, wound healing time, scar area, and functional scores.

Statistical analysis

Statistical analyses were performed using SPSS version 26.0. The Kolmogorov-Smirnov test was used to assess data normality. Non-normally distributed variables were analyzed using the Mann-Whitney U test. Normally distributed variables were and presented as mean ± standard deviation analyzed with independent samples t-tests. Categorical data were compared using the chi-square test. Pearson correlation assessed linear relationships between continuous variables. Repeated measures ANOVA with Bonferroni correction was used for intra-group comparisons over time. A two-tailed *P*-value of less than 0.05 was considered significant.

Results

Comparison of baseline data of patients

No significant differences were observed between the groups in baseline characteristics, including age, sex, BMI, disease duration, diabetes and hypertension history, smoking and

Table 1. Baseline characteristics of patients

Factor	Total	Control Group (n = 90)	Combined Group (n = 96)	Statistic	*P* Value
Age (years)	43.44±11.35	42.44±11.16	44.38±11.51	1.160	0.248
Gender (Male/Female)	132/54	69/27	63/27	0.079	0.778
BMI (kg/m^2)	23.260±2.889	23.547±2.844	22.991±2.920	-1.314	0.190
Disease Duration (years)	3.000 [2.000, 5.000]	3.000 [2.000, 4.000]	3.50 [2.00, 5.00]	0.263	0.793
History of Diabetes (Yes/No)	16/170	9/87	7/83	0.151	0.698
History of Hypertension (Yes/No)	21/165	12/84	9/81	0.290	0.590
Smoking History (Yes/No)	141/45	73/23	68/22	0.006	0.938
Drinking History (Yes/No)	18/168	11/85	7/83	0.720	0.396
Marital Status (Married/Other)	174/12	85/5	89/7	0.232	0.630
Employment Status (Employed/Other)	136/50	72/24	64/26	0.357	0.550

Note: BMI, Body Mass Index.

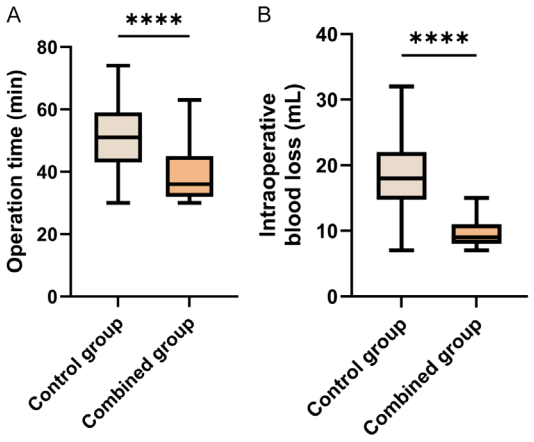

Figure 1. Comparison of Surgery Time and Intraoperative Bleeding Volume. A. Surgery Time: Distribution of surgery times in the control group and the combined group. B. Intraoperative Bleeding Volume: Distribution of intraoperative bleeding volumes in the control group and the combined group. Note: **** indicates P < 0.0001.

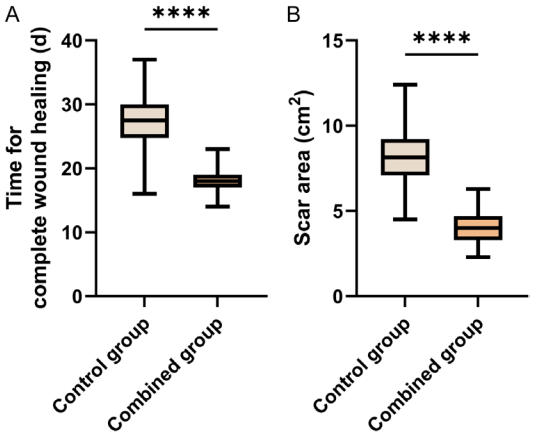

Figure 2. Comparison of Wound Healing Time and Scar Area. A. Wound Healing Time: Distribution of healing times for the control group and the combined group. B. Scar Area: Distribution of scar areas for the control group and the combined group. Note: **** indicates P < 0.0001.

alcohol consumption, marital and employment status (all P > 0.05, **Table 1**).

