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Prognostic value of MRI and TRUS versus intraoperative findings in detecting fistula-in-ano: implications for perianal abscess recurrence

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Abstract

Background: Perianal abscesses frequently recur and may progress to fistula formation, representing a significant clinical challenge. Accurate identification of fistulas and their prognostic significance is essential for effective management. This study evaluated the prognostic value of radiologic versus intraoperative fistula detection and compared the diagnostic performance of magnetic resonance imaging (MRI) and transrectal ultrasonography (TRUS) in predicting recurrence.

Methods: A retrospective review was conducted of 79 patients treated for perianal abscesses between 2021 and 2024. Demographic, clinical, laboratory, microbiological, imaging, and surgical data were analyzed. Imaging was performed selectively based on clinical indications.

Results: A total of 79 patients were analyzed, most presenting with subcutaneous abscesses (83.5%). Postoperative imaging (MRI/TRUS) detected perineal fistulas in 26.9% of imaged patients, and the presence of a radiologically identified fistula was significantly associated with abscess recurrence (OR = 4.58), whereas intraoperatively identified fistula showed no prognostic significance. MRI detected fistulas with higher sensitivity than TRUS (OR = 4.25), confirming its utility in complex cases. Recurrent abscess at admission also increased the likelihood of a radiologic fistula (OR = 4.22), whereas intraoperatively detected fistulas were not predictive of recurrence.

Conclusion: Radiologically detected perianal fistulas are a strong predictor of abscess recurrence, whereas intraoperatively identified fistulas do not retain prognostic value due to immediate treatment. MRI demonstrates higher sensitivity than TRUS and should be considered the preferred modality for postoperative imaging in patients at risk. These findings support selective, targeted imaging strategies to identify high-risk patients and guide timely clinical management.

Introduction

Perianal abscesses and fistulas present a significant clinical challenge, often requiring surgical intervention [1]. They develop from infection of the anal glands, which can spread either upward or downward, extending into surrounding tissues and causing both acute and chronic inflammation [2]. Despite appropriate incision and drainage, recurrence remains a clinical problem, and a substantial proportion of patients subsequently develop fistulous disease [3, 4]. A second surgical intervention is often necessary, which prolongs the course of the disease, extends hospital stays and increase the risk of infections [5, 6, 7].

Accurate identification of risk factors for recurrence is therefore of considerable clinical importance. However, evidence regarding the risk factors for subsequent recurrence remains limited, requiring further investigation. Despite the clinical relevance of perianal abscess recurrence, the specific role of fistula detection timing has not been sufficiently investigated. In particular, it remains unclear whether fistulas identified intraoperatively during abscess drainage and those detected later by imaging represent the same prognostic entity.

Numerous studies focus on comparing the reference of imaging techniques to intraoperative findings [8, 9]. Many studies have demonstrated that MRI has high sensitivity in detecting fistula tracts [8, 9, 10, 11]. TRUS, which shows comparable results to MRI in imaging perianal abscesses and fistulas, is less effective at detecting extrasphincteric fistulas [12]. Additionally, a radiologically detected fistula may also indicate the severity of the condition, as it can reveal secondary complications such as horseshoe extensions [13]. However, there is a lack of investigations concerning recurrence after intraoperatively detected fistulas compared to those identified preoperatively through imaging. It is essential to distinguish between these two scenarios, as imaging results do not always accurately reflect surgical findings. Intraoperatively identified fistulas are usually immediately treated by drainage, probing, or seton placement according to the Hippocratic principle, effectively modifying their natural course. In contrast, radiologically detected fistulas reflect persistent or newly formed tracts that have not been surgically addressed and may therefore represent a fundamentally different clinical situation.

While imaging techniques such as MRI and TRUS are widely used to detect perianal fistulas, their prognostic significance in the context of abscess recurrence remains unclear. In particular, it is unknown whether fistulas detected intraoperatively and those identified by imaging represent equivalent clinical entities in terms of recurrence risk.

This study specifically aims to clarify whether timing and modality of fistula detection influence recurrence risk.

