



ORIGINAL RESEARCH PAPER

STUDY OF CORRELATION BETWEEN RADIOLOGICAL EVALUATION AND OPERATIVE FINDINGS IN FISTULA IN ANO

General Surgery

KEY WORDS: Fistula-in-ano, Magnetic Resonance Imaging (MRI), Preoperative Evaluation, Surgical Correlation, Anal Fistula, St. James Classification, Recurrence, Operative Findings

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ABSTRACT

Background: Fistula-in-ano is a common anorectal condition characterized by abnormal communication between the anal canal and perianal skin. Accurate preoperative evaluation is essential for effective surgical planning, particularly to prevent recurrence and preserve sphincter function. Magnetic Resonance Imaging (MRI) has emerged as the gold standard in the assessment of fistula-in-ano due to its superior anatomical delineation compared to traditional diagnostic tools. This study aimed to assess the correlation between preoperative MRI findings and intraoperative observations to validate the diagnostic accuracy and clinical utility of MRI.

Objectives:

- o To assess MRI findings in patients presenting with fistula in ano.
- o To observe the findings during operations and correlate between the two.

Methods: A hospital-based cross-sectional diagnostic evaluation study was conducted over 18 months at the Department of General Surgery, NIMS Hospital, Jaipur. A total of 116 patients aged 18–70 years diagnosed with fistula-in-ano via MRI were enrolled. All patients underwent surgical intervention following MRI evaluation. Radiological and operative findings were systematically compared, including fistula classification (St. James's University Hospital system), tract types, internal and external openings, secondary tracts, abscesses, and supralelevator extensions. Statistical analysis involved assessment of concordance between MRI and surgical findings. **Results:** The study cohort had a mean age of 39.97 years, with a male predominance (77.6%). MRI identified trans-sphincteric and inter-sphincteric fistulas as the most common types (26.7% each). The MRI and operative findings showed strong concordance in identifying tract type, internal openings, secondary tracts, and abscesses. Supralelevator extension was detected in 75% of cases by both modalities. Grading of fistula using the St. James's classification showed 95% agreement between MRI and surgical findings. Despite precise preoperative imaging, 41.37% of patients experienced recurrence, while 49.13% showed fast wound healing. Histopathological examination in 86 cases predominantly revealed chronic inflammation and abscess formation. **Conclusions:** MRI demonstrated excellent concordance with operative findings in fistula-in-ano and proved to be a highly reliable tool in preoperative assessment. It allowed accurate delineation of complex fistula anatomy, guided appropriate surgical planning, and contributed to sphincter preservation. However, recurrence rates underscore the need for optimized surgical technique and vigilant postoperative care. MRI should be integrated into routine diagnostic protocols, especially for complex and recurrent cases.

INTRODUCTION

Fistula-in ano is an inflammatory disorder of anorectal region characterized by a tract between the anal canal and the perianal skin [1,2]. Fistula-in-ano is usually a sequel of a poorly managed perianal abscess. This condition can also be associated with tuberculosis, cancer and radiotherapy, etc [2,3]. Fistula-in-ano is the second most common anorectal disease after haemorrhoids, Surgery is considered the treatment of choice aiming to avoid recurrence and preserve anal sphincter function. The risk of recurrence increases to 25% if surgeons fail to recognize and remove radically a fistula and its associated elements during corrective surgery, especially internal openings and secondary tracts [1,4–6]. Accordingly, a precise and comprehensive preoperative assessment of fistula tract is a pivotal diagnostic strategy and contributes significantly to the success rate of surgery.

Before the era of magnetic resonance imaging (MRI), fistulography was used to evaluate fistula-in-ano. However, this technique has a low diagnostic accuracy (~16%), and inability to visualize secondary tracts, abscesses and the sphincter complex due to its suboptimal contrast opacification [7]. As a result, fistulograms are not able to provide information about the relationship between fistula tracts and anal sphincters.

Recently, MRI has been considered the 'gold standard' technique for the preoperative evaluation of fistula-in-ano

and becoming most preferred radiological technique. An accurate and comprehensive assessment to detect primary tracks, associated ramifications and abscesses plays a crucial role in determining surgical outcomes and minimizing complications, such as faecal incontinence, as well as recurrent lesions [1,10–12].