Comparison of surgical time and intraoperative blood loss

The combination group had a significantly shorter operative duration (Z = 7.133, P < 0.001, **Figure 1A**) and lower intraoperative blood loss (Z = 10.922, P < 0.001, **Figure 1B**) compared to the control group.

Comparison of wound healing time and scar area

The combination group showed significantly shorter wound healing time (Z = 11.305, P < 0.001, **Figure 2A**) and smaller scar area (t = 22.101, P < 0.001, **Figure 2B**) compared to the control group.

Comparison of Wexner, VAS, and wound bleeding scores

No significant difference in preoperative Wexner scores was noted between the groups (P > 0.05, t = 0.532). However, at both 1 and 3 months postoperatively, the combination group showed significantly greater improvement (1 month: P < 0.0001, t = 24.371; 3 months: P < 0.0001, t = 12.799). Within-group comparisons revealed significant reductions in the Wexner score from baseline in the combination group (P < 0.0001), with notable improvement in the control group, especially at 1 month (P < 0.0001, t = 27.604) (**Figure 3A**).

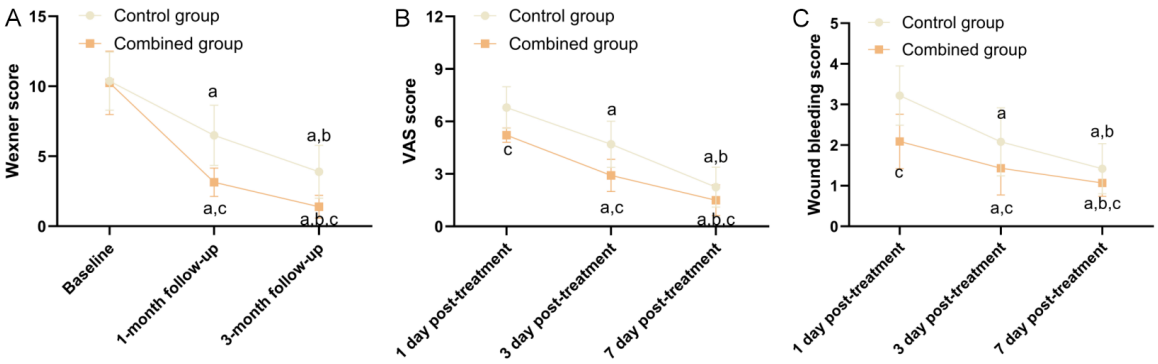

Figure 3. Changes in Wexner Score, VAS Score, and Wound Bleeding Score Over Treatment Time. A. Wexner Score: Changes in Wexner scores before treatment and at 1 month and 3 months after treatment for the control and combined groups. B. VAS Score: Changes in VAS scores at 1 day, 3 days, and 7 days after treatment for the control and combined groups. C. Wound Bleeding Score: Changes in wound bleeding scores at 1 day, 3 days, and 7 days after treatment for the control and combined groups. Note: Visual Analogue Scale (VAS), a denotes $P < 0.05$ compared to baseline or 1 day post-treatment, b denotes $P < 0.05$ compared to 1 month or 3 days post-treatment, and c denotes Control group vs. Combined group compared with $P < 0.05$.

In terms of VAS scores, the combination group reported significantly lower pain levels compared to the control group on postoperative days 1, 3, and 7 ($P < 0.0001$; $t = 10.675$, 12.049, and 34.404, respectively). Significant pain relief was observed in the combination group across all time points ($P < 0.0001$). The control group also experienced pain relief, but the changes were more gradual (**Figure 3B**).