Materials and methods

This retrospective cohort study included 79 consecutive patients hospitalized for perianal abscess between 2021 and 2024. Patients were identified using ICD-10 codes for anal abscesses (K61.0–K61.4). Clinical data extracted from medical records included age, sex, abscess type, surgical procedure performed (external or internal drainage), presence of an intraoperative fistula, and abscess recurrence. Medical history was reviewed with particular attention to obesity, diabetes mellitus, and inflammatory bowel disease (IBD).

Laboratory parameters collected at admission included white blood cell count (WBC), lymphocytes, monocytes, neutrophils, hemoglobin, platelets, urea, creatinine, and C-reactive protein (CRP). Microbiological test results were also recorded when available. Imaging data were analyzed to evaluate the effectiveness of magnetic resonance imaging (MRI) compared with transrectal ultrasonography (TRUS) in fistula detection. Imaging was performed postoperatively based on clinical judgment, particularly in patients with suspected fistula or abnormal postoperative course.

The inclusion criterion was hospitalization due to an anal abscess between 2021 and 2024 in the study center. Patients were excluded if medical records were incomplete or if abscess anatomy could not be clearly defined. Patients without postoperative imaging were excluded from MRI vs TRUS analyses.

As imaging was not performed routinely but based on clinical suspicion, a potential selection bias toward more complex cases cannot be excluded.

Statistical analyses were performed using R software (version 4.3.1; RStudio). Continuous variables were assessed for normality using the Shapiro–Wilk test and are presented as median with interquartile range (IQR) or as mean ± standard deviation, as appropriate. Categorical variables are reported as absolute numbers (n) and percentages (%).

Comparisons between groups were conducted using the Mann–Whitney U test or Wilcoxon test for continuous variables and the chi-square test or Fisher's exact test for categorical variables, depending on expected frequencies. Correlations were assessed using Spearman's rank correlation coefficient. Associations between clinical variables and abscess recurrence, as well as between imaging modality and fistula detection, were evaluated using odds ratios (ORs) with 95% confidence intervals (95% CIs) derived from 2×2 contingency tables. Imaging-related analyses included only patients who underwent MRI or TRUS. All statistical tests were two-sided, and a p-value < 0.05 was considered statistically significant.

The study was retrospective and based on anonymized medical record data. Written informed consent was obtained from all participants. All procedures were conducted in accordance with the Declaration of Helsinki and its subsequent amendments. The study protocol was approved by the local Bioethics Committee (approval No. 1/2024).

Results

a) Characteristics of the study group

A total of 79 patients were analyzed. The median age was 42 years (IQR 36.50–55.50). The study cohort consisted of 22 women (28%) and 57 men (72%).

In the analyzed group of patients, subcutaneous abscess was the most common form of the disease, identified in 66 cases (83.5%). An ischiorectal abscess was diagnosed in 6 patients (7.6%), a supralevator abscess in 5 patients (6.4%), and an intersphincteric abscess in 2 patients (2.5%). A primary abscess occurred in 64 patients (81%), while a recurrent abscess was noted in 15 cases (19%).

Laboratory parameters at admission are summarized in Table 1.

Table 1. Laboratory parameters in the study population presented as median and interquartile range (IQR).

Parameter	Unit	Median (IQR)
WBC	×10⁹/L	12.20 (9.18, 15.05)
Lymphocytes	×10⁹/L	1.82 (1.40, 2.20)
Neutrophils	×10⁹/L	9.25 (5.99, 12.22)
Monocytes	×10⁹/L	0.84 (0.52, 1.17)
NLR		4.79 (3.13, 8.71)
MLR		0.48 (0.29, 0.77)
PLR		129.50 (105.56, 188.22)
Hb	g/dL	14.40 (13.39, 15.30)
PLT	×10⁹/L	245.85 (199.65, 279.75)
Urea	mg/dL	28.56 (22.50, 32.70)
Creatinine	mg/dL	0.81 (0.77, 1.00)
PCT	ng/ml	0.03 (0.02, 0.19)
CRP	mg/L	36.80 (14.25, 85.10)

Values are presented as median (IQR). Legend**:** WBC, white blood cells; NLR, neutrophil-to-lymphocyte ratio; MLR, monocyte-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio; Hb, hemoglobin; PLT, platelets; CRP, C-reactive protein; PCT, procalcitonin; IQR, interquartile range.

