

Role Of Mri Fistulography In Ano-Rectal Fistula And It's Correlation With Surgical Findings

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ABSTRACT

Anorectal fistula is a common yet complex condition of the anorectal region, often resulting from cryptoglandular infections. It typically presents as a persistent or recurrent discharging sinus and can significantly impair the patient's quality of life due to chronic pain, discomfort, and social embarrassment. The intricate anatomy of the anal sphincter complex, combined with the potential for multiple internal and external openings, secondary tracts, and deep-seated abscesses, makes accurate diagnosis and management particularly challenging. Surgical intervention remains the definitive treatment; however, the risk of recurrence and fecal incontinence underscores the need for precise preoperative evaluation. Magnetic Resonance Imaging (MRI) has emerged as the gold standard for imaging anorectal fistulas, offering unparalleled soft tissue contrast, multiplanar capabilities, and detailed visualization of fistulous anatomy. MRI fistulography enables accurate delineation of the primary fistulous tract, identification of internal and external openings, detection of secondary ramifications, and assessment of associated inflammatory changes—all critical factors influencing surgical planning and outcomes. In this prospective, cross-sectional study, 33 adult patients with clinically diagnosed fistula-in-ano were evaluated using MRI at Sharda Hospital, Greater Noida, over an 18-month period. MRI was performed using a 3 Tesla scanner with standard T1-weighted, T2-weighted, and fat-suppressed SPAIR sequences in axial, coronal, and sagittal planes. MRI findings were categorized based on the Parks anatomical classification and the St. James University Hospital MRI grading system and in identifying fistula type, internal and external openings, secondary tracts, and associated abscesses with systematically correlating with intraoperative surgical findings. The study revealed a male predominance (78.8%) and a peak incidence in the 26–40 age group (51.5%). Discharge was the most common presenting symptom (72.7%), followed by pain and swelling. The most frequent fistula type was intersphincteric (72.7%), with the 6 o'clock position being the most common site for internal openings (39.4%). MRI findings showed a strong correlation with surgical observations (Pearson correlation coefficient = 0.897, $p < 0.001$), confirming its reliability in preoperative assessment. St. James's University Hospital Classification identified Grade I as the most prevalent fistula type (57.5%). In conclusion, MRI fistulography is a highly accurate imaging modality for evaluating perianal fistulas. It provides critical preoperative insights into the anatomical course of the fistulous tract, its relationship with sphincter muscles, and secondary complications, thus improving surgical planning and patient outcomes.

Keywords: MRI Fistulography, Ano-Rectal Fistula, Surgical Correlation, Park's Classification, St. James Classification

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INTRODUCTION

Anorectal fistula, or fistula-in-ano, is a pathological condition defined by an abnormal epithelial-lined communication between the rectal or anal canal and the perianal skin¹. It often arises as a sequela of an inadequately resolved anorectal abscess, due to infection

of the anal glands situated in the intersphincteric plane. The persistence or recurrence of inflammation in this region may lead to the formation of chronic fistulous tracts, which are frequently difficult to manage and have a significant tendency for recurrence post-surgery, more

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commonly in inpatient undergone incision drainage for an abscess².

Globally, fistula-in-ano affects approximately 12.3 per 100,000 men and 5.6 per 100,000 women annually, with the highest incidence between the ages of 30 and 50³. The male predominance has been widely observed and attributed to a combination of anatomical and possibly hormonal factors. Clinically, the condition typically presents with symptoms such as persistent perianal discharge, recurrent abscesses, local pain, pruritus, and perianal soiling, all of which severely impair the patient's quality of life and psychosocial well-being⁴.

The complex anatomy of the anorectal region, comprising the internal and external sphincters, puborectalis muscle, levator ani, and ischioanal fossae, poses a significant challenge to clinicians in both diagnosis and surgical planning. Additionally, certain risk factors such as Crohn's disease, tuberculosis, trauma, prior surgeries, and lifestyle-related conditions like obesity, diabetes, and sedentary behavior further complicate fistula morphology and recurrence risk.

Historically, clinical examination, probe-based assessment, and surgical exploration were the mainstays of evaluation. However, these methods have limitations, especially in identifying high fistulas, secondary tracts, or internal openings that are not clinically obvious. Imaging thus plays a crucial role in the preoperative evaluation of these fistulas. Among the available modalities, X-ray fistulography, CT, and endoanal ultrasound have seen varying degrees of use⁵. Yet, their inability to adequately define soft tissue planes and sphincter relationships reduces their reliability.