Regarding the wound bleeding score, the combination group exhibited significantly lower bleeding scores than the control group on days 1, 3, and 7 postoperatively ($P < 0.0001$). Intra-group comparisons showed a significant reduction in bleeding scores on days 3 and 7 compared to baseline ($P < 0.0001$, $t = 18.623$). In the control group, a significant change occurred only on day 1 ($P < 0.0001$, $t = 30.560$). Notably, the combination group maintained significantly lower bleeding scores on day 7 ($P = 0.0012$, $t = 3.785$) (**Figure 3C**).

Comparison of SF-36 scores at baseline and 3-month follow-up

Significant improvements in SF-36 scores were observed across all dimensions - physical function, mental health, social functioning, and cognitive functioning - at three months post-treatment in both groups. Within-group comparisons revealed that scores at the 3-month follow-up were significantly higher than baseline values in both groups ($P < 0.0001$; $t = 19.897$, 22.451, 12.708, and 16.924, respectively). Between-group analysis showed that the combination group achieved significantly better outcomes than the control group in all four domains at the 3-month mark ($P < 0.0001$; $t = 6.087$, 15.191, 22.451, and 3.195, respectively). These results suggest that the combination therapy provided superior improvements in physical, psychological, social, and cognitive health status (**Figure 4**).

Comparison of treatment outcomes

The total treatment efficacy rate was significantly higher in the combination group (97.92%) compared to the control group (84.44%) ($P = 0.003$). The proportion of patients achieving complete recovery was also significantly higher in the combination group (85.42%) than in the control group (62.22%) ($P = 0.001$). However, no significant differences were observed in the rates of partial or moderate improvement between the two groups (both $P > 0.05$, **Table 2**).

Comparison of one-year recurrence rate

During the one-year follow-up, 27 patients (14.51%) experienced recurrence. Among these, 21 cases were from the control group and 7 from the combination group. The recurrence rate was significantly lower in the combination group compared to the control group ($P < 0.001$), indicating that combination therapy may have been more effective in reducing long-term relapse (**Table 3**).

