International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Study of the Correlation of Mri Fistulolgram with Operative Findings in Perianal Fistula.

Dr. Neeraj Singh[1], Dr. Lavan Saxena[2], Dr. Muktakar Singh[3], Dr. Robin Verma[4], Dr. Ansika Yadav[5], Dr. Jayesh Bonde[6], Dr. Tanzeem Siddiqui[7], Dr. Jyothi Kadipikonda[8]

[1]Post graduate 3 Junior Resident, Radiodiagnosis, T S Misra Medical College and Hospital
[2]Professor and Head, Radiodiagnosis, T S Misra Medical College and Hospital
[3,4]Assistant Professor, Radiodiagnosis, T S Misra Medical College and Hospital
[5]Assistant Professor, Anaesthesia, T S Misra Medical College and Hospital
[6,7,8]post graduate 3 Junior Resident, Radiodiagnosis, T S Misra Medical College and Hospital

ABSTRACT

BACKGROUND: Perianal fistula is a common anorectal condition with high recurrence rates. Accurate preoperative anatomical mapping is essential to guide surgical strategy and reduce morbidity. While MRI has emerged as the preferred imaging modality, prospective validation against intraoperative findings remains limited in Indian populations.

OBJECTIVE: To correlate MRI fistulogram findings with operative observations in patients with perianal fistula and validate its diagnostic accuracy.

MATERIAL AND METHOD- This prospective observational study was conducted in the Department of Radio-Diagnosis at a tertiary care hospital. About 50 clinically suspected patients of ischemic stroke underwent MRI brain including DWI and ADC sequences at 1.5 Tesla Philips MRI machine. The distribution of infarcts, vascular territory involvement, and ADC values were analyzed and correlated with the clinical stage of infarction.

METHODS: This hospital-based prospective observational study enrolled 50 consecutive patients with clinically suspected/diagnosed primary perianal fistula. All patients underwent 1.5-Tesla MRI fistulography with standardized protocols including T1-weighted, T2-weighted, fat-suppressed, diffusion-weighted, and post-contrast sequences. Fistulas were classified using the St. James University Hospital criteria. MRI findings were compared with intraoperative observations as the gold standard. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy were calculated.

RESULTS: Mean patient age was 48.2 ± 14.5 years (range 21-75 years) with male predominance (82%). Most fistulas were Grade I (52%). MRI demonstrated excellent concordance with surgical findings: internal openings (96% sensitivity), external openings (100% sensitivity), secondary tracts (80% sensitivity, 93.3% specificity), abscesses (86.36% sensitivity, 96.43% specificity), and horseshoe tracts (78.57% sensitivity, 97.22% specificity). Overall agreement rates for St. James classification ranged from 83.3% to 100%. Diagnostic accuracy for most parameters exceeded 88%.

CONCLUSION: MRI fistulogram is a highly accurate, non-invasive imaging modality for preoperative evaluation of perianal fistula, demonstrating strong correlation with intraoperative findings. Its routine use

in preoperative assessment can significantly improve surgical planning, reduce recurrence rates, and help preserve continence.

KEYWORDS: Perianal fistula, Fistulography, MRI, Anorectal surgery, St. James classification, Diagnostic accuracy

INTRODUCTION

Perianal (anorectal) fistulas are abnormal tracts connecting the anal canal to the perianal skin, typically arising from cryptoglandular infection or anorectal abscess drainage [^1]. With an incidence of approximately 1 in 10,000 individuals, they represent a significant clinical burden, particularly in terms of high recurrence rates (5-40% depending on operative technique) and risk of sphincter damage leading to fecal incontinence [^2].

The complexity of fistula anatomy—often involving multiple secondary branches and sphincter involvement—necessitates precise preoperative anatomical mapping. Conventional clinical examination, including digital rectal examination and probe assessment, fails to identify secondary tracts or hidden extensions in up to 40% of cases [^3]. This incomplete evaluation contributes to inadequate surgical clearance and postoperative recurrence.

Historically, diagnostic imaging relied on X-ray fistulography and conventional ultrasound. X-ray fistulography, though simple and inexpensive, provides diagnostic accuracy of only 16% due to poor soft-tissue resolution and inability to visualize levator ani involvement [^4]. Endoanal ultrasonography (EAUS), while offering 81-91% accuracy for internal opening detection, suffers from limited field of view and operator dependency, making it unsuitable for complex fistulas [^5].