Among the most frequently reported comorbidities were arterial hypertension (25%), diabetes mellitus (9%), ischemic heart disease (6%), chronic obstructive pulmonary diseases (5%), and obesity (4%). Inflammatory bowel diseases, on the other hand, were observed only rarely. The distribution of comorbidities is presented in Table 2.

Table 2. Comorbidities in the study population (n = 79).

Comorbidity	n/N(%)
Obesity	3/79 (4%)
Hypertension	20/79 (25%)
Ischemic heart disease	5/79 (6%)
Diabetes	7/79 (9%)
Inflammatory bowel diseases	1/79 (1%)
Asthma/COPD	4/79 (5%)
Chronic kidney disease	1/79 (1%)

Surgical intervention was performed in all patients. The most common procedure was external drainage (75/79; 95%). An intraoperative fistula was identified in 17 patients (21.5%). The median duration of surgery was 15 minutes (IQR 10–15), and the median length of hospital stay (with the day of surgery considered day 0) was 2 days (IQR 2–3). Surgical revision was required in approximately 5% of patients (4/79).

During postoperative follow-up, abscess recurrence occurred in 12 patients (15.2%). Post-treatment imaging (MRI/TRUS) was performed in 67 patients (84.8%). In 18 individuals (26.9% of those imaged; 22.8% of the entire cohort), a perineal fistula was identified on imaging.

b) Comparison of patients by sex

In the comparative analysis, no significant differences were observed between men and women with respect to age, abscess type, presence of recurrent abscess at admission, prevalence of comorbidities, laboratory parameters (CRP, NLR, MLR, PLR), type of surgical procedure performed, need for surgical revision, duration of surgery, length of hospital stay, or recurrence rates during follow-up. Sex was not a risk factor for abscess recurrence or for the occurrence of fistula on imaging; therefore, odds ratios were not calculated for this variable

c) Factors associated with abscess recurrence after treatment

Recurrence of the abscess after treatment occurred in 12 out of 79 patients (15.2%). The groups with and without recurrence did not differ significantly in terms of age, sex, type of abscess, or comorbidities.

c1) Radiologic fistula and abscess recurrence

The presence of a radiologically detected fistula was significantly associated with abscess recurrence. Patients with a fistula had more than a fourfold higher risk of recurrence compared to those without a fistula (OR = 4.58; 95% CI: 1.26–16.69). The association between radiologic fistula and abscess recurrence is shown in Table 3.

Table 3. Association between radiologic fistula and abscess recurrence

	No abscess recurrence (0)	Abscess recurrence (1)
Absence of radiologic fistula (0)	55	6
Presence of radiologic fistula (1)	12	6

c2) Recurrent abscess at admission and recurrence after treatment

A recurrent abscess at the time of admission was observed in 15 patients (19.0%). In the group with recurrence after treatment, a recurrent abscess at admission was present in 3 out of 12 patients (25.0%), whereas in the group without recurrence it was observed in 12 out of 67 patients (17.9%) (OR = 1.53; 95% CI: 0.36–6.50). The relationship between recurrent abscess at admission and recurrence is presented in Table 4.

Table 4. Association between recurrent abscess at admission and abscess recurrence after treatment.

	No abscess recurrence (0)	Abscess recurrence (1)
Primary abscess (0)	55	9
Recurrent abscess at admission (1)	12	3

A recurrent abscess at admission showed only a moderate, statistically non-significant tendency to increase the risk of subsequent recurrence.

d) Intraoperative fistula

An intraoperative fistula was observed in 17 patients (21.5%), while in 62 patients (78.5%) no fistula was noted during the procedure. Patients with an intraoperative fistula did not differ significantly from the others in terms of age, sex, type of abscess, presence of recurrent abscess at admission, inflammatory parameters, duration of surgery, length of hospitalization, or complication rates (OR = 2.08; 95% CI: 0.54–7.97). The association between intraoperative fistula and recurrence is shown in Table 5.

Table 5. Association between intraoperative fistula and abscess recurrence.

	No abscess recurrence (0)	Abscess recurrence (1)
No intraoperative fistula (0)	54	8
Intraoperative fistula present (1)	13	4

An intraoperatively detected fistula was therefore not a statistically significant predictor of abscess recurrence.

e) Impact of imaging method (MRI vs TRUS) on fistula detection

After the completion of treatment, pelvic MRI or TRUS was performed in 67 patients (84.8%). In this subgroup MRI was performed in 48 patients, TRUS in 19 patients (OR = 4.25; 95% CI: 0.87–20.70). The comparison of imaging modalities is presented in Table 6.