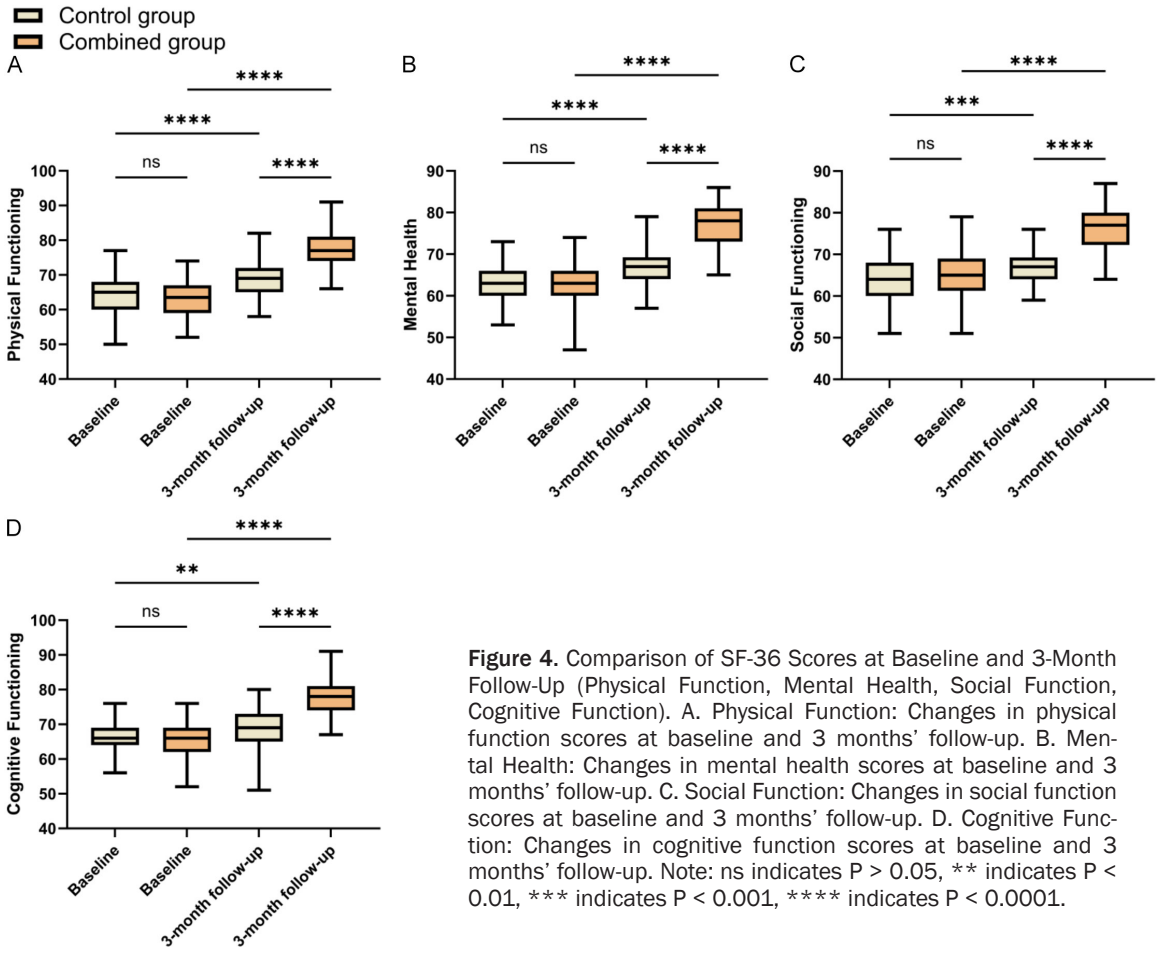

Figure 4. Comparison of SF-36 Scores at Baseline and 3-Month Follow-Up (Physical Function, Mental Health, Social Function, Cognitive Function). A. Physical Function: Changes in physical function scores at baseline and 3 months' follow-up. B. Mental Health: Changes in mental health scores at baseline and 3 months' follow-up. C. Social Function: Changes in social function scores at baseline and 3 months' follow-up. D. Cognitive Function: Changes in cognitive function scores at baseline and 3 months' follow-up. Note: ns indicates $P > 0.05$, ** indicates $P < 0.01$, *** indicates $P < 0.001$, **** indicates $P < 0.0001$.

Table 2. Comparison of treatment outcomes between control and combined groups

Group	Cured	Marked Improvement	Effective	Ineffective	Total Effectiveness Rate
Control Group (n = 90)	56 (62.22%)	13 (14.44%)	7 (7.78%)	14 (15.56%)	76 (84.44%)
Combined Group (n = 96)	82 (85.42%)	8 (8.33%)	4 (4.17%)	3 (3.13%)	94 (97.92%)
Chi-square value	11.869	1.176	0.536	-	9.078
P Value	0.001	0.278	0.464	-	0.003

Table 3. Statistics of the number of patients in both groups

Group	Recurrence	No Recurrence
Control group (n = 90)	21 (23.33%)	69 (76.67%)
Combined group (n = 96)	5 (5.21%)	91 (94.79%)
Chi-square value	11.228	
P value	< 0.001	

Correlation analysis of clinical variables with postoperative recurrence

Pearson correlation analysis identified factors associated with postoperative recurrence of high-position complex anal fistulas. Significant correlations were found for the following variables: history of diabetes ($r = -0.472$, $P < 0.001$), treatment modality ($r = -0.242$, $P = 0.001$), wound bleeding score on postoperative day 1 ($r = 0.234$, $P = 0.001$), disease duration ($r = 0.187$, $P = 0.011$), scar area ($r = 0.162$, $P = 0.027$), and pain score on postoperative day 1 ($r = 0.152$, $P = 0.039$). These findings suggest that these factors are important in the risk of recurrence. In contrast, variables such as alcohol consumption history ($P = 0.066$) and hyper-

Figure 5. Correlation analysis between clinical variables and recurrence.

tension history (P = 0.180) were not significantly associated with recurrence (P > 0.05) (**Figures 5** and **6**).

