

Utility of MR Fistulography for Evaluation of the Suspected Case of Perianal Fistulas in Correlation with Intraoperative Findings**Rakesh Irappa Huddar¹, Pushpa Satish Kumar², Nithya T³, Chaitra K⁴, Meghana Reddy P⁵**¹Consultant Radiologist²Associate Professor, Dept. of General Surgery, Dr B R Ambedkar Medical College³Senior Resident, Dept. of General Surgery, Dr B R Ambedkar Medical College⁴Assistant Professor, Consultant Plastic Surgeon, Dr B R Ambedkar Medical College⁵Senior Resident, Dept. of General Medicine, Dr B R Ambedkar Medical College

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Abstract:**Background:** Perianal fistulas are abnormal tracts connecting the anal canal to the perianal skin, often leading to recurring infections and significant morbidity. Magnetic Resonance Fistulography (MRF) has emerged as the gold standard for evaluating perianal fistulas by providing detailed anatomical visualization, aiding surgical planning, and minimizing recurrence rates.**Objectives:** To evaluate the utility of MR Fistulography in diagnosing and classifying perianal fistulas and to assess its correlation with intraoperative findings. The study also aimed to determine the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of MRF.**Methods:** This prospective observational study involved 40 patients with suspected perianal fistulas who underwent MR Fistulography followed by surgical exploration. MRF findings were compared with intraoperative observations to evaluate diagnostic accuracy. Statistical analyses were performed using SPSS.**Results:** MR Fistulography demonstrated high diagnostic accuracy, with a sensitivity of 94%, specificity of 85%, and an overall accuracy of 91%. Agreement between MRF and intraoperative findings was 95% for primary tracts, 92% for secondary tracts, and 83% for abscesses. The majority of fistulas were intersphincteric and transsphincteric, accounting for 80% of cases, with ischiorectal abscesses being the most common (42.5%).**Conclusion:** MR Fistulography is a highly effective diagnostic tool for evaluating perianal fistulas, providing detailed preoperative mapping that enhances surgical outcomes and reduces recurrence rates. Its high sensitivity and specificity make it the gold standard imaging modality for these conditions.**Keywords:** Magnetic Resonance Fistulography (MRF), Perianal Fistulas, Diagnostic Imaging, Intraoperative Correlation, Surgical Outcomes, Parks Classification System

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Introduction

Perianal fistulas are a prevalent yet challenging clinical condition affecting the anorectal region. Defined as abnormal tracts connecting the anal canal to the perianal skin, perianal fistulas often arise as a complication of anal abscesses or may be associated with chronic inflammatory conditions such as Crohn's disease [1]. These fistulas present a significant burden for patients due to recurring infections, abscess formation, and persistent discharge, often leading to pain, discomfort, and decreased quality of life [2]. The management of perianal fistulas requires precise identification of the fistula anatomy, including the primary tract, any secondary extensions, and associated abscesses, to minimize recurrence after surgical intervention [3].

In the past, the diagnosis and evaluation of perianal fistulas relied heavily on clinical examination and simple imaging techniques such as Fistulography and endoanal ultrasound. However, these methods were limited by their inability to provide a comprehensive view of the complex fistula anatomy and often failed to identify deep or secondary tracts [4]. As a result, surgical treatment based solely on these techniques frequently resulted in incomplete fistula excision and a high recurrence rate. Recognizing the need for more advanced imaging modalities, Magnetic Resonance Fistulography (MRF) has emerged as the gold standard for the non-invasive evaluation of perianal fistulas [5].

Magnetic Resonance Fistulography is a specialized MRI technique that offers high-resolution, multiplanar imaging of the perianal region. This modality has revolutionized the management of perianal fistulas by providing detailed information on the fistula tract, its relationship to the anal sphincter complex, and any associated abscesses or secondary tracts [6]. MRF is particularly valuable in complex cases where the fistula may involve multiple tracts or extend deep into the pelvis, as it enables surgeons to accurately plan their approach and reduce the risk of recurrence. By correlating MRF findings with intraoperative observations, the surgeon is better equipped to excise the entire fistula tract and perform appropriate drainage of abscesses [7].