Table 6. Association between imaging methods (MRI vs TRUS) and fistula detection.

Imaging methods	No fistula (0)	Fistula (1)
MRI (1)	32	16
TRUS (2)	17	2

Compared with TRUS, MRI showed more than a fourfold higher likelihood of detecting a fistula, although the wide confidence interval (resulting from the small number of TRUS examinations) means that this difference did not reach formal statistical significance. Clinically, however, this confirms the superiority of MRI as an imaging method in suspected complex or recurrent perianal fistulas.

f) Recurrent abscess at admission and presence of radiologic fistula

Additionally, the relationship between whether the abscess was recurrent at admission and the presence of a fistula on imaging was evaluated. In the group of patients with a primary abscess, a radiologic fistula was detected in 11 out of 64 patients (17.2%), whereas among patients with a recurrent abscess at admission, it was present in 7 out of 15 patients (46.7%) (OR = 4.22; 95% CI: 1.26–14.06). The association between recurrent abscess and radiologic fistula is shown in Table 7.

Table 7. Association between recurrent abscess at admission and presence of radiologic fistula

	No fistula (0)	Fistula (1)
Primary abscess (0)	53	11
Recurrent abscess at admission (1)	8	7

Patients presenting with a recurrent abscess had more than a fourfold higher risk of radiologically detected fistula compared to those with a primary abscess, confirming the close association between recurrence and fistulous disease. The detailed odds ratio analysis is shown in Figure 1.

Discussion

The key finding of this study is that the prognostic value of fistula detection depends on the method and timing of diagnosis. While intraoperatively detected fistulas are immediately treated and therefore lose

their predictive significance, radiologically detected fistulas represent untreated or persistent disease and remain a strong predictor of recurrence.

Radiologically detected fistulas emerged as the strongest predictor of recurrence, whereas intraoperative fistulas did not, likely because they are addressed immediately during surgery. Additionally, it was observed that patients with a recurrent abscess at admission more often had a radiologic fistula, and MRI demonstrated significantly higher sensitivity than TRUS (OR 4.25).

Radiologically confirmed fistula may reflect an advanced stage of the inflammatory process and established communication between the rectal lumen and abscess cavity. In many centers, imaging is performed only after an abnormal postoperative course, which further increases the likelihood of detecting a fistula in patients whose abscess has already recurred. Radiologically detected fistulas may serve as a marker of disease complexity and higher inflammatory burden, rather than being the direct cause of recurrence. Inflammatory markers and common comorbidities were not predictive of recurrence in this cohort, suggesting that imaging findings are more clinically informative than systemic parameters.

According to the literature patients with a pre-existing fistula (or other perianal disease) had significantly higher rates of abscess recurrence after incision and drainage ($P = 0.032$ and $P < 0.001$) [14].

Patients who underwent local ultrasound and MRI examinations before surgery were less likely to experience a recurrence of perianal fistulas. This may be because auxiliary examinations enable surgeons to recognize the scope of the abscess and clarify the surgical method [15]. A study conducted in a pediatric population demonstrated that additional surgical interventions (fistulotomy, probing) may reduce the recurrence of anal abscesses, highlighting the importance of early fistula detection, as an undiagnosed fistula may be one of the contributing factors to abscess recurrence [16].

These findings are consistent with previous studies reporting the abscess cavity size and the surgical method were independent predictors of treatment failure, and patients without preoperative MRI had a higher rate of recurrence [2].

In contrast to radiologically confirmed fistula, intraoperative fistula did not affect the risk of recurrence (OR 2.08; 95% CI 0.54–7.97). This finding is consistent with clinical observations: a fistula detected during surgery is immediately addressed according to the Hippocratic principle (probe, drainage, seton), which effectively constitutes the first stage of fistula treatment. Immediate management of intraoperative fistulas likely negates their role as a recurrence predictor. This phenomenon can be interpreted as “therapeutic confounding” — the intervention alters the natural course of the disease, causing the fistula to lose its prognostic value. These findings are supported by a meta-analysis, which demonstrated a significant reduction in recurrence, persistent abscess or fistula, and the need for repeat surgery when fistula surgery was performed concurrently with abscess incision and drainage (RR = 0.13; 95% CI, 0.07–0.24). This highlights the potential benefit of addressing the fistula at the initial intervention, effectively reducing the risk of recurrent disease and the need for additional procedures [8].