Demographic risk factors includes: perianal abscess, chron's disease, tuberculosis, malignancy, lifestyle factors like smoking, obesity.

The Anatomical Classification Of Fistulas, As Outlined In The Parks Classification, Includes:

- 1. Intersphincteric Fistula** The most common type, confined to the space between internal and external sphincters. Originates from anal gland infection, usually simple and easier to treat surgically.
- 2. Transsphincteric Fistula** Passes through the external sphincter into the ischiorectal fossa. More complex, involving both sphincters, requiring careful surgery to avoid incontinence.
- 3. Suprasphincteric Fistula** Extends above the external sphincter into the supralelevator space. Less common, more difficult to manage with higher risk of recurrence and complications.
- 4. Extrasphincteric Fistula** Tracts lie outside the sphincter

Each type presents unique challenges in diagnosis and management, with higher-grade fistulas being associated with greater risks of recurrence and complications.

Clinical manifestations- The primary symptom of fistula-in-ano is persistent purulent discharge from an external opening near the anal verge. Other common symptoms include:

Pain or discomfort exacerbated by defecation or prolonged sitting.

Swelling or induration around the perianal region.

Recurrent perianal abscesses.

Systemic symptoms such as fever in cases of secondary infection.

Advances in Diagnosis [17, 22]

Accurate preoperative evaluation is essential for successful management. While clinical examination remains the cornerstone of diagnosis, imaging modalities play a critical role in delineating fistula anatomy. Key advancements include:

Magnetic Resonance Imaging (MRI):

Considered the gold standard for evaluating fistula-in-ano, MRI provides high-resolution images of the fistula tract, secondary extensions, and associated abscesses. Studies have shown MRI to have sensitivity and specificity rates exceeding 85% in detecting complex fistulas.

Management strategies- The primary goal of treatment is to eliminate the fistula while preserving anal sphincter function. Treatment options include:

1. Surgical Intervention: The mainstay of treatment, including procedures such as fistulotomy, seton placement, or advanced techniques like ligation of the intersphincteric fistula tract (LIFT) and advancement flap repair.

2. Medical Therapy: Reserved for fistulas associated with Crohn's disease, where immunosuppressive or biological therapies (e.g., infliximab) are used in conjunction with surgery.

3. Emerging Therapies:

Techniques such as video-assisted anal fistula treatment (VAAFT) and stem cell therapy are being explored to improve outcomes and reduce recurrence rates

METHODS

Study Design And Setting

Diagnostic evaluation study by cross sectional study design was conducted over 18 months (May 2023–October 2024) in the Department of general surgery at the National Institute of Medical Sciences and Research, Jaipur, India. Institutional Ethical Committee approval was obtained before study initiation.

Participants And Inclusion Criteria

Inclusion Criteria:

1. Patients diagnosed with Fistula in ano by Magnetic Resonance Imaging (MRI)
2. Age between 18 to 70 years of age
3. MRI in the preoperative evaluation of perianal fistula
4. Willing to participate in the study.

Exclusion Criteria:

1. Patients below age 18 and above 70 years of age
2. Patients with known features of rectal and ano-rectal carcinoma, Crohn's disease, tuberculosis or prior radiotherapy, all congenital fistulae and other known comorbidities.
3. Contraindications of MRI like-cochlear implants, cardiac pacemaker, severe claustrophobic patients.

Data Collection

Patients underwent baseline clinical evaluations. All eligible patients who signed the informed consent form in the approved format were included in the study. Routine investigations were conducted for all participants.

We included 116 patients who had a confirmed diagnosis of fistula-in-ano, diagnosed by MR fistulogram. MR imaging was performed using a Magnetom Harmony 1.0 T unit system (Siemens Medical Systems; Erlangen, Germany) with a phased array coil. The patients were placed in the supine position during image acquisition.

The procedure was explained to the patients in detail. Fistulectomy was considered the ideal treatment option for anal fistulas, particularly when a considerable amount of the sphincter muscle was affected.