Analysis of risk factors for postoperative recurrence

The multivariate risk factor analysis in **Table 4** found that treatment protocol, diabetes history, disease duration, scar area, Day 1 wound pain score, and wound bleeding score were related to postoperative recurrence. The treatment protocol (combination group vs. control group) was not significantly different (P = 0.405, OR = 0.409, 95% CI = 0.047-3.560), indicating minimal effect on postoperative recurrence. Diabetes history was a significant risk factor (P < 0.001, OR = 0.027, 95% CI = 0.004-0.118), suggesting that a history of diabetes significantly increases the risk of recurrence. Disease duration (≥ 3.5 years vs. < 3.5 years) significantly influenced postoperative recurrence (P = 0.001, OR = 0.110, 95% CI = 0.027-0.359), indicating that a longer disease duration is significantly associated with postoperative recurrence. The scar area (≥ 5.25 cm^2 vs. < 5.25

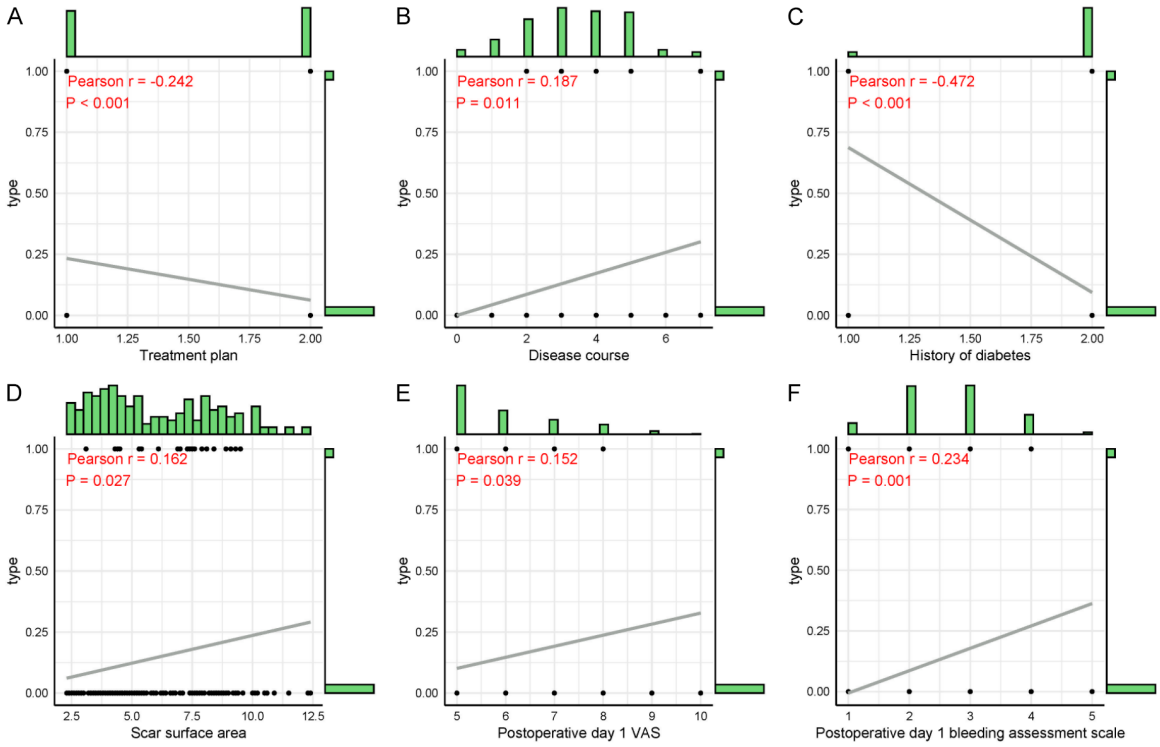

Figure 6. Scatter plot of variables related to recurrence. A. Treatment Plan and Postoperative Recurrence: Relationship between treatment plan and postoperative recurrence. B. Disease Duration and Postoperative Recurrence: Relationship between disease duration and postoperative recurrence. C. History of Diabetes and Postoperative Recurrence: Relationship between history of diabetes and postoperative recurrence. D. Scar Area and Postoperative Recurrence: Relationship between scar area and postoperative recurrence. E. Postoperative Day 1 Pain Score and Postoperative Recurrence: Relationship between postoperative day 1 pain score and postoperative recurrence. F. Postoperative Day 1 Bleeding Score and Postoperative Recurrence: Relationship between postoperative day 1 bleeding score and postoperative recurrence.

Table 4. Multivariate analysis of risk factors for postoperative recurrence

Variable	Estimate	Std Error	*P* Value	OR	Lower	Upper