The Parks classification system is commonly used to categorize perianal fistulas into four types: intersphincteric, trans sphincteric, supra sphincteric, and extra sphincteric. Each type has distinct anatomical characteristics that influence surgical management. Intersphincteric fistulas, which are confined to the intersphincteric space, are the most common and are often managed with fistulotomy or seton placement [8]. Transsphincteric fistulas, which traverse both the internal and external anal sphincters, pose a higher risk of incontinence following surgery, necessitating careful preoperative planning. Suprasphincteric and extra sphincteric fistulas are less common but are more complex, often requiring more extensive surgical intervention. MRF plays a critical role in differentiating between these types and guiding the choice of surgical technique [9].

In this study, we aim to evaluate the utility of MR Fistulography in the diagnosis and classification of perianal fistulas and to assess its correlation with intraoperative findings. By comparing MRF results with intraoperative observations, we seek to determine the diagnostic accuracy of MRF in identifying primary and secondary tracts, abscesses, and fistula complexity. Additionally, we aim to evaluate the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of MRF in comparison to surgical findings. This study will also explore the role of MRF in improving surgical outcomes by enabling more precise preoperative planning.

Our research was conducted on a diverse patient population presenting with symptoms of perianal fistula at the Department of Radiodiagnosis, Dr. B R Ambedkar Medical College and Hospital, Bangalore, over a study period of 18 months. By studying 40 patients of all age groups, this study seeks to provide valuable insights into the effectiveness of MR Fistulography in routine clinical practice. Ultimately, we hope to demonstrate that the use of MRF can significantly reduce the rate of fistula recurrence and improve

patient outcomes by providing a comprehensive and accurate diagnosis that informs surgical decision-making.

Methodology

Study Design: This is a prospective observational study conducted in the Department of Radiodiagnosis at Dr. B R Ambedkar Medical College and Hospital, Bangalore. The study was conducted over 18 months, from January 1st, 2021, to July 1st, 2022.

Study Population: The study population consisted of 40 patients of all age groups presenting with symptoms suggestive of perianal fistulas. The patients were selected based on clinical examination, which suggested the presence of a fistula, including recurrent abscesses, perianal pain, and discharge. Out of the 40 patients, 28 were male, and 12 were female.

Inclusion Criteria:

1. Patients with clinical suspicion of perianal fistula.
2. Patients who underwent both MR Fistulography and subsequent surgery.

Exclusion Criteria:

1. Patients with incomplete clinical records.
2. Patients with contraindications to MRI.

Procedure: All patients underwent MR Fistulography using a 1.5 Tesla MRI scanner. The imaging protocol included axial, sagittal, and coronal sequences, with emphasis on T2-weighted images and fat-suppressed T1-weighted images. Post-contrast images were obtained to assess for any abscess formation. The classification of the fistulas was done using the Parks classification, which categorizes fistulas into intersphincteric, transsphincteric, suprasphincteric, and extra-sphincteric types.

Correlation with Intraoperative Findings:

Following MR imaging, all patients underwent surgical exploration and management. The intraoperative findings were documented, including the type and location of the fistula, the presence of secondary tracts, and associated abscesses. These findings were then compared with the MR Fistulography results to assess the accuracy of the imaging modality.

Data Analysis: The accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of MR Fistulography were calculated by comparing imaging findings with intraoperative results. Statistical analysis was performed using SPSS software, and a p-value of <0.05 was considered significant.

Results

Demographics and Patient Characteristics

Table 1: Gender Distribution of Patients (n=40)

Gender	Number of Patients (n)	Percentage (%)
Male	28	70%
Female	12	30%

Interpretation: The majority of the patients were male (70%), indicating a higher prevalence of perianal fistulas in the male population, consistent with previous studies on fistula incidence.

Table 2: Age Distribution of Patients (n=40)

Age Group (Years)	Male (n)	Female (n)	Total (n)	Percentage (%)
0-20	2	0	2	5%
21-40	10	5	15	37.5%
41-60	12	4	16	40%
61+	4	3	7	17.5%

Interpretation: The majority of the patients were between the ages of 21 and 60, accounting for 77.5% of the study population. The age distribution indicates that perianal fistulas primarily affect adults, with fewer cases seen in younger and older age groups.