Another prospective study demonstrated that the incidence of fistula formation after the operative procedures was 37 (44.05%) in the incision and drainage group and 5 (8.93%) in the primary fistulotomy group [17].

A substantial proportion of fistulas were missed intraoperatively and detected only by imaging, highlighting the importance of postoperative radiologic assessment. The available literature lacks clear data on the proportion of fistulas detected during surgery compared with those diagnosed based on postoperative imaging. Most studies have focused on comparing the effectiveness of diagnostic modalities such as TRUS and MRI, without considering the timing of detection. In a study by Beets-Tan et al., the authors emphasized that MRI is an accurate tool for describing fistula anatomy and correlating with surgical findings, but the literature primarily assesses the accuracy of diagnostic methods rather than the timing of detection [18].

Therefore, our results may provide a valuable contribution to the understanding of fistula detection dynamics in the course of perianal abscesses. It should be noted that not all fistulas can be identified during the initial surgical procedure. Some may remain undetected—fistula tracts may be occluded or underdeveloped in the acute phase of the abscess, making localization difficult. Additionally, massive inflammatory infiltrates and limited visibility of the operative field may obscure the internal opening of the fistula. Only after the acute inflammatory phase subsides can imaging studies more accurately visualize the fistula tract. In a large study by Garg et al., postoperative MRI following fistulotomy-in-ano proved highly valuable for detecting residual or new fistulas and associated complications, even when clinical healing appeared complete, highlighting the benefit of supplementary imaging during later stages of treatment [19].

Imaging modalities such as MRI and TRUS play a key role in the diagnosis of perianal abscesses and related fistulas, particularly in complex or recurrent cases. A meta-analysis by Buchanan et al. demonstrated that the sensitivity of both methods is similar (~ 87%), but MRI showed significantly higher specificity (69%) compared with EUS (43%) [20, 21]. In the study by West et al., MRI achieved higher sensitivity (84%) and specificity (68%) in detecting fistula type than TRUS (60%, 21%) [22]. In this study, MRI demonstrated more than a fourfold higher likelihood of detecting fistulas compared to TRUS (OR 4.25). Although the confidence interval was wide (due to the small number of TRUS studies), the effect is consistent with the literature, which confirms the higher sensitivity of MRI in detecting intersphincteric, suprasphincteric, and high fistulas. These data suggest that in patients with recurrent abscesses or symptoms indicative of fistulous disease, MRI should be the first-line investigation, while TRUS has limited diagnostic utility. According to the literature pelvic MRI is superior to TRUS for the evaluation of perianal fistulas (especially for supralevator and extrasphincteric ones).

From a clinical perspective, these findings raise the question of which patients should undergo postoperative imaging. Routine MRI for all patients after abscess drainage may not be justified. However, early imaging appears particularly warranted in patients presenting with recurrent abscess, persistent symptoms, or delayed healing. In this subgroup, radiologic identification of a fistula may allow earlier

definitive management and potentially reduce the risk of further recurrence. Therefore, a selective imaging strategy based on clinical risk factors may represent a rational and cost-effective approach.

An important finding was also the observation that patients with recurrent abscesses at admission were four times more likely to have a radiologically detected fistula (OR 4.22). This result confirms clinical experience, indicating that recurrent abscesses are rarely an isolated infectious process and usually represent the manifestation of a previously unrecognized fistula [23].These data further support the argument for early imaging diagnostics in patients experiencing abscess recurrence.