Treatment Plan (Control/Combined)	-0.893	1.073	0.405	0.409	0.047	3.560
History of Diabetes (Yes/No)	-3.611	0.815	< 0.001	0.027	0.004	0.118
Disease Duration (≥ 3.5 years/< 3.5 years)	-2.205	0.646	0.001	0.11	0.027	0.359
Scar Area (≥ 5.25 cm^2/< 5.25 cm^2)	-1.197	1.041	0.250	0.302	0.034	2.218
Day 1 Postoperative Pain Score (≥ 5.5/< 5.5)	-1.438	0.754	0.056	0.237	0.047	0.952
Day 1 Postoperative Bleeding Score (≥ 2.5/< 2.5)	-0.433	0.789	0.584	0.649	0.123	2.894

cm^2) showed no statistical significance (P = 0.250, OR = 0.302, 95% CI = 0.034-2.218). The Day 1 wound pain score was close to significance (P = 0.056, OR = 0.237, 95% CI = 0.047-0.952), suggesting a possible association with postoperative recurrence. The Day 1 wound bleeding score showed no significant association (P = 0.584, OR = 0.649, 95% CI = 0.123-2.894). Furthermore, RCS (restricted cubic splines) analysis indicated a significant non-linear relationship with disease duration (P for overall = 0.038, P for nonlinear = 0.038), suggesting that the effect of disease duration on recurrence varies, with the risk increasing as disease duration lengthens (**Figure 7**).

Interactive analysis of postoperative recurrence: relationship between treatment protocol, diabetes history, and disease duration

The interaction analysis revealed that the interaction between treatment protocol and diabe-

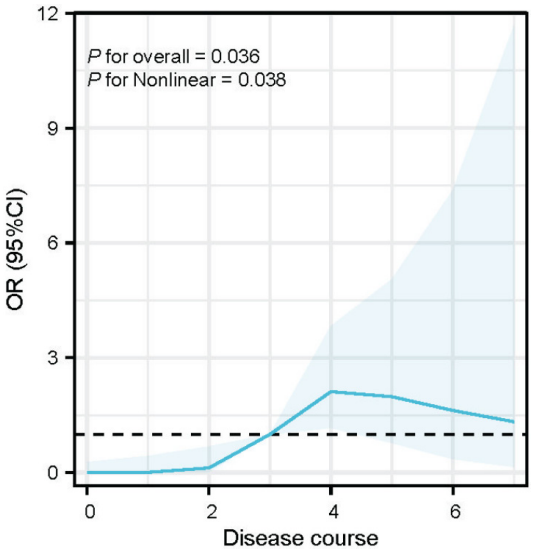

Figure 7. RCS Analysis of Disease Duration on Postoperative Recurrence.

tes history did not significantly affect postoperative recurrence (P = 0.886), indicating that this interaction does not substantially affect the probability of recurrence. Disease duration (≥ 3.5 years vs. < 3.5 years) significantly influenced postoperative recurrence (P = 0.012), with longer disease duration increasing the likelihood of recurrence. Specifically, as disease duration increased, the probability of recurrence showed an upward trend (**Figure 8**).