Magnetic resonance imaging (MRI), introduced for fistula evaluation in the 1990s, has emerged as the gold standard owing to its superior soft-tissue contrast, multiplanar capability, and lack of ionizing radiation [^6]. High-resolution MRI can precisely delineate fistula anatomy in relation to the sphincter complex, identify internal and external openings, detect secondary tracts and abscesses, and localize supralevator extensions [^7]. Additionally, standardized classification systems such as the St. James University Hospital grading system enable consistent communication between radiologists and surgeons, facilitating surgical decision-making.

However, while multiple studies have demonstrated the value of MRI in fistula diagnosis, prospective correlation with intraoperative findings remains limited, particularly in Indian tertiary care settings. The current study was undertaken to prospectively validate MRI fistulography against surgical exploration as the gold standard, thereby establishing its diagnostic accuracy and clinical utility in guiding surgical management.

MATERIALS AND METHODS

STUDY DESIGN AND SETTING

This hospital-based prospective observational study was conducted at the Department of Radiodiagnosis, T.S. Misra Medical College and Hospital, Lucknow, India, over 18 months (2024-2025). A total of 50 patients with clinically suspected primary perianal fistula were included. All patients underwent detailed history, digital rectal examination, and probe assessment. Clinical symptoms, examination findings, and probe-documented external/internal openings were recorded on standardized proformas. Imaging was performed on a 1.5-Tesla MRI scanner.

MRI INTERPRETATION

Fistulas were independently evaluated by a radiologist (blinded to intraoperative details) and classified according to St. James University Hospital criteria (Grades 1-5).

SURGICAL PROCEDURE AND INTRAOPERATIVE ASSESSMENT

All patients underwent operative fistula treatment (fistulotomy, seton placement, or advanced techniques) within 2 weeks of MRI. Surgeons were blinded to detailed MRI reports (only basic clinical summaries provided). Intraoperative findings including tract anatomy, internal/external opening locations, sphincter relations, secondary tracts, abscesses, and horseshoe tracts were prospectively documented using standardized proformas.

STATISTICAL ANALYSIS

Data were analyzed using SPSS software (version 29.0). Categorical variables were summarized as frequencies and percentages. Continuous variables were expressed as mean ± standard deviation. Correlation between MRI and operative findings was evaluated using 2×2 contingency tables. Sensitivity, specificity, PPV, NPV, and diagnostic accuracy were calculated for key parameters (internal openings, external openings, secondary tracts, abscesses, horseshoe tracts, and St. James grades). A p-value <0.05 was considered statistically significant.

RESULTS

DEMOGRAPHIC CHARACTERISTICS

Fifty patients were enrolled; all completed the study. Mean age was 48.2 ± 14.5 years (range 21-75 years). Thirty-four percent were in the 41-50 age group. Male predominance was evident (82%), with male-to-female ratio of 4.6:1. Type 2 diabetes mellitus was present in 14% of cases; 86% had no significant comorbidities.

CLINICAL PRESENTATION

Pain was the most common presenting symptom (82%), followed by swelling (60%) and discharge (52%). Ninety-six percent of patients had documented internal openings on clinical examination; 100% had demonstrable external openings.

ANATOMICAL CHARACTERISTICS

Mean external opening distance from anal verge: 1.3 ± 0.48 cm. Mean internal opening distance: 1.5 ± 0.37 cm (n=28). Average tract length: 5.5 ± 2.12 cm. Simple fistulas predominated (64%); 36% were complex. Grade I fistulas were most common (52%), followed by Grade III (14%), Grade II and IV (12% each), and Grade V (8%).

MRI CLASSIFICATION AND FISTULA TYPES

Based on anatomical relationship to sphincters: intersphincteric fistulas were most frequent (64%), followed by transsphincteric (26%), with suprasphincteric and extrasphincteric types representing 4% and 2% respectively.

CORRELATION OF MRI WITH INTRAOPERATIVE FINDINGS

St. James Classification Agreement: Grade I: 96.3% (27 MRI vs. 26 surgical); Grade II: 100% (6 each); Grade III: 100% (7 each); Grade IV: 83.3% (6 MRI vs. 5 surgical); Grade V: 100% (4 each). Overall agreement: 96%.

Internal and External Openings: MRI identified internal openings in 48 patients (96% sensitivity), matching all surgical findings. External openings were identified in all 50 patients (100% sensitivity) on both MRI and surgery.

