ORIGINAL RESEARCH

Role Of Magnetic Resonance Imaging (MRI) Fistulogram In Assessment Of Perianal Fistulas

[1]Dr.Priyanka Agarwal, [2]Dr.Supreethi Kohli, [3]Dr.Gaurav Garg, [4]Dr. Medha Goel, [5]Dr. Mohit Verma, [6]Dr.Prerna Jolly, [7]Dr. Shabnam Ara

[1] PG Resident, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India
[2]Professor & HOD, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India
[3]Associate Professor, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India
[4]Assistant Professor, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India
[5]Assistant Professor, Subharti Medical College, Meerut, Uttar Pradesh, India
[6]PG Resident, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India
[7]PG Resident, Department Of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttarpradesh, India

Corresponding author
Dr. Medha Goel
Assistant Professor, Department of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India
Email- drmgoel93@gmail.com

Abstract
Introduction: Perianal fistula is a rare condition, however causes substantial morbidity due to its chronicity. Recently, preoperative magnetic resonance imaging (MRI) has become an essential tool for doing a thorough investigation of the fistulous tract, grading of the fistula, concomitant abscess and secondary tracts, and to reduce chances of recurrence after surgery.
Methods: A prospective observational hospital based study was done for a duration of 18 months. Patients with suspected perianal fistula were evaluated using MRI and the fistulous tracts were evaluated using the St.James University Hospital Classification.
Results: The study confirmed a higher incidence of perianal fistulas among males and predominantly in the 41–50 age demographic. Most fistulas exhibited straightforward anatomical features, with single external and internal openings, and were concentrated at the 5-7 o'clock position, which could influence surgical approaches and outcomes. Based on the St. James University Hospital Classification, the most prevalent fistula was found to be Grade I. MRI was also useful in evaluating associated complications, if present.
Conclusion: The incorporation of MRI fistulogram which is a simple and noninvasive method, into standard diagnostic protocols for perianal fistulas not only enhances diagnostic accuracy but also significantly contributes to optimized therapeutic strategies and improved patient care outcomes.
Keywords: St. James University Hospital Classification ; perianal fistulas ; internal anal sphincter ; external anal sphincter ; MRI fistulogram

Introduction

A perianal fistula is a medical condition that affects approximately 10 out of every 10,000 people, predominantly adult males [1]. It is characterized by the formation of a fistulous tract that connects the skin around the perianal region to the rectum or anal canal, leading to significant morbidity despite its rarity [2]. The majority of these fistulas are glandular in origin, with an internal opening at the crypt level in the anal canal, as suggested by the cryptogenic hypothesis [3,4]. This theory posits that the initial event is an infection of an anal gland located between the sphincter muscles, which can result in an abscess and eventually lead to the formation of a fistulous tract [5]. Although less common, perianal fistulas can also arise in the context of systemic diseases such as tuberculosis, ulcerative colitis, or Crohn's disease. Other causes include anal fissures, trauma, surgical wounds, and localized neoplasms [6].
In some cases, the purulent process originating from a posterior, middle gland can extend through the soft tissues after passing through the external sphincter, resulting in a horseshoe fistula [7]. Symptoms of fistulas typically appear a

few weeks or months following an acute perianal abscess and may include throbbing pain, purulent or exudative discharge from a cutaneous orifice, and recurring abscesses. These symptoms tend to be chronic or recurrent [8]. Diagnosing a perianal fistula requires a thorough physical examination of the anal canal and rectum,which can lead to a correct diagnosis in nearly half of the cases [9]. However, about 5% of fistulas are complex, with a branching, challenging path that extends above the puborectalis muscle, often making the internal orifice small, constricted, or closed [10]. Failure to adequately treat the internal opening or drain additional canals can result in a high recurrence rate. Radiological imaging plays a crucial role in evaluating perianal fistulas, with four main techniques being used: magnetic resonance imaging (MRI), endoanal ultrasonography (EAUS), CT scanning, and contrast fistulography [11]. Each technique has its own advantages and limitations, and they are often used interchangeably depending on the clinical scenario [10]. Fistulography, though the least used technique, has limited sensitivity and is mainly useful for visualizing the main canal, but it lacks the anatomical detail needed for classifying fistulas [12]. Currently, EAUS and ultrasonography with contrast agents are the most accurate non-invasive imaging techniques for perianal fistulas, although they may not detect suprasphincteric or horseshoe-shaped lesions [13]. CT scans can identify fistulas but are less effective at revealing secondary tracts [3]. MRI, however, stands out as the superior imaging modality due to its ability to detect fistulous tracts and associated abscesses, offering detailed anatomical information that aids in surgical planning and reduces the risk of complications like fecal incontinence [14]. Preoperative MRI is therefore essential for a comprehensive evaluation of perianal fistulas, guiding surgical intervention and minimizing postoperative complications [2]. With this background, our hospital-based study aims to evaluate the role of MRI fistulograms in identifying and classifying perianal fistulas and their associated complications