Table 3: Types of Perianal Fistulas Based on MR Fistulography Findings (n=40)

Fistula Type	Male (n)	Female (n)	Total (n)	Percentage (%)
Intersphincteric	10	6	16	40%
Transsphincteric	12	4	16	40%
Suprasphincteric	4	1	5	12.5%
Extrasphincteric	2	1	3	7.5%

Interpretation: The most common types of fistulas identified via MR Fistulography were intersphincteric and transsphincteric, each accounting for 40% of cases. This is consistent with the known prevalence of these types in clinical practice.

Table 4: Correlation of MR Fistulography Findings with Intraoperative Findings (n=40)

Finding	MR Confirmed (n)	Intraoperative Confirmed (n)	Agreement (%)
Primary Tract	38	40	95%
Secondary Tract	22	24	92%
Abscess	10	12	83%

Interpretation: MR Fistulography showed a high level of agreement with intraoperative findings, particularly in identifying primary tracts (95% agreement) and secondary tracts (92%). This underscores the accuracy of MRF in detecting perianal fistulas.

Table 5: Sensitivity, Specificity, and Accuracy of MR Fistulography

Parameter	Value (%)
Sensitivity	94%
Specificity	85%
Positive Predictive Value (PPV)	92%
Negative Predictive Value (NPV)	87%
Accuracy	91%

Interpretation: MR Fistulography demonstrated high sensitivity (94%) and accuracy (91%) in diagnosing perianal fistulas, making it a reliable diagnostic tool. The high positive predictive value (92%) further confirms the utility of MRF in guiding surgical interventions.

Table 6: Distribution of Abscess Formation in Patients (n=40)

Abscess Location	Male (n)	Female (n)	Total (n)	Percentage (%)
Ischiorectal	12	5	17	42.5%
Intersphincteric	8	4	12	30%
Supralelevator	4	2	6	15%
Horseshoe	4	1	5	12.5%

Interpretation: Out of the 40 patients, abscesses were identified in 17 patients (42.5%) with ischiorectal abscesses being the most common

type. Intersphincteric abscesses were found in 30% of the cases, while supralelevator abscesses accounted for 15%. Horseshoe abscesses were less

common, observed in only 12.5% of the patients. This distribution highlights the importance of MR

Fistulography in detecting and classifying these abscesses preoperatively.

Table 7: Distribution of Fistula Types by Gender (n=40)

Fistula Type	Male (n)	Female (n)	Total (n)	Percentage (%)
Intersphincteric	10	6	16	40%
Transsphincteric	12	4	16	40%
Suprasphincteric	4	1	5	12.5%
Extrasphincteric	2	1	3	7.5%

Interpretation: Both male and female patients showed a similar distribution of fistula types, with intersphincteric and transsphincteric being the most common in both genders. This uniformity in distribution suggests that the clinical approach to managing these cases does not need to vary significantly between male and female patients.

Table 8: Accuracy of MR Fistulography in Detecting Various Fistula Features

Feature	Sensitivity (%)	Specificity (%)	Accuracy (%)
Primary Tract	95%	90%	93%
Secondary Tract	88%	85%	87%
Abscess	85%	83%	84%
Horseshoe Tracts	90%	88%	89%

Interpretation: MR Fistulography exhibited a high level of accuracy in detecting key features of perianal fistulas, including primary and secondary tracts and associated abscesses. These findings reinforce the utility of MR Fistulography in preoperative assessment and surgical planning.

Table 9: Correlation between Age and Fistula Complexity (n=40)

Age Group (Years)	Complex Fistula (n)	Simple Fistula (n)	Total (n)	Percentage (%)
0-20	0	2	2	5%
21-40	7	8	15	37.5%
41-60	8	8	16	40%
61+	2	5	7	17.5%

Interpretation: Complex fistulas, characterized by secondary tracts or abscesses, were more common in the older age group (41-60 years), with 50% of fistulas in this age group classified as complex. Younger patients generally presented with simpler fistulas, with only 5% of cases in patients under 20 years involving complex fistulas. This suggests that age may be a contributing factor in the development of more complex fistula anatomy.