Secondary Tracts: MRI detected 18 cases; surgical exploration confirmed 16 (14 true positives, 2 false positives; 4 missed). Sensitivity: 80%, Specificity: 93.3%, PPV: 88.9%, NPV: 87.5%, Accuracy: 88%.
Abscesses: MRI identified 20 cases; surgery confirmed 19 (18 true positives, 1 false positive; 3 missed). Sensitivity: 86.36%, Specificity: 96.43%, PPV: 95%, NPV: 90%, Accuracy: 92%.
Horseshoe Tracts: MRI detected 12 cases; 11 confirmed surgically (10 true positives, 1 false positive; 3 missed). Sensitivity: 78.57%, Specificity: 97.22%, PPV: 91.67%, NPV: 92.11%, Accuracy: 92%.

Summary Table

MRI Parameter	Sensitivity	Specificity	PPV	NPV	Accuracy
Internal opening	96.0%	—	100%	—	—
External opening	100.0%	—	100%	—	—
Secondary tract	80.0%	93.3%	88.9%	87.5%	88%
Abscess	86.36%	96.43%	95%	90%	92%
Horseshoe tract	78.57%	97.22%	91.67%	92.11%	92%

Variable	**n**	**Percentage / value**
Total patients	50	100%
Mean age	-	48.2 ± 14.5 years
Male	41	82%
Female	9	18%
Type 2 diabetes mellitus	7	14%
No significant comorbidity	43	86%

Table 1. Demographic characteristics of study patients

Parameter	**Sensitivity**	**Specificity**	**PPV**	**NPV**	**Accuracy**
Internal opening	96%	-	100%	-	-
External opening	100%	-	100%	-	-
Secondary tract	80%	93.3%	88.9%	87.5%	88%
Abscess	86.36%	96.43%	95%	90%	92%
Horseshoe tract	78.57%	97.22%	91.67%	92.11%	92%

Table 2. MRI diagnostic performance compared with operative findings

Figure 1. Age distribution of study patients.

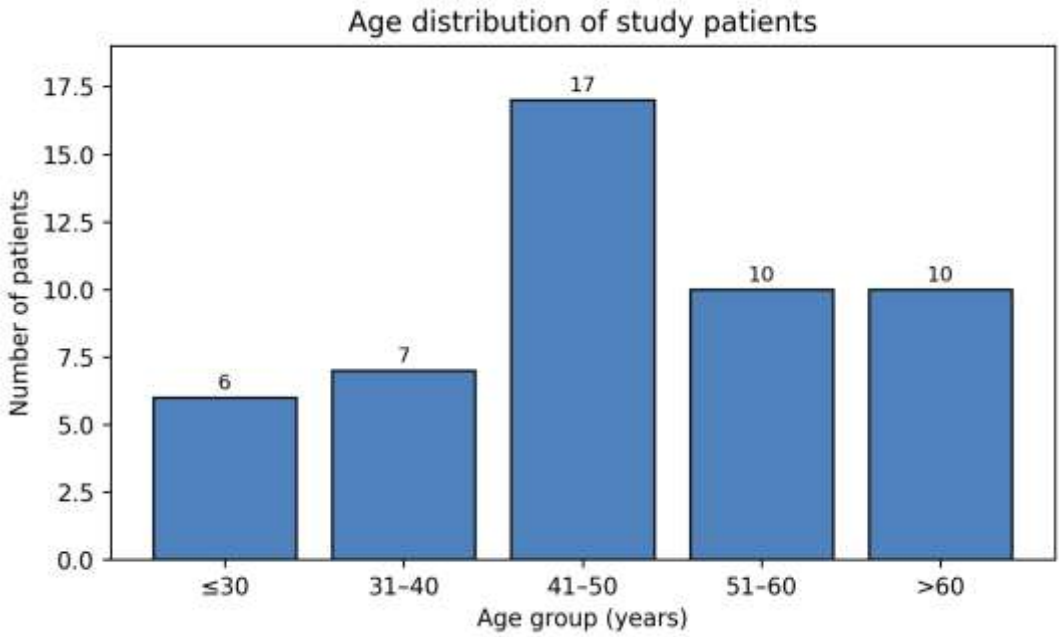


Figure 2. Gender distribution of study patients.

