



Original Article

The Role of MRI's Diagnostic Accuracy in Evaluating Perianal Fistulas and Its Correlation with Surgical Findings

Dr Rakesh Sankaran S¹, Dr Sangeetha S²

¹ Assistant professor, Department of radiodiagnosis, Tagore medical college and hospital, Chennai, Tamil Nadu.

² Assistant professor, Department of pulmonary medicine, Tagore medical college and hospital, Chennai, Tamil Nadu.

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Corresponding Author:

Dr Sangeetha S

Assistant professor, Department of pulmonary medicine, Tagore medical college and hospital, Chennai, Tamil Nadu.

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ABSTRACT

Introduction: Magnetic Resonance Imaging (MRI) is a key diagnostic tool for evaluating perianal fistulas, offering detailed visualization of complex tracts and abscesses compared to clinical examinations aiding in precise surgical planning.

Methods: This retrospective study was carried out involving 62 patients with perianal fistulas using MRI and surgical findings. MRI assessed fistula tracts, internal openings, and abscesses. Data were analyzed in SPSS for diagnostic accuracy, sensitivity, and specificity.

Results; In this study, men aged 41-50 years demonstrated a higher incidence of fistula-in-ano. The sensitivity and specificity of MRI for detecting secondary tracts were both 100%, with a positive predictive value (PPV) of 76.9% and a negative predictive value (NPV) of 85.7%. For abscess detection, MRI showed a sensitivity of 100%, specificity of 85.7%, PPV of 42.9%, and NPV of 100%. Additionally, MRI was 100% sensitive and specific in identifying horseshoe fistulas. The study also found that Grade 1 and Grade 2 fistulas, as assessed by MRI, were the most prevalent.

Conclusion; MRI is crucial in improving the treatment of perianal fistulas by offering detailed anatomical insights, such as the extent of sphincter involvement above the fistula tract and the exact location of the internal opening. This information significantly increases the likelihood of surgical success. In our study, MRI displayed excellent sensitivity and specificity in identifying secondary tracts, with strong predictive accuracy. It also demonstrated high reliability in detecting abscesses and horseshoe fistulas. Additionally, the study found that Grade 1 and Grade 2 fistulas were more commonly observed through MRI assessment.

Keywords: MRI, Fistula-in Ano, Perianal fistulas, Surgical success, Diagnostic accuracy.

INTRODUCTION

A fistula-in-ano is an irregular passage that forms a connection with the rectum or anal canal through a recognizable internal opening, typically between the anal canal and the surrounding perianal skin. This condition, though relatively rare, affects approximately 10 out of every 100,000 people, predominantly men in their 40s [1].

Medical imaging is crucial for mapping out any hidden fistula tracts and determining how these tracts relate to the anal sphincter. Misjudging this relationship can cause damage to the sphincter, potentially leading to anal incontinence. Thus, understanding the fistula's course relative to the sphincter is essential. However, imaging