Our results are consistent with reports indicating that some perianal abscesses should be considered part of the spectrum of fistulous disease. Large retrospective analyses have shown that 30% to 50% of abscesses have a fistulous component, which in many cases develops secondarily after recurrence [24, 25]. The literature also emphasizes the superiority of MRI over other imaging modalities; however, few studies have directly compared the detectability of fistulas by MRI and TRUS in the context of primary abscesses. These results support the use of postoperative imaging in patients with perianal abscesses and suggest that intraoperative identification and management of fistulas can reduce recurrence risk

This study has several limitations that should be considered when interpreting the results. Its retrospective nature carries a risk of data registration bias, and the decision to perform imaging was made individually by the treating physician, which may have biased fistula detection toward patients with more complex clinical courses. The number of TRUS examinations was limited, affecting the width of the confidence intervals for the OR. Also the follow-up period varied among patients, which may have affected the detection of recurrent abscesses. As a single-center study, the generalizability of the findings to other institutions with different patient populations and surgical protocols may be limited. Future prospective multicenter studies are warranted to validate these findings and assess their generalizability across diverse patient populations and surgical settings. The non-randomized use of imaging represents a major limitation and may have led to overestimation of the prognostic value of radiologically detected fistulas. Nevertheless, the standardized treatment protocol enhances the reliability of our findings.

Conclusion

Radiologically detected perianal fistulas are a strong and independent predictor of abscess recurrence, whereas intraoperatively identified fistulas lose prognostic significance due to immediate surgical management. MRI demonstrates higher sensitivity than TRUS and should be considered the preferred imaging modality for postoperative assessment in patients at risk of recurrence. These findings highlight the importance of selective, risk-based imaging to guide early identification and management of persistent or complex fistulous disease, ultimately supporting timely clinical decision-making and reducing the likelihood of recurrent abscess formation.

Declarations

Ethics approval and consent to participate

The study was approved by the Bioethics Committee of Jan Kochanowski University of Kielce (approval No. 1/2024). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the Declaration of Helsinki and its subsequent amendments.

Consent to participate

Written informed consent was obtained from all individual participants included in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to institutional data protection policies but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AK: Conceptualization, data collection, analysis, manuscript writing
EO: Data collection, manuscript editing
DG: Statistical analysis, data interpretation
AS: Data collection
NW: Literature review
KN: Data collection
BM: Supervision, study design, critical revision of the manuscript

All authors read and approved the final manuscript.

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References

1. Reichert M, Eckerth L, Fritzenwanker M, Imirzalioglu C, Amati AL, Askevold I, et al New Perianal Sepsis Risk Score Predicts Outcome of Elderly Patients with Perianal Abscesses. J Clin Med. 2023 Aug 10;12(16):5219. doi: 10.3390/jcm12165219. PMID: 37629259; PMCID: PMC10455731.
2. Dong, S., Chen, B. & Zhang, J. Study on the factors influencing the prognosis after perianal abscess surgery. BMC Gastroenterol 23, 334 (2023). https://doi.org/10.1186/s12876-023-02959-1
3. Shi Y, Zhi C, Cheng Y, Zheng L. A systematic review and meta-analysis of incision and seton drainage in the treatment of high perianal abscess. Ann Palliat Med 2021;10(9):9830-9840. doi: 10.21037/apm-21-2229
4. Katy Newton, Jo Dumville, Michelle Briggs, Jennifer Law, Julia Martin, Lyndsay Pearce, et al. Postoperative Packing of Perianal Abscess Cavities (PPAC2): randomized clinical trial, British Journal of Surgery, Volume 109, Issue 10, October 2022, Pages 951–957, https://doi.org/10.1093/bjs/znac225
5. Dong S, Chen B, Zhang J. Study on the factors influencing the prognosis after perianal abscess surgery. BMC Gastroenterol. 2023 Sept 27;23(1):334.
6. Moradi S, Najafpour Z, Cheraghian B, Keliddar I, Mombeyni R. The Extra Length of Stay, Costs, and Mortality Associated With Healthcare-Associated Infections: A Case-Control Study. Health Sci Rep. 2024;7(11):e70168.
7. Narayanan S, Althans AR, Reitz KM, Allen LH, Kurukulasuriya C, Larkin TM, et al. Drainage of anorectal abscesses in the operating room is associated with a decreased risk of abscess recurrence and fistula formation. Am J Surg. 2023 Feb;225(2):347–51.
8. Narsingh NP, Goswami V, Sharma R. Assessment of Clinical MRI and Intraoperative Findings in Cases of Anorectal Fistula. J Pharm Bioallied Sci. 2024 Dec;16(Suppl 4):S3992.
9. Sohrabi M, Bahrami S, Mosalli M, Khaleghian M, Obaidinia M. Perianal Fistula; from Etiology to Treatment - A Review. Middle East J Dig Dis. 2024 Apr;16(2):76–85.
10. Sikander M, Alia N, Nazir MH, Liaquat F. Diagnostic Accuracy of Magnetic Resonance Imaging in Detecting Perianal Fistula, Taking Surgical Findings as Gold Standard. Indus J Biosci Res. 2025 June 10;3(6):55–8.
11. Argın V, Usta MA. Clinical Characteristics, Surgical Outcomes, and Diagnostic Value of MRI in Patients Undergoing Surgery for Perianal Fistula: A Retrospective Study. Med Sci Discov. 2025 Nov 30;12(11):311–5.
12. Garg P, Bhattacharya K, Yagnik VD, Mahak G. Recent advances in the diagnosis and treatment of complex anal fistula. Ann Coloproctology. 2024 Aug 31;40(4):321–35.
13. Saigusa N, Saigusa J ichi, Shinozaki M, Yokoyama T, Yokoi Y, Takami H, et al. A series of seton techniques involving “top-down therapy” for patients with Crohn’s disease who initially presented with perianal fistulas. J Anus Rectum Colon. 2018 Oct 29;2(4):122–9.