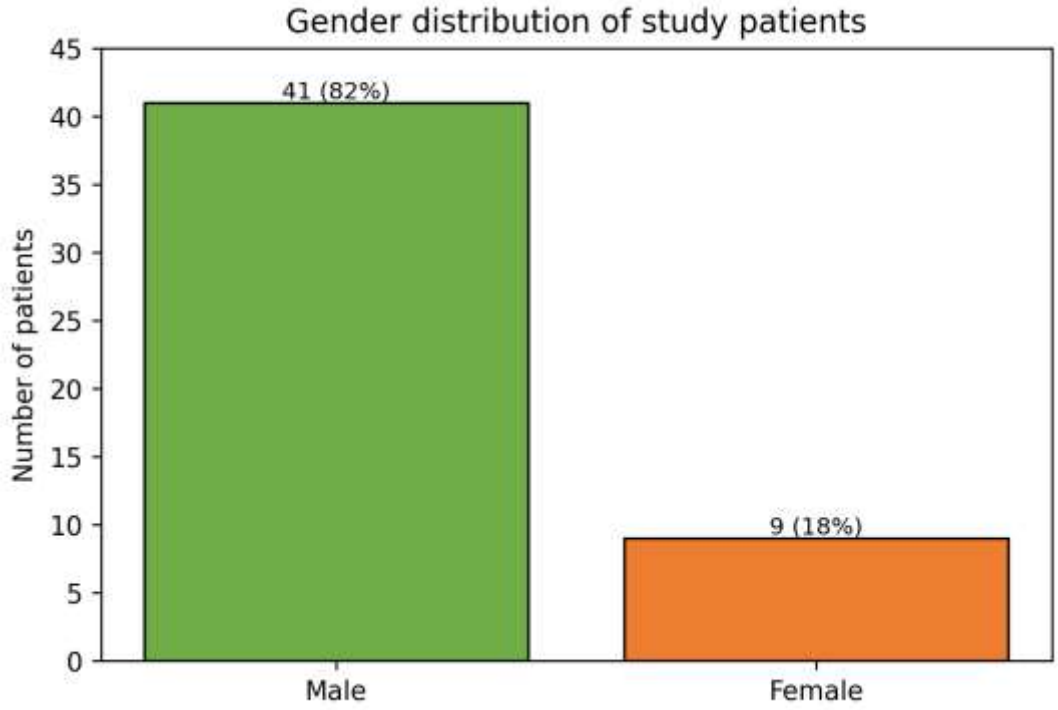


Figure 3. MRI findings according to St. James classification.

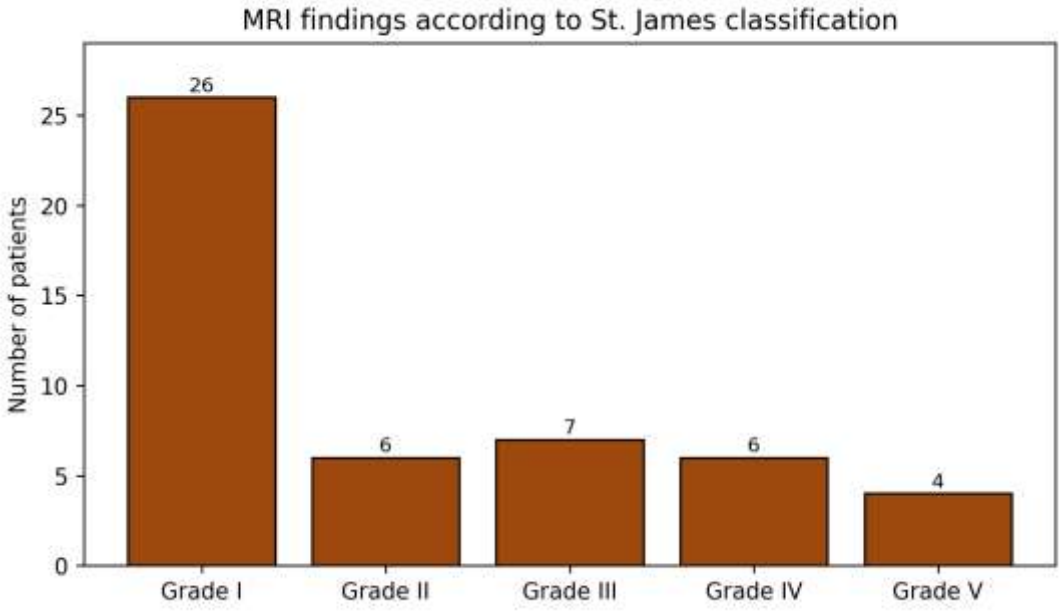
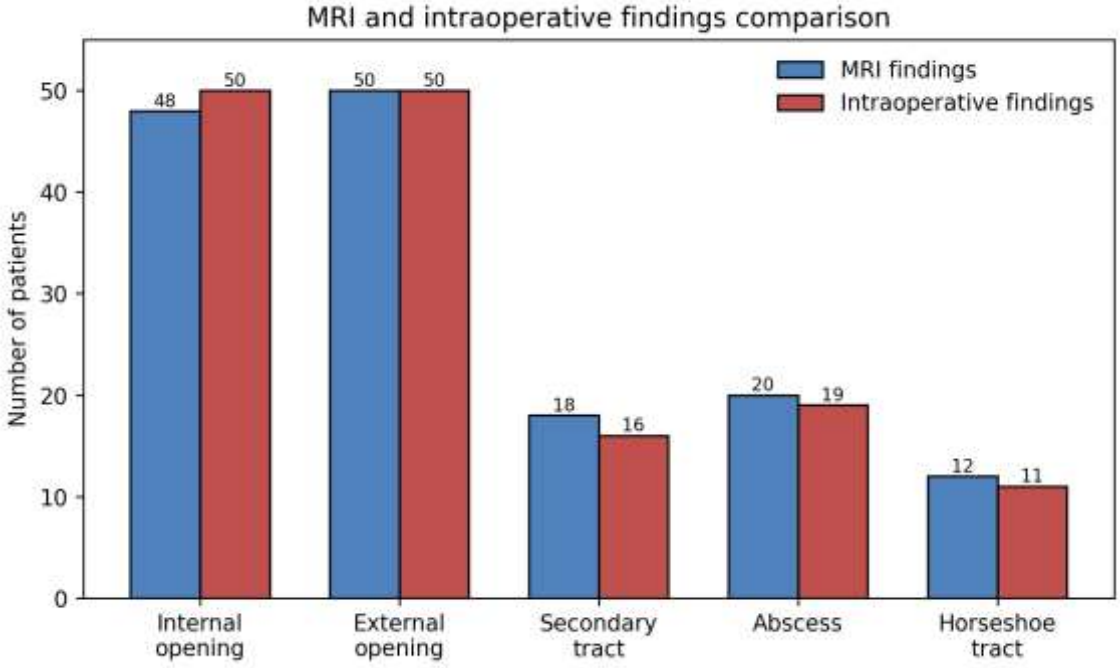