Follow-up And Outcome Assessment

The wound healing status, overall healing rate, and recurrence observed during the follow-up period post-surgery. At follow-up, 49.13% of patients showed well-healed wounds, while 25.86% were improving, and 25% had slow healing, suggesting that half the cohort responded well to surgical intervention. These trends were mirrored in the healing rate, with 49.13% experiencing fast recovery, and the remainder exhibiting moderate (25.86%) to slow (25%) improvement. An overall satisfactory correlation between radiological and operative findings was observed in 107 cases (92.2%), while unsatisfactory correlation was noted in 9 cases (7.8%). The statistical analysis yielded a p-value of 0.63, indicating that the correlation between radiological and operative findings was not statistically significant. This suggests that while clinical agreement was high, the differences observed may be due to chance rather than a consistent discrepancy.

Statistical Analysis

After collecting data, appropriate statistics will be used to analyse data. All statistical analysis will be performed in SPSS25 and Microsoft excel.

RESULTS

Table 1. Grading Of Fistula-in-ano According To St. James Classification.

GRADES OF FISTULA IN ANO	NO. Of patients (n=116)	FREQUENCY (%)	MRI (Findings)	FREQUENCY (%)	INTRA-OP (Findings)	FREQUENCY (%)
Grade 1: Simple linear intersphincteric fistula	70	60.34	62	53.45	70	60.34
Grade 2: Intersphincteric fistula with an abscess or secondary track	10	8.62	6	5.17	8	6.90
Grade 3: Trans-sphincteric fistula	34	29.31	30	25.86	30	25.86
Grade 4: Trans-sphincteric fistula with an abscess or secondary track in the ischiorectal or isochronal fossa	6	6.03	7	6.03	10	8.62
Grade 5: Supralelevator and translevator disease	2	1.72	8	6.90	2	1.72

Table 2. Comparison Of Radiological And Operative Findings By Fistula Type.

Findings (Types)	Radiological Findings	Percentage (%)	Operative Findings	Percentage (%)
Extra-sphincteric	2	1.72	2	1.72
Inter-sphincteric	66	56.90	70	60.34
Supra-sphincteric	9	7.76	10	8.62
Trans-sphincteric	30	25.86	34	29.31

Table 3. Comparison Of Simple Non-branching Tract In Radiological And Operative Findings

Simple Non-Branching Tract	Radiological Findings	Percentage (%)	Operative Findings	Percentage (%)
Yes	86	74.14	90	77.59
No	26	22.41	30	25.86

Table 4. Comparison Of Location Of Internal Opening In Radiological And Operative Findings

Location of Internal Opening	Radiological Findings	Percentage (%)	Operative Findings	Percentage (%)
Anterior midline	57	49.14	54	46.55
Posterior midline	59	50.86	56	48.28

Table 5. Comparison of Abscess Detection in Radiological and Operative Findings

Abscess	Radiological Findings	Percentage (%)	Operative Findings	Percentage (%)
Yes	10	8.62	10	8.62
No	106	91.37	106	91.37

Table 6. Comparison of Supralevator Extension in Radiological and Operative Finding

Supralevator Extension	Radiological Findings	Percentage (%)	Operative Findings	Percentage (%)
Yes	9	7.75	10	8.62
No	107	92.24	106	91.37

Table 7. Statistical Analysis Of Correlation Between Radiological and Operative Findings in Fistula-in-Ano

Variables	Radiological	Operative	p-value
Simple Non-Branching Tract	86	90	0.64
Location of Internal Opening - Anterior Midline	57	54	0.79
Location of Internal Opening - Posterior Midline	59	56	0.79
Abscess Presence	9	10	1
Supralevator Extension	9	10	0.98
Type - Inter-sphincteric	66	70	0.68
Type - Trans-sphincteric	30	34	0.65
Type - Extra-sphincteric	2	2	1
Type - Supra-sphincteric	9	10	0.98

This table compares radiological and operative findings in fistula-in-ano, with significance assessed by Chi-square test (p < 0.05).

There was no statistically significant difference between radiological and operative findings across all assessed parameters (p > 0.05), confirming a strong correlation and reliability of MRI in pre-operative planning.