Discussion

High-level complex anal fistula is a challenging condition to treat, often involving the anal sphincter and surrounding rectal tissues, which complicates surgical intervention and increases risks [16]. While traditional treatments such as Seton placement and sphincterotomy are commonly used, they often fall short in managing complex fistulas. These methods are associated with high recurrence rates and the potential for compromising anal function [17]. When dealing with deep or multi-tract fistulas, surgeons find that a single surgical technique is insufficient. This often results in a frustrating outcome for both the surgeon and the patient: the fistula recurs, and continence is compromised. As a result, a combined approach using a Parks' modified Seton with an inter-sphincteric fistulotomy has been adopted. The rationale behind this approach is that the Seton first drains the fistula tract, allowing acute inflammation to subside. Once the infection is controlled, the surgeon performs the inter-sphincteric division. This staged method has proven effective in reducing recurrence while preserving anal function [18].

Our retrospective analysis confirms that this combined approach was superior to traditional methods in several key aspects. Patients in the combined group had shorter operative times, less blood loss, faster healing, and smaller scars. The shorter operative times are attributed to the two-stage design: the preliminary drainage simplifies the main procedure, while the precise inter-sphincteric division enhances surgical efficiency. Similarly, reduced blood loss and shorter healing times indicate that the technique is less traumatic, promoting faster recovery. Our findings are consistent with other research, such as Park et al. [19], who reported shorter operative times and reduced blood loss with a similar combined treatment, and An et al. [20], who found that these approaches minimize bleeding and accelerate healing.

Another key advantage of the combined approach was the superior recovery of anal function. At one and three months post-treatment, the combined group showed significantly lower Wexner scores than the control group, indicating better control. The improved VAS and Wound Bleeding scores further highlighted this, with patients experiencing less postoperative pain and bleeding. Our results align with those of Huang et al. [15], who also reported improved functional recovery and reduced complications with combination therapy. We believe that the key to this improvement lies in the preservation of the sphincter's structure, which reduces the risk of incontinence and allows for a more complete return to normal function. Similarly, Liu et al. [21] found that combined treatments reduce complications and improve recovery, especially in terms of pain management, which aligns with our observations. By supporting better tissue regeneration and minimizing scarring, the dual approach appears to reduce pain and enhance functional outcomes.

The most compelling result was the difference in overall effectiveness. The combined treatment group achieved a success rate of 97.92%, significantly surpassing the 84.44% in the control group. This clearly demonstrates that the combined approach leads to more complete healing and better symptom relief. Our findings