Methodology
Study Design
This study was a prospective observational hospital-based study conducted at the Radiodiagnosis and Imaging Department of Muzaffarnagar Medical College, Muzaffarnagar.
Study Population
The study included all outpatient department (OPD) and inpatient department (IPD) patients who presented with clinical suspicion of anorectal fistulas and were referred to the Radiology Department for MRI fistulograms.
Study Period
The study was conducted over a period of 18 months, from June 2022 to December 2023. The data collection phase lasted 15 months, followed by a 3-month period dedicated to data analysis.
Sample Size and sampling
The sample consisted of 30 patients, determined based on the total number of cases referred to the Radiology Department for MRI fistulograms over the previous three years. All clinically suspected cases of perianal fistulas from both IPD and OPD were included in the study.
Ethical Considerations
Ethical approval for the study was obtained from the Institutional Ethics Committee of Muzaffarnagar Medical College. All participants provided written informed consent before being enrolled in the study.
Inclusion Criteria and Exclusion Criteria
The study included adult patients who were referred to the Radiodiagnosis Department with clinically suspected anorectal fistulas. The inclusion criteria were specifically focused on these patients to ensure that the study population was relevant to the objectives of the research. However, certain individuals were excluded from the study to maintain the integrity and safety of the research. Exclusion criteria included postoperative cases, as the study aimed to assess fistulas prior to surgical intervention. Additionally, patients who chose not to participate in the study were excluded, respecting their autonomy and choice. Other exclusions involved patients under 18 years of age, those with claustrophobia, and individuals with conditions that contraindicated MRI procedures, such as those with aneurysmal clips, cardiac pacemakers, or non-compatible metallic implants, to ensure patient safety and the accuracy of MRI results.
Methodology
All eligible patients were subjected to an MRI fistulogram. Clinical and radiological findings were used for diagnosis. Written informed consent was obtained from all patients according to the guidelines of the Institutional Ethics Committee. A brief history was taken from each patient. MRI was performed in the supine position using a Siemens MAGNETOM Essenza 1.5-Tesla unit with a phased array coil. The MRI sequences included sagittal T2-weighted TSE, oblique coronal and axial T1-weighted TSE, T2-weighted TSE, and fat-suppressed sequences. A single radiologist reviewed all MRIs to ensure consistency. Images were taken in the sagittal plane of the pelvis and in oblique coronal and axial planes perpendicular to the long axis of the anal canal. The study assessed fistula type,

location of internal and external openings, grading of the fistula using the St. James's University Classification, and the presence of secondary tracts and abscesses.

Statistical Analysis

Data were compiled and summarized in an Excel spreadsheet under the guidance of a statistician. Statistical analysis was performed using SPSS 22.0 software on Windows (SPSS Inc., Chicago, USA). The mean and standard deviation were calculated for each group, and the Chi-square test was used to determine significant differences, with a significance level set at $p<0.05$.