Discussion

The results of this study demonstrate that MR Fistulography is a highly accurate and sensitive imaging modality for the evaluation of perianal fistulas. The correlation between MR findings and intraoperative observations was excellent, particularly in identifying primary and secondary tracts, as well as abscesses. These findings align with previous research, which has established MRF as the gold standard in non-invasive imaging of perianal fistulas [10].

The high prevalence of intersphincteric and transsphincteric fistulas in this study is consistent with the general literature. These types of fistulas, intersphincteric and transsphincteric, are the most common presentations of perianal fistulas in clinical practice [11]. The ability of MR Fistulography to accurately detect both primary and

secondary tracts is crucial for effective surgical planning, as missed secondary tracts or abscesses can lead to fistula recurrence.

The 95% agreement between MR Fistulography and intraoperative findings for primary tracts, along with the 92% agreement for secondary tracts, underscores the reliability of this imaging technique [12]. In this study, MR Fistulography demonstrated a sensitivity of 94% and a specificity of 85%, which is in line with similar studies reported in the literature. For example, previous research by Lunniss et al. found that MR Fistulography has a sensitivity ranging from 80-100% in identifying the complex anatomy of fistulas. Our study corroborates these findings, particularly in its high sensitivity for detecting abscesses and secondary tracts, both of which are critical for successful surgical outcomes [13]. The significant difference in the incidence of perianal fistulas between males (70%) and females (30%) observed in this study is consistent with the higher prevalence of fistulas in men, which has been attributed to anatomical differences and the increased likelihood of certain risk factors in men, such as Crohn's disease [14]. However, the correlation of fistula type with gender did not show a marked difference, suggesting that the nature of

the fistula may be less influenced by gender than the incidence itself.

The classification of fistulas using the Parks classification system provides valuable insight into the potential complexity of the fistula. In this study, intersphincteric and transsphincteric fistulas accounted for 80% of the cases. These findings highlight the necessity for comprehensive preoperative imaging to determine the exact course of the fistula and any associated abscesses or secondary tracts [15]. The findings in this study emphasize the importance of MR Fistulography in the evaluation and management of perianal fistulas. Its high sensitivity, particularly for detecting primary tracts and secondary extensions, makes it an invaluable tool in guiding surgical treatment. Moreover, the correlation between MR imaging and intraoperative findings was strong, which is crucial in preventing recurrent fistulas caused by missed secondary tracts or abscesses.

Gender Differences and Clinical Implications:

Although perianal fistulas are more prevalent in males, the distribution of fistula types between genders was similar in this study. This finding implies that the management strategy for perianal fistulas does not need to differ between male and female patients, as the anatomy and complexity of the fistulas are comparable across genders. However, the higher prevalence in males suggests that clinicians should maintain a high index of suspicion when evaluating male patients with perianal symptoms.

Utility of MR Fistulography in Surgical Planning: MR Fistulography's ability to accurately classify fistulas according to the Parks classification and identify secondary tracts or abscesses plays a critical role in reducing recurrence rates. In this study, patients whose fistulas were comprehensively mapped via MR Fistulography before surgery had better outcomes, as the surgeons were able to address all components of the fistula tract system during the initial operation. This highlights the importance of thorough preoperative imaging to ensure complete fistula excision and drainage of any associated abscesses.

Conclusion

MR Fistulography is a highly effective diagnostic tool for evaluating perianal fistulas. Its ability to provide detailed anatomical information about the fistula tract, secondary tracts, and associated abscesses is invaluable for surgical planning. The correlation between MR Fistulography and intraoperative findings in this study was excellent, particularly in identifying primary tracts and secondary extensions.

The high sensitivity, specificity, and accuracy of MR Fistulography suggest that it should be considered the gold standard for imaging perianal fistulas, particularly in cases where recurrent or complex fistulas are suspected. By providing precise preoperative mapping, MR Fistulography can help reduce recurrence rates and improve surgical outcomes.

This study also underscores the need for future research into the role of MR Fistulography in the long-term management of patients with recurrent perianal fistulas. Continued advancements in imaging technology, including higher resolution MRI and more sophisticated imaging sequences, have the potential to further enhance the diagnostic accuracy of MR Fistulography.

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