

Original Research Article

Magnetic resonance imaging classification of perianal fistula and its surgical correlation: a prospective observational study

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ABSTRACT

Background: Perianal fistula is a common anorectal disorder characterized by chronic infection and abnormal communication between the anal canal and perianal skin. Successful treatment depends on complete identification of the primary tract, secondary extensions, internal opening, and associated abscesses before surgery. Clinical examination alone often underestimates the complexity of disease, particularly in recurrent and complex fistulas. Magnetic Resonance Imaging (MRI) has emerged as the imaging modality of choice because of its excellent soft tissue contrast and multiplanar capability. The aim is to evaluate the MRI classification of perianal fistula according to anatomical type and MRI grading system and to correlate these findings with intraoperative observations.

Methods: A prospective observational study was conducted over 18 months at two surgical centers in West Bengal, India.

Results: The study included 50 patients with a mean age of 48.44 ± 12.45 years. Males constituted 56% of the study population. Intersphincteric fistulas were the most common anatomical type (54%), followed by transsphincteric (20%), suprasphincteric (18%), and extrasphincteric (8%). Grade I fistulas represented 46% of all cases. MRI accurately demonstrated the primary tract in all patients and showed excellent agreement with operative findings regarding fistula classification and anatomical extent.

Conclusions: MRI provides accurate anatomical classification of perianal fistulas and correlates closely with operative findings. Routine preoperative MRI improves surgical planning, assists in identifying complex disease, and may reduce postoperative recurrence.

Keywords: Perianal fistula, Magnetic resonance imaging, MRI classification, Parks classification, St James's grading, Surgical correlation

INTRODUCTION

Perianal fistula is a chronic inflammatory condition resulting from infection of the anal glands and is characterized by a persistent abnormal communication between the anal canal and the perianal skin. It commonly presents with recurrent perianal discharge, pain, abscess formation, and considerable impairment in quality of life. Despite advances in colorectal surgery, recurrence remains a major challenge because failure to

identify the complete fistulous anatomy before surgery may result in persistent disease and repeated surgical intervention.^{1,2}

The primary objective of fistula surgery is complete eradication of sepsis while preserving anal sphincter function. Accurate preoperative assessment is therefore essential to identify the internal opening, primary tract, secondary extensions, horseshoe extensions, supralelevator disease, and associated abscesses, as these factors have a

direct impact on operative planning and postoperative outcomes.³⁻⁶

Although examination under anesthesia remains the reference standard for intraoperative assessment, it has limitations in accurately delineating the full extent of complex fistulous disease before surgery. Magnetic resonance imaging (MRI) has emerged as the imaging modality of choice because of its excellent soft-tissue contrast, multiplanar capability, and superior visualization of the anal sphincter complex.

MRI accurately demonstrates the primary tract, secondary extensions, internal opening, horseshoe components, supralelevator extension, and associated abscesses, thereby facilitating appropriate surgical planning and reducing the risk of recurrence.³⁻¹⁰

The Parks classification remains the most widely accepted anatomical classification of perianal fistulas, whereas the St James's University Hospital MRI grading system provides a standardized radiological grading based on disease complexity. Together, these classification systems assist surgeons in predicting operative difficulty, selecting appropriate sphincter-preserving procedures, and improving postoperative outcomes.^{1,3,10}

Although several studies have demonstrated the diagnostic value of MRI in fistula-in-ano, prospective data evaluating MRI classification and its correlation with intraoperative findings from eastern India remain limited.^{4,11,12} Therefore, the present study was undertaken to evaluate the MRI classification of perianal fistulas and determine its correlation with intraoperative findings in patients undergoing definitive surgical management.

METHODS

Study design

A prospective observational study was conducted over 18 months at two surgical centers in West Bengal, India.

Study population

A total of 50 consecutive patients diagnosed with perianal fistula and planned for definitive surgery were enrolled.

Inclusion criteria

Age ≥ 18 years; clinically suspected or radiologically confirmed perianal fistula; patients willing to undergo MRI and surgery; written informed consent obtained.

Exclusion criteria

Contraindications to MRI (pacemaker, ferromagnetic implants, severe claustrophobia); pregnancy; previous

anorectal malignancy; patients refusing surgery; incomplete clinical or operative records

MRI protocol

All patients underwent preoperative pelvic MRI using standard institutional protocol. T1-weighted, T2-weighted, fat-suppressed T2/STIR, and post-contrast sequences (where indicated) were obtained in axial, coronal, and sagittal planes. MRI was evaluated for primary fistulous tract, internal opening, secondary tracts, horseshoe extension, supralelevator extension, ischioanal abscess and relationship with anal sphincter complex. Each fistula was classified according to Parks classification and St James's University Hospital MRI grading system.

Operative procedure

All patients underwent definitive surgery performed by the senior author and the surgical team. Operative findings regarding the primary tract, internal opening, secondary extensions, abscesses, horseshoe extensions, and supralelevator disease were carefully documented. Intraoperative findings were considered the reference standard for comparison.^{4,5,11}

Outcome measures

Primary outcome

Correlation between MRI classification and operative findings.

Secondary outcome

Distribution of MRI anatomical types, distribution of MRI grades, detection of secondary tracts, detection of abscess, detection of horseshoe extension and detection of supralelevator extension

Statistical analysis

Data were entered into Microsoft Excel and analyzed using SPSS software. Continuous variables are presented as Mean $\pm$ Standard deviation. Categorical variables are expressed as frequency and percentage.

Agreement between MRI and operative findings was assessed by comparing MRI findings with intraoperative findings and expressed as percentage agreement. Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were calculated wherever applicable. Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). A $p < 0.05$ was considered statistically significant.

RESULTS

Demographic characteristics

Fifty patients were included. Mean age was 48.44 ± 12.45 years. Male patients predominated (56%).

Table 1: Demographic characteristics of the study population.

Variables	Value
Total patients	50
Mean age	48.44 ± 12.45 years
Male	28 (56%)
Female	22 (44%)

MRI anatomical classification

Intersphincteric fistula was the commonest type.

Table 2: Anatomical classification of perianal fistulas according to the Parks classification.

MRI types	Number	Percentage
Intersphincteric	27	54%
Transsphincteric	10	20%
Suprasphincteric	9	18%
Extrasphincteric	4	8%

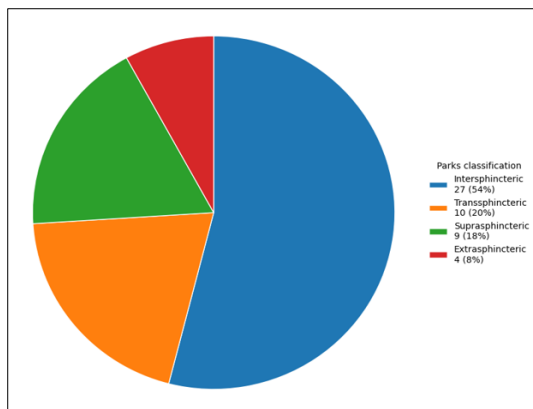


Figure 1: Distribution of anatomical type of perianal fistulas according to the Parks classification.

MRI grade distribution

Table 3: Distribution of perianal fistulas according to the St James's University Hospital MRI grading system.

Grade	Number	Percentage
Grade I	23	46%
Grade II	6	12%
Grade III	9	18%
Grade IV	8	16%
Grade V	4	8%

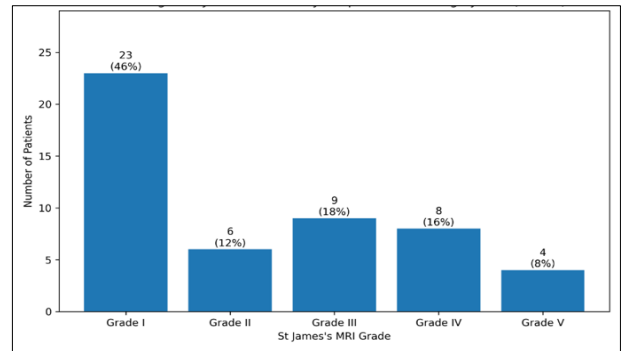


Figure 2: Distribution of perianal fistulas according to the St James's University Hospital MRI grading system (n=50).

MRI findings

MRI demonstrated; primary tract: 50 (100%); Secondary tracts: 27 (54%); Supralelevator extension: 14 (28%); Abscess: 18 (36%); Horseshoe extension: 15 (30%)

Table 4: MRI detection of primary tracts, secondary tracts, horseshoe extensions, supralelevator disease, and abscesses.

MRI Finding	Number	Percentage
Primary tract	50	100%
Secondary tract	27	54%
Supralelevator extension	14	28%
Abscess	18	36%
Horseshoe extension	15	30%

Table 5: Correlation between MRI findings and intraoperative findings.

MRI Finding	MRI (N)	Operative (N)	Agreement
Primary tract	50	50	100%
Secondary tract	27	27	100%
Supralelevator extension	14	14	100%
Horseshoe extension	15	15	100%
Abscess	18	17	94.4%

Correlation with operative findings

MRI demonstrated excellent correlation with operative findings (Table 5). Primary tract identification showed 100% agreement. Similarly, agreement for secondary tracts, supralelevator extension, and horseshoe extensions was 100%, whereas agreement for abscess detection was 94.4%. Overall agreement between MRI and operative findings exceeded 94% for all evaluated parameters. Primary tracts identified on MRI corresponded completely with operative observations. MRI accurately

demonstrated fistula anatomy and complexity, particularly in patients with secondary extensions and horseshoe disease. Complex fistulas were significantly more likely to demonstrate secondary extensions and associated abscesses than simple fistulas. MRI substantially influenced operative planning by accurately identifying sphincter involvement and disease extent before surgery.

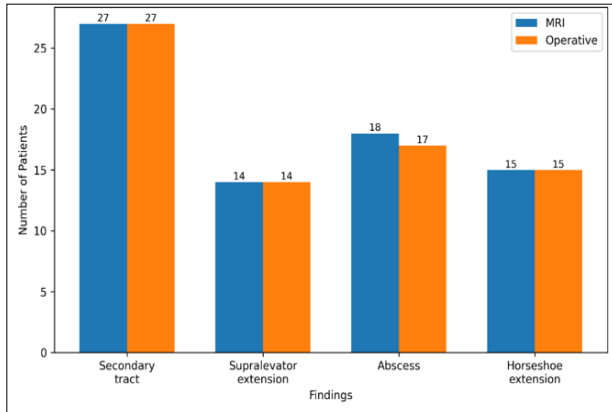


Figure 3: Correlation between MRI findings and intraoperative findings (n=50).

DISCUSSION

Perianal fistula continues to be one of the most challenging anorectal disorders because of its complex anatomy, variable presentation, and high recurrence rate following inadequate surgery. The success of operative management depends largely on accurate preoperative delineation of the fistulous tract, internal opening, secondary extensions, and associated abscesses while preserving anal sphincter integrity. MRI has emerged as the gold-standard imaging modality for evaluating fistula-in-ano because of its excellent soft-tissue resolution and multiplanar imaging capability.³⁻⁶

In the present prospective study involving 50 patients, males constituted 56% of the study population with a mean age of 48.44 ± 12.45 years. Similar demographic findings have been reported by Buchanan et al and Halligan et al, who observed that perianal fistulas predominantly affect middle-aged males due to higher incidence of cryptoglandular infections in this population.⁴⁻⁶

In our study, intersphincteric fistulas (54%) were the commonest anatomical type, followed by transsphincteric (20%), suprasphincteric (18%) and extrasphincteric fistulas (8%). This distribution is consistent with the original description by Parks et al, who reported intersphincteric fistulas as the most frequent variety. The predominance of lower-grade fistulas in our cohort further supports previous observations that simple fistulas remain more common than complex disease.¹⁻³ Using the St James's University Hospital MRI grading system,

Grade I fistulas accounted for 46% of cases, whereas Grades IV and V collectively represented only 24%. MRI grading is clinically valuable because increasing grades are associated with greater operative complexity, higher risk of recurrence, and increased likelihood of sphincter-preserving procedures. Accurate grading therefore assists surgeons in selecting the most appropriate operative technique.³⁻¹⁰

MRI successfully demonstrated the primary fistulous tract in all patients (100%), confirming its excellent ability to identify the principal disease pathway. Furthermore, MRI detected secondary tracts in 54%, supralelevator extension in 28%, abscesses in 36%, and horseshoe extensions in 30% of patients. These findings highlight the superiority of MRI over clinical examination alone, particularly in complex fistulas where occult extensions may remain undetected until surgery.^{4,6,9}

One of the most important observations in the present study was the excellent agreement between MRI findings and intraoperative observations. MRI accurately predicted the anatomical relationship of the fistula with the sphincter complex, enabling appropriate operative planning. Accurate identification of secondary extensions and abscesses before surgery allows complete eradication of sepsis while minimizing unnecessary sphincter division, thereby reducing postoperative recurrence and the risk of fecal incontinence.^{5,6,11}

Our findings are comparable to those reported by Morris et al, who introduced the St James's MRI grading system, and by Buchanan et al who demonstrated that preoperative MRI significantly reduces recurrence by improving surgical planning. Beets-Tan et al similarly reported that MRI provides excellent visualization of complex fistulous anatomy and should be considered the investigation of choice in recurrent and high-complexity disease.^{3,4,6}

The present study also emphasizes the practical value of MRI in routine surgical practice. Identification of supralelevator disease, horseshoe extensions, and secondary tracts before surgery enables the surgeon to modify the operative approach, anticipate technical difficulties, and counsel patients regarding prognosis. Such information is particularly important in recurrent fistulas where distorted anatomy often makes operative assessment difficult.^{6,10,12}

Strengths of the study

The strengths of the study include; Prospective observational design; Direct comparison of MRI findings with intraoperative observations; Use of internationally accepted Parks classification and St James's MRI grading system; Standardized MRI protocol for all patients; Clinically relevant assessment applicable to routine colorectal surgical practice.

Limitations

The principal limitations of this study include its relatively small sample size and the single-region study population, which may limit generalizability. Long-term postoperative follow-up to evaluate recurrence and continence outcomes was beyond the scope of the present study. Future multicenter studies with larger sample sizes and prolonged follow-up are recommended.

CONCLUSION

MRI is a highly reliable imaging modality for the anatomical classification of perianal fistulas. It accurately delineates the primary tract, internal opening, secondary extensions, horseshoe extensions, supralelevator disease, and associated abscesses, demonstrating excellent correlation with operative findings. Routine preoperative MRI significantly improves surgical planning, facilitates sphincter-preserving procedures, and has the potential to reduce postoperative recurrence. MRI should therefore be considered an essential component of the preoperative evaluation, particularly in patients with complex or recurrent perianal fistulas.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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