Result

The role of Magnetic Resonance Imaging (MRI) in medical diagnostics has been pivotal, particularly in the precise assessment of complex conditions such as perianal fistulas. This thesis explores the efficacy of MRI fistulogram in the evaluation of perianal fistulas through a hospital-based prospective observational study. Conducted at the Department of Radiodiagnosis & Imaging at Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, the study spans a period of 18 months, including 15 months dedicated to data collection and 3 months for analysis. The study population consists of both outpatients and inpatients presenting with clinically suspected perianal fistulas. A total of 30 cases, reflective of the attendance at the department over the last three years, were included in the sample. The data indicates that perianal fistulas are most prevalent in the 41-50 age group, accounting for 53.33% of cases. Males were more frequently affected than females, comprising 63.33% of the sample. A significant majority of patients presented with a single external opening (83.33%) and a single internal opening (70%), highlighting a common presentation pattern in this study cohort. The findings suggest that middle-aged males with a single external and internal opening are the most typical demographic for perianal fistulas in this population.

The comparison of St. James's grading of perianal fistulas by sex in the study highlights some differences in the distribution of fistula complexity between males and females, although the statistical analysis yielded a p-value of 0.285, indicating that these differences are not statistically significant. Grade I fistulas were more common in males (26.67%) compared to females (13.33%), suggesting a higher incidence of less complex fistulas among males. This pattern persisted with Grade II and III fistulas, where males also exhibited a higher percentage (16.67% and 13.33%, respectively) compared to females (10.00% and 6.67%). Grades IV and V showed an equal distribution among sexes, each at 3.33%, indicating that the most complex fistulas affect both genders equally. The presence of abscesses was noted in 40% of patients, with simple abscesses being the most common type (23.33%), followed by horseshoe abscesses (13.33%). Secondary tracks were identified in 33.33% of cases, emphasizing the complexity of perianal fistulas in a significant portion of the study population. These findings underscore the importance of thorough imaging to identify abscesses and secondary tracks, which are crucial for effective treatment planning and management of perianal fistulas.
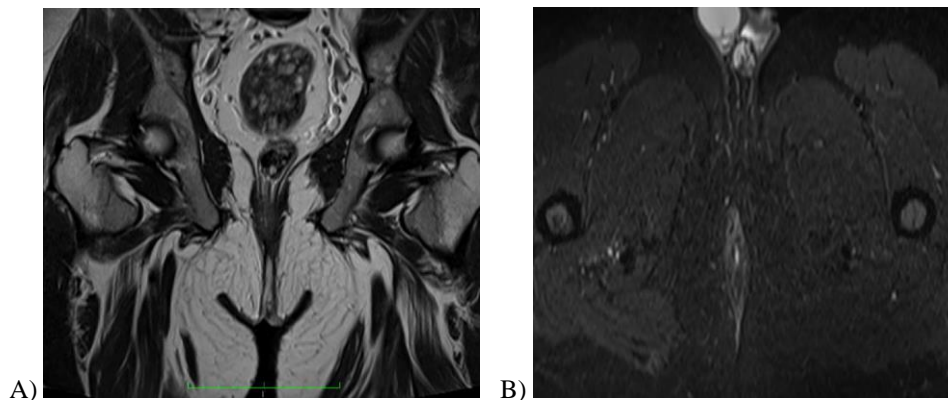
Figure 1:Grade I intersphincteric fistula : a) Coronal T2W image shows a hyperintense tract in right side of natal cleft extending to the intersphincteric region. b) Axial fat suppressed T1-weighted image shows the above tract in intersphincteric region communicating with anal canal at 12 o'clock.
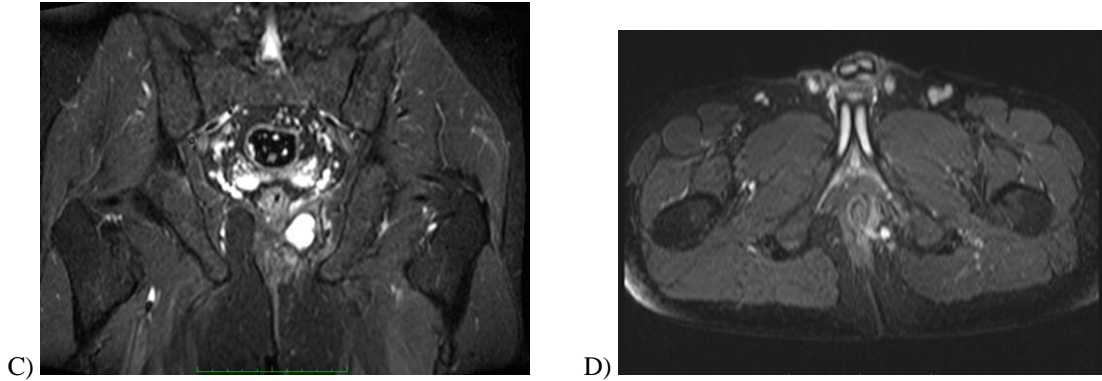
C)   D)