14. Hajinasrollah E, Rezaee SP, Ashodari B, Rashno F, Mirhashemi SH, Souri M. Factors predisposing perianal abscess recurrence in patients underwent incision and drainage: A retrospective study. *EPH-International Journal of Medical and Health Science.* 2018;4(2). doi:10.53555/eijmhs.v5i1.59
15. Fang F, Wen L. Multifactorial Analysis of Postoperative Recurrence of Anal Fistula: A Retrospective Study. J Multidiscip Healthc. 2025 Sep 22;18:6015-6024. doi: 10.2147/JMDH.S537028. PMID: 41019154; PMCID: PMC12474735.
16. Doerner J, Seiberth R, Jafarov S, Zirngibl H, Boenicke L. Risk factors for therapy failure after surgery for perianal abscess in children. Front Surg. 2022 Dec 15;9:1065466. doi: 10.3389/fsurg.2022.1065466. PMID: 36589625; PMCID: PMC9797814.
17. Begum, N., & Ahmed, Q. S. U. (2016). Incidence of Anal Fistula and Recurrent Abscesses following Management of Perianal Abscess. *Journal of Armed Forces Medical College, Bangladesh*, *12*(2), 26–29. https://doi.org/10.3329/jafmc.v12i2.41081
18. Vo, D., Phan, C., Nguyen, L. *et al.* The role of magnetic resonance imaging in the preoperative evaluation of anal fistulas. *Sci Rep* **9**, 17947 (2019). https://doi.org/10.1038/s41598-019-54441-2
19. Garg P. Comparison of Preoperative and Postoperative MRI After Fistula-in-Ano Surgery: Lessons Learnt from An Audit of 1323 MRI At a Single Centre. World J Surg. 2019 Jun;43(6):1612-1622. doi: 10.1007/s00268-019-04926-y. PMID: 30706106.
20. Buchanan GN, Halligan S, Bartram CI, Williams AB, Tarroni D, Jeffries C, et al. Clinical examination, endosonography, and MRI in preoperative assessment of fistula-in-ano: comparison with outcome-based reference standard. Radiology. 2004;233(3):674-81.
21. Buchanan GN, Radcliffe AG, Boulos PB. Endoanal ultrasonography and magnetic resonance imaging in the evaluation of fistula-in-ano. Br J Surg. 2002;89(4):464-9.
22. West RL, van Onkelen RS, Zuidema WD, Mulder CJ, Meijerink WJ. Magnetic resonance imaging and endoanal ultrasound in the evaluation of fistula-in-ano. Int J Colorectal Dis. 2001;16(4):221-7.
23. Chaveli Díaz C, Esquiroz Lizaur I, Eguaras Córdoba I, González Álvarez G, Calvo Benito A, Oteiza Martínez F et al. Recurrence and incidence of fistula after urgent drainage of an anal abscess. Long-term results. Cir Esp (Engl Ed). 2022 Jan;100(1):25-32. doi: 10.1016/j.cireng.2021.11.012. Epub 2021 Dec 6.
24. Skovgaards, D.M., Perregaard, H., Dibbern, C.B. *et al.* Fistula development after anal abscess drainage—a multicentre retrospective cohort study. *Int J Colorectal Dis* **39**, 4 (2024). https://doi.org/10.1007/s00384-023-04576-6
25. He, Z., Du, J., Wu, K. *et al.* Formation rate of secondary anal fistula after incision and drainage of perianal Sepsis and analysis of risk factors. *BMC Surg* **20**, 94 (2020). https://doi.org/10.1186/s12893-020-00762-3