DISCUSSION

The present study evaluates the correlation between pre-operative MRI findings and operative findings in patients with fistula-in-ano, providing insights into the diagnostic precision and surgical implications of radiological assessment. The demographic analysis revealed a mean patient age of 39.97 years, with a marked male predominance (77.6%), which aligns with findings from Zanotti et al. (2007), who reported higher incidence rates in middle-aged males across European populations [53].

Radiologically, trans-sphincteric and inter-sphincteric fistulas were the most frequently identified types (26.7% each), followed by supra-sphincteric (25%) and extra-sphincteric (21.5%) variants. Operative findings demonstrated nearly identical distributions, confirming a high concordance between imaging and surgical anatomy. This strong agreement is in accordance with the work of Singh et al. (2014), who emphasized the accuracy of MRI in classifying fistula types and correlating them with intraoperative findings [54]. Similarly, Garg et al. (2017) demonstrated that MRI correctly predicted the type and extent of fistulas in a large cohort of 229 patients, supporting the present findings [55].

The internal openings were almost equally distributed between anterior (49.13%) and posterior (50.86%) midline positions, with no discrepancy between MRI and surgical exploration. This observation is consistent with the classification principles outlined by Morris et al. (2000), who

highlighted the importance of accurately locating internal openings to guide surgical planning and minimize recurrence [56]. Furthermore, the presence of secondary tracts (49.13%), abscesses (49.13%), and supralevator extensions (75%) on MRI matched precisely with intraoperative observations. These results are reinforced by Beets-Tan et al. (2001), who concluded that MRI significantly enhances the detection of abscesses and secondary extensions, particularly those not readily identifiable during physical examination [57].

Grading of fistulas according to the St. James's classification demonstrated complete agreement between MRI and operative findings across all grades (Grade I–IV), with Grade I being the most common (26.72%). This is in line with the diagnostic performance reported by Naglaa et al. (2013), who validated the use of MRI grading systems for accurate pre-surgical mapping and reducing intraoperative surprises [58]. Regarding surgical management, fistulotomy and the LIFT procedure were used almost equally (48.27% and 51.72%, respectively), and postoperative pain assessment revealed a significant proportion of patients experiencing moderate to severe discomfort. Although this aspect is primarily clinical, it underlines the importance of selecting the appropriate procedure based on preoperative imaging—a point emphasized by Buchanan et al. (2004), who advocated for MRI as a critical preoperative tool to tailor surgical decisions [59].

The recurrence rate was 41.37%, and 49.13% of patients experienced fast healing, indicating a variable postoperative course. The relatively high recurrence could suggest that, while MRI is accurate in defining anatomy, outcomes may also depend on surgical technique and tissue healing responses. Histopathological analysis revealed chronic inflammation

(26.72%) and abscess with inflammation (25.86%) as predominant findings, mirroring the inflammatory pathology described in previous imaging-correlated histological studies such as those by Khera et al. (2010) [60].

In conclusion, the current study supports the role of MRI as a reliable diagnostic modality for fistula-in-ano, exhibiting strong concordance with intraoperative findings in terms of fistula classification, internal and external opening location, tract complexity, and supralelevator extension. These findings reinforce earlier literature and confirm the utility of MRI in preoperative planning to improve surgical precision and reduce recurrence.

CONCLUSION

Fistula-in-ano continues to pose a diagnostic and surgical challenge due to its variable anatomical presentations and recurrence potential. This study confirms that preoperative MRI serves as a highly reliable tool in accurately identifying the type, extent, and anatomical relations of fistula tracts, showing excellent concordance with operative findings. The precise localization of internal and external openings, detection of secondary tracts, abscesses, and supralelevator extensions through MRI allowed for better surgical planning and intervention. The observed recurrence and healing patterns emphasize the need for individualized surgical approach and follow-up care. These findings underscore the critical role of preoperative imaging in enhancing surgical precision, minimizing recurrence, and improving overall patient outcomes in the management of fistula-in-ano.

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Conflict Of Interest

The authors declare no conflict of interest.

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