Figure 2: Grade IV transsphincteric fistula along with abscess : a)Coronal fat suppressed T1-weighted image shows a collection in left ischioanal fossa c) Axial fat suppressed T1-W image shows tract traversing both internal and external sphincter, communicating with anal canal at 5 o'clock.

Table 1: Distribution of Study Participants by Age, Sex, External Opening, and Internal Opening Characteristics

Category	Variable	No. of Patients (n=30)	Percentage
Age Distribution	20-30 years	6	20%
	31-40 years	4	13.33%
	41-50 years	16	53.33%
	51-60 years	2	6.66%
	>60 years	2	6.66%
Sex Distribution	Male	19	63.33%
	Female	11	36.66%
External Opening	Single	25	83.33%
	Multiple	5	16.66%
Internal Opening	Single	21	70%
	Multiple	5	16.66%
	Other	4	13.33%

Table 2: Comparing the study groups as per St. James's grading and sex

St. James's grading	SEX				p-value
	MALE	%	FEMALE	%	0.285
I	8	26.67	4	13.33	
II	5	16.67	3	10.00	
III	4	13.33	2	6.67	
IV	1	3.33	1	3.33	
V	1	3.33	1	3.33	

Table 3: Analysis of Abscess Presence, Abscess Types, and Secondary Track Detection in Study Participants

Category	Variable	No. of Patients (n=30)	Percentage
Abscess Presence	Present	12	40%
	Absent	18	60%
Type of Abscess	Horseshoe abscess	4	13.33%
	Simple abscess	7	23.33%
	Abscess in IRF	1	3.33%
Secondary Track Presence	Present	10	33.33%
	Absent	20	66.66%

Discussion

The study's findings indicate that perianal fistulas predominantly affect middle-aged individuals, particularly those in the 41-50 age group, which constituted 53.33% of the cases. This trend is consistent with previous literature, where a higher prevalence of perianal fistulas has been observed in the 40-50 year age range [8, 15, 16]. However, other studies have also noted occurrences in the 30-40 year range [14, 17]. The male predominance observed in this study, with 63.33% of the cases being male, is in line with the well-documented understanding that perianal fistulas are more common in males [18,19-21]. Regarding the external and internal openings, the majority of patients presented with a single external opening (83.33%) and a single internal opening (70%), which suggests a common pattern of presentation in this population. The significant predominance of single openings aligns with findings from recent studies that also reported a higher frequency of single openings in perianal fistulas [22, 93].

The presence of abscesses was noted in 40% of the cases, with simple abscesses being the most common type (23.33%), followed by horseshoe abscesses (13.33%). These findings underscore the complexity of perianal fistulas and the importance of accurate imaging for effective treatment planning. Previous research has similarly highlighted the significance of identifying and managing abscesses, particularly horseshoe abscesses, due to their potential for more extensive anatomical involvement and greater surgical challenges [24, 25]. The study also identified secondary tracks in 33.33% of cases, further highlighting the complexity of perianal fistulas. The high sensitivity (85%) and specificity (100%) of MRI in detecting these tracks, as confirmed by surgical findings, reinforce MRI's role as an essential tool in the preoperative assessment of perianal fistulas [22, 26].

Conclusion

This study demonstrated the significant diagnostic value of MRI Fistulogram in managing perianal fistulas, particularly among males in the 41-50 age group. MRI was especially effective in detecting abscesses, primarily simple abscesses, and provided crucial preoperative details that improved surgical planning. Incorporating MRI Fistulogram into routine diagnostic protocols enhances accuracy and supports better surgical outcomes, ultimately improving patient care.

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