Figures

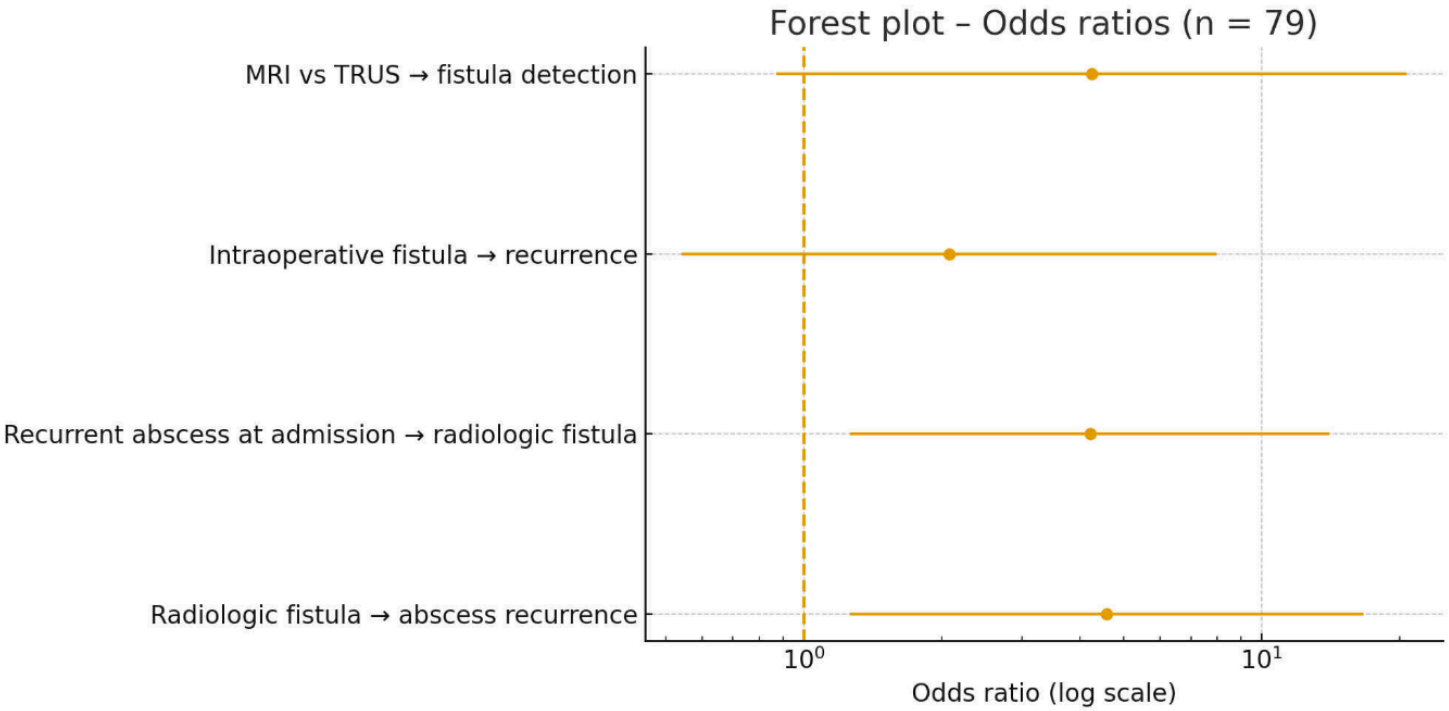


Figure 1

Odds ratios for predictors of recurrence and fistula detection in patients with perianal abscess (n = 79).