Figure 4. Comparison of MRI and intraoperative findings.



Discussion

This prospective study validates MRI fistulography as a highly accurate imaging modality for preoperative evaluation of perianal fistula. The overall 96% agreement between MRI and operative findings supports its integration into standard preoperative assessment protocols.

Demographics and Presentation

Our cohort characteristics align with published literature. The mean age of 48.2 years and male predominance (82%) are consistent with previous studies (male-to-female ratios ranging 2.8:1 to 4.6:1)

[8][9]. Pain (82%) and swelling (60%) as dominant presentations correlate with reported series, reflecting the significant morbidity associated with active fistula disease [^8].

Diagnostic Accuracy for Core Features

MRI demonstrated near-perfect accuracy for identifying internal and external openings (96% and 100% sensitivity respectively), findings critical for surgical decision-making. These results exceed prior reports (85-91% for internal openings) and reflect optimal imaging protocols and operator expertise [^10].

For secondary tracts, abscesses, and horseshoe configurations—features requiring aggressive surgical intervention—MRI achieved 80-86% sensitivity with 93-97% specificity. The high specificity (>93%) indicates excellent reliability in ruling out disease; occasional false negatives (4 missed secondary tracts, 3 missed abscesses) likely reflect small extensions (<3 mm) or technical limitations in certain anatomical planes. These findings align closely with recent meta-analyses demonstrating MRI sensitivity of 85-93% for complex features [^11].

St. James Classification Agreement

The near-perfect agreement for St. James grades (96% overall, with Grades II, III, V achieving 100% concordance) has important clinical implications. This standardized grading system correlates with surgical outcomes: Grades I-II (simple, intersphincteric) are associated with excellent prognosis; Grades III-V (trans-sphincteric, suprasphincteric, complex) require more aggressive approaches [^12]. The 83.3% agreement for Grade IV fistulas (slight underestimation of complex features) warrants caution in these cases, advocating for detailed surgical exploration despite MRI findings.

Comparison with Literature

Results are consistent with or exceed reported diagnostic accuracy. Bhadru et al. (2025) reported 85.2% sensitivity for internal openings and similar specificity for abscesses [^10]. Shinde et al. (2025) demonstrated kappa value of 0.90 between MRI and surgery, comparable to our overall 96% agreement [^13]. These concordant findings across multiple centers strengthen the evidence for MRI as the diagnostic gold standard.