Magnetic Resonance Imaging (MRI), with its high soft tissue contrast, multiplanar capability, and non-invasiveness, has emerged as the imaging modality of choice for detailed assessment of perianal fistulas. MRI allows comprehensive visualization of the primary tract, internal and external openings, secondary ramifications, and associated abscesses and superior delineation of the relationship between the fistula and the anal sphincter complex — a key determinant in surgical decision-making aimed at preventing postoperative fecal incontinence.

Several classification systems have been proposed to categorize anorectal fistulas, including the Parks classification, which is based on anatomical location, and the St. James's University Hospital classification, which grades fistulas based on MRI features. These systems help standardize reporting and improve communication between radiologists and surgeons.

This study seeks to fill that gap by evaluating the diagnostic efficacy of MRI fistulography in identifying fistulous anatomy and comparing these findings directly with intraoperative observations. The ultimate aim is to guide precise surgical intervention, reduce recurrence, and improve patient outcomes .

AIMS AND OBJECTIVE

1. To assess the role of MRI in the preoperative evaluation of anorectal fistulas.

2. To classify fistulas according to Parks and St. James systems.

3. To correlate MRI findings with intraoperative surgical observations.

MATERIAL AND METHODS

This prospective, cross-sectional, hospital-based study of 33 patients was conducted in the Department of Radiodiagnosis at Sharda Hospital, Greater Noida , ensuring adequate power to assess the role of MRI fistulogram in preoperative evaluation. Adult patients (≥ 18 years) with ano-rectal fistulas planned for surgery were included. Patients with coexisting medical conditions rendering them surgically unfit were excluded. Additionally, individuals with contraindications to MRI—such as cardiac pacemakers, recent implants or body clips were excluded to ensure patient safety and imaging quality. The patients were advised to fast for four hours prior to the MRI scan and to arrive with an empty bladder. All MRI examinations were performed using a 3 Tesla Philips Achieva scanner (2014, manufactured in Singapore). To maintain consistency and reliability, the same machine and two operators—a student and a supervising radiologist—conducted all scans. Patients were positioned supine, with imaging performed using a body coil complemented by integrated spine elements to enhance signal reception. To reduce artifacts from bowel movement, saturation bands were applied around the abdomen. The MRI protocol included acquisition of T1-weighted (T1WI), T2-weighted (T2WI), and Spectral Attenuated Inversion Recovery (SPAIR) sequences in axial, coronal, and sagittal planes, ensuring comprehensive visualization of the fistulous tracts and associated structures. The Data was analysed using SPSS v22 was used for analysis. Pearson's and Chi-square tests were applied. Significance set at $p \leq 0.05$.

RESULTS

A total of 33 patients diagnosed with perianal fistula were included in this study. The demographic distribution revealed a significant male predominance, with 26 males (78.8%) and 7 females (21.2%). Patients ranged in age from 13 to 68 years, with the majority (87.9%) falling within the 26–55 year age group. Specifically, 17 patients (51.5%) were aged 26–40 years (middle-aged), 11 (33.3%) were between 41–55 years (older adults), 3 patients (9.1%) were younger than 25, and only 2 (6.1%) were over 55 years (elderly). This indicates that perianal fistula primarily affects middle-aged males.

The most frequently reported presenting symptom was discharge from the perianal region, noted in 21 patients (63.6%). Seven patients (21.2%) reported combined symptoms of pain and bleeding, while 3 (9.1%) presented with swelling alone. A minority (6.1%) exhibited mixed symptoms, including pain, discharge, and swelling. These findings highlight that discharge alone is the dominant clinical complaint.

MRI evaluation of external openings revealed that the most common locations were at the 5 o'clock and 7

o'clock positions, each accounting for 19.0% of cases. Additional frequent positions included 6 o'clock, 3 o'clock, and 8 o'clock (each 9.5%). Less common were openings at 1, 2, 9, and 10 o'clock (each 4.8%). When grouped by quadrant, external openings clustered predominantly between 7–9 o'clock (33.3%) and 4–6 o'clock (28.6%), suggesting a tendency for posterior and lateral localization. Regarding internal openings, MRI identified them in 29 patients (87.9%), with the 6 o'clock position being the most common (39.4%). Multiple internal openings were observed in 2 cases (6.1%), while 4 patients (12.1%) had no detectable internal opening on imaging. The absence of internal openings may reflect either healed tracts or limitations of imaging resolution. Comparison between MRI and intraoperative findings demonstrated a strong concordance. Internal openings detected on MRI closely matched intraoperative observations, with a Pearson correlation coefficient of 0.897 ($p < 0.001$). This indicates a high level of diagnostic agreement. A detailed comparison of clock-face positions between MRI and surgical findings revealed substantial overlap, particularly at the 6 o'clock position (MRI: 11 cases; surgery: 12 cases). However, some discrepancies were noted. For instance, MRI suggested internal openings at 4 o'clock and 5 o'clock in isolated cases where no intraoperative confirmation was achieved, indicating possible false positives. Conversely, there were also surgical detections not seen on MRI, reflecting occasional false negatives.