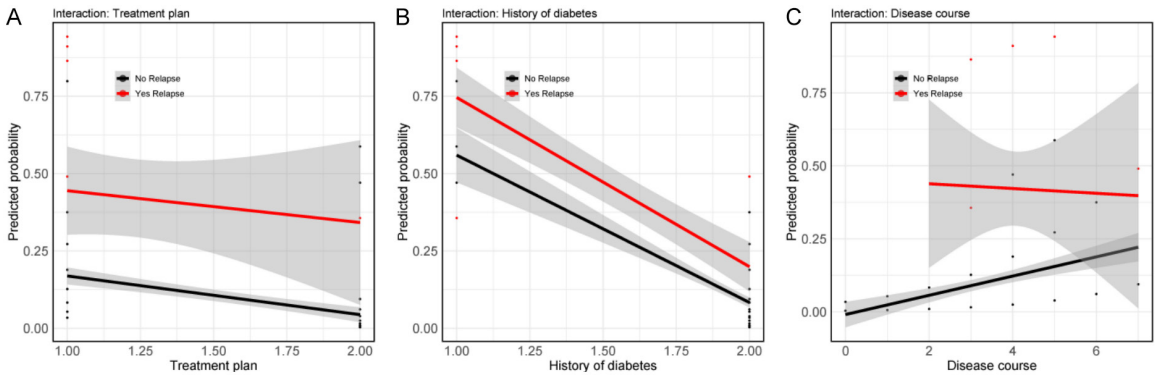

Figure 8. Interaction Analysis of Treatment Plan, History of Diabetes, and Disease Duration on Postoperative Recurrence. A. Interaction Between Treatment Plan and Postoperative Recurrence: Relationship between treatment plan and recurrence probability (black represents no recurrence, red represents recurrence). B. Interaction Between History of Diabetes and Postoperative Recurrence: Effect of diabetes history on recurrence probability (black represents no history of diabetes, red represents with history of diabetes). C. Interaction Between Disease Duration and Postoperative Recurrence: Effect of disease duration on recurrence probability (X-axis represents disease duration, Y-axis represents recurrence probability).

align with existing research, which also shows that combined treatments result in higher cure rates and lower recurrence compared to single-method therapies [22]. Uzun et al. [23] further support this, concluding that such approaches reduce the risk of recurrence and improve treatment success. The rationale behind this is clear: the combined technique simultaneously addresses both the fistula tract and the surrounding inflamed tissue, creating a more stable healing environment. By effectively managing both drainage and closure, this dual-action method substantially reduces the risk of fistula persistence or recurrence.

Despite the effectiveness of the combined technique, recurrence remains a persistent challenge in treating high, complex anal fistulas. Although our study showed a lower recurrence rate in the combined group, we identified two significant risk factors: a history of diabetes and longer disease duration. The connection to diabetes is well-established, since the condition impairs the immune response and slows wound healing, making these patients more susceptible to recurrence. Our results echo the findings of Salgado-Nesme et al. [24], who also linked diabetes to higher recurrence rates and slower recovery. Diabetes compromises the body's ability to repair tissue and combat infection, making fistulas more likely to persist or recur. This strongly suggests that for diabetic patients, early intervention and close postoperative monitoring are crucial to reduce risk.

We also found that a longer disease duration was associated with a higher likelihood of recurrence. This is not surprising, as chronic inflammation and scarring over the years make the fistula structure more complex, and the surrounding tissue harder to repair. Our findings are consistent with a meta-analysis by Mei et al. [25], which also linked a prolonged disease course to a significantly higher risk of recurrence, particularly in cases where the fistula was structurally complex or had been incompletely resected previously. After repeated interventions and chronic inflammation, the tissue struggles to remodel and heal effectively. For these high-risk patients with long-standing disease, more refined surgical techniques and meticulous postoperative care are essential.

Additionally, our analysis revealed other factors contributing to recurrence. The surgical strategy itself was a significant predictor; our results confirmed that an optimized treatment plan directly reduced the risk of recurrence. We also found that patients with larger scars were more likely to experience recurrence, likely because extensive scar tissue interferes with proper healing. The most telling predictors, however, were early signs of pain and bleeding. Significant pain or bleeding on the first day post-surgery was strongly correlated with future recurrence. This underscores an important point: a successful outcome depends not only on excising the fistula but also on minimizing scar tissue and effectively managing pain and bleeding from the outset to give patients the best chance of long-term recovery.

The combined treatment offers three key advantages: reduced recurrence, preserved anal function, and faster recovery. Combining Parks Seton with inter-sphincteric fistulotomy significantly lowers recurrence rates, especially in complex cases, while maintaining sphincter integrity. However, the technique has limitations. It requires greater surgical expertise and incurs higher costs, potentially limiting its accessibility. Patients with severe comorbidities may not tolerate the procedure. Future research should focus on individualized approaches and broader population validation to provide more precise solutions for managing complex anal fistulas.

Conclusion

Parks Seton combined with transanal sphincterotomy effectively treats high-position complex anal fistulas, reducing recurrence while preserving sphincter function. Diabetes, longer disease duration, larger scars, and early postoperative pain/bleeding are key factors associated with recurrence.

Disclosure of conflict of interest

None.

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