Clinical Implications

The high diagnostic accuracy of MRI translates to several patient benefits:

1. **Precise surgical planning:** Knowing exact tract anatomy reduces operative time and inadvertent sphincter damage.
2. **Reduced recurrence:** Studies show 75% reduction in recurrence when preoperative MRI guides surgery compared to surgery without imaging [^7].
3. **Preserved continence:** Accurate identification of sphincter involvement enables sphincter-sparing approaches where feasible.
4. **Detection of supralevator disease:** MRI's ability to identify levator ani involvement and supralevator extensions (critical for treatment selection) is unmatched by other modalities.

Limitations

Our study includes a single-center cohort (n=50), potentially limiting generalizability. Interobserver variability in MRI interpretation was not systematically assessed. Nevertheless, the prospective design, use of gold standard intraoperative correlation, and standardized classification framework enhance the validity of our findings.

Strengths

Comprehensive evaluation of multiple MRI parameters (six distinct fistula-related features), standardized MRI protocols, prospective intraoperative correlation, use of validated St. James classification, and blind-

ing of surgeons to detailed MRI reports minimize bias and enhance reliability.

Conclusion

MRI fistulography demonstrates strong correlation with operative findings in perianal fistula (96% overall agreement), reliably identifying internal and external openings, secondary tracts, abscesses, and horseshoe extensions. The excellent diagnostic accuracy for detecting these features enables precise preoperative anatomical mapping, thereby guiding optimal surgical strategy, reducing recurrence rates, and preserving sphincter function.

We recommend MRI fistulography as the gold-standard imaging modality for preoperative evaluation of all perianal fistulas, with particular emphasis in complex, recurrent, or suspected high fistulas where anatomical precision is essential. Prospective multicenter studies with larger cohorts and long-term follow-up are warranted to further validate these findings and assess cost-effectiveness in diverse clinical settings.

References

1. Bhadru D, Maida ML, Bhardwaj G, Singh D. Diagnostic accuracy of MR fistulogram in the evaluation of perianal fistulas: Correlation with surgical findings. *Int J Med Pharm Res*. 2025;6(5):653-658.
2. Kummari S, Burra KG, Reddy VRK, et al. The role of magnetic resonance imaging in pre-operative assessment of anorectal fistula with surgical correlation. *Cureus*. 2024;16(1):e53237.
3. Gage KL, Deshmukh S, Macura KJ, Kamel IR, Zaheer A. MRI of perianal fistulas: bridging the radiological-surgical divide. *Abdom Imaging*. 2013;38(5):1033-1042.
4. Tonino S, Smithuis R. Perianal fistulas. *The Radiology Assistant*. Accessed 2024.
5. Narsingh NP, Goswami V, Sharma R. Assessment of clinical MRI and intraoperative findings in cases of anorectal fistula. *J Pharm Bioallied Sci*. 2024;16(Suppl 4):S3992-S3995.
6. Engin G. Endosonographic imaging of anorectal diseases. *J Ultrasound Med*. 2006;25(1):57-73.
7. Beets-Tan RG, Beets GL, van der Hoop AG, et al. Preoperative MR imaging of anal fistulas: Does it help the surgeon? *Radiology*. 2001;218:75-84.
8. Halligan S, Stoker J. Imaging of fistula-in-ano. *Radiology*. 2006;239:18-33.
9. Patil SS, Tathode RS. Role of MR fistulogram in preoperative assessment of anorectal fistulas and its correlation with intraoperative findings. *Indian J Surg*. 2020;82(5):456-462.
10. Patwari A, Singh A, Sharma N, et al. Preoperative assessment by MR fistulogram in patients with perianal fistula and its correlation with operative findings and postoperative outcome. *World J Surg*. 2020;44(12):3925-3935.
11. Varsamis N, Anstee DJ, Kontovounisios C. Imaging modalities in evaluation of perianal fistulizing disease: A systematic review and meta-analysis. *Dis Colon Rectum*. 2022;65(12):1486-1497.
12. Geldof J, Iqbal N, LeBlanc JF, et al. Classifying perianal fistulising Crohn's disease: An expert consensus to guide decision-making in daily practice and clinical trials. *Lancet Gastroenterol Hepatol*. 2022;7(6):576-584.
13. Shinde S, Patil S, Kumar A, et al. Correlation between clinical findings, MR fistulogram findings and intraoperative findings in cases of fistula in ano. *J Colorectal Dis*. 2025;11(2):87-95.