The types of fistula observed on MRI were primarily intersphincteric (72.7%), followed by transsphincteric (21.2%). In two patients (6.1%), no clear internal opening was visualized, making precise classification difficult. This reinforces that intersphincteric tracts remain the most prevalent subtype, though more complex presentations are not uncommon.

Diagnostic tests returned positive in 28 patients (84.8%), with only 5 patients (15.2%) testing negative. This high positivity rate underscores the effectiveness of current diagnostic protocols.

Grading based on the St. James classification system showed that most patients presented with early-stage disease. Grade I fistulas were identified in 19 patients (57.6%), followed by Grade II in 5 (15.2%), Grade IV in 4 (12.1%), and Grade III in 3 (9.1%). Two patients (6.1%) could not be classified due to insufficient imaging clarity. Age-wise, the majority of Grade I and II cases occurred in patients under 50, while Grades III and IV were more common in those aged 50 and above.

DISCUSSION

This study's findings closely align with existing literature on the demographic and clinical features of perianal fistulas. The high prevalence among males (78.8%) supports prior research by Vasilevsky and Gordon (1984), who attributed this to anatomical and hormonal differences in the pelvic and perianal regions. Most patients (87.9%) were aged 25–50, consistent with Garcia-Aguilar et al. (2000), who noted this age group's increased risk due to chronic infections and inflammation⁶.

Perianal discharge was the most common symptom (72.7%), followed by pain and swelling, corroborating findings from McCourtney and Finlay (1995) and Shanahan et al. (1997), who associated discharge and pain with chronic inflammation and abscess formation^{7,8}. The presence of swelling alone in 12.1% of cases supports Malik et al. (2010), who described fistula evolution from untreated abscesses⁹.

MRI data showed the 6 o'clock position as the most common site for external openings (39.4%), consistent with Beets-Tan et al. (2001), who identified posterior midline weakness as a common origin site¹⁰. Most patients (72.7%) had a single external opening; 24.2% had multiple, aligning with Chapman et al. (2005)¹¹. A detailed analysis showed clustering of openings in the 7–9 and 4–6 o'clock regions, supporting Toyonaga et al. (2007) and Holmes et al. (2012)^{12,13}. The identification of 3.1% of cases with no external opening supports that some fistulas may remain occult or be in an early developmental stage, as described by Sahni et al. (2008)¹⁴.

Internal openings were found in 87.9% of patients, with 6 o'clock being most common, again aligning with Beets-Tan et al. (2001). Multiple internal openings (6.1%) support Singh et al. (2013), who noted their link with complexity and recurrence¹⁵.

In terms of classification, intersphincteric fistulas were most frequent (72.7%), followed by transsphincteric (21.2%), consistent with Parks et al. (1976)¹⁶. Cases without visible internal openings (6.1%) highlight diagnostic challenges, as noted by Morris et al. (2014). MRI confirmed fistulas in 84.8% of cases, reinforcing its diagnostic value per Sahni et al. (2008), with 15.2% negative results possibly due to early-stage disease or resolution.

According to the St. James classification, most fistulas were Grade I (54.5%), with fewer in Grades II–IV and 6.1% unclassified. These findings mirror Singh et al. (2013) and highlight the need for tailored management strategies in complex cases, as emphasized by Malik et al. (2010) and Sparks et al. (2016)¹⁷. In this study 6.1% of cases lacked a clearly defined internal opening, posing diagnostic challenges. These findings are in line with those of Morris et al. (2014), who noted that fistulas without detectable internal openings may represent early-stage disease or atypical presentations, requiring additional imaging or surgical exploration for definitive diagnosis¹⁸.

Overall, the data reinforce known patterns in perianal fistula presentation and support the use of MRI and classification systems to guide diagnosis and treatment. However, the variability in presentation underscores the need for ongoing refinement of diagnostic criteria and management protocols.

CONCLUSION

This study offers a detailed analysis of perianal fistulas, emphasizing their demographic, clinical, and radiological characteristics. The condition predominantly affects males, particularly those aged 25–50, suggesting a potential role for anatomical and hormonal factors. Perianal discharge was the most

frequently reported symptom, often accompanied by pain and swelling, underscoring the chronic and symptomatic nature of the disease.

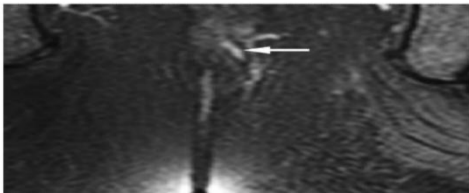
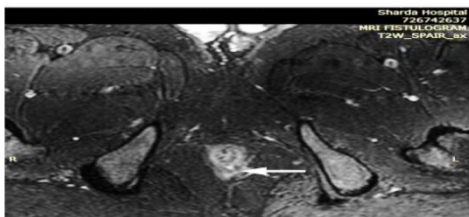
MRI findings showed that both external and internal openings were most commonly located at the 6 o'clock position, reflecting anatomical predispositions. Most cases involved single external openings, indicating simpler fistula tracts, while multiple openings in some patients suggested more complex or advanced disease. Intersphincteric fistulas were the most prevalent type, followed by transsphincteric, aligning with known anatomical pathways. A minority of cases lacked identifiable internal openings, highlighting diagnostic variability.

According to the St. James classification, most fistulas were low-grade, with Grade I being most common,

indicating early-stage presentation. However, the presence of higher-grade cases underlines the need for timely diagnosis and intervention to prevent complications.

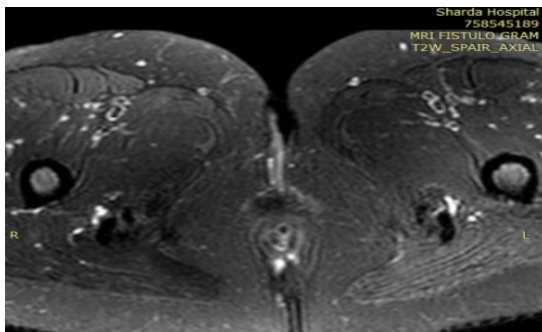
The high rate of positive diagnostic results confirms the reliability of MRI as a gold standard imaging modality. These findings support the use of standardized diagnostic and classification systems for accurate assessment and effective treatment planning.

In conclusion, this study reinforces existing knowledge about perianal fistulas and underscores the importance of early detection, MRI-based evaluation, and individualized management strategies. Future research should explore long-term outcomes, recurrence patterns, and the efficacy of various treatment modalities to optimize care and reduce disease burden.

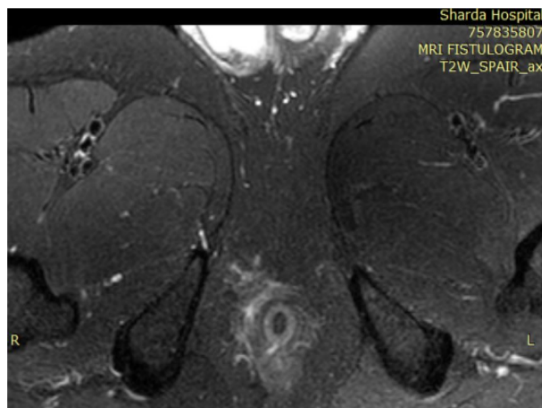


ST. JAMES GRADE I:

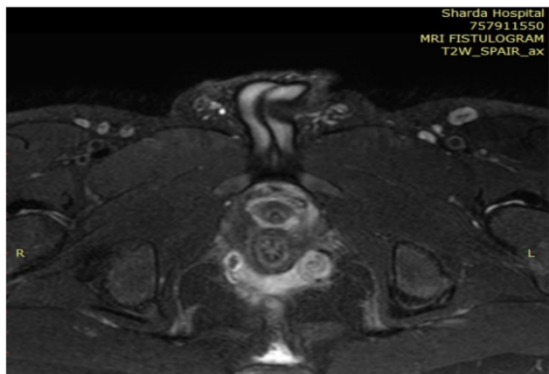
Simple linear intersphincteric fistula



ST. JAMES GRADE II :
Intersphincteric fistula with secondary fistulous tract



ST. JAMES GRADE III :
Transsphincteric fistula



**ST. JAMES GRADE IV :
Transsphincteric fistula with
abscess (horse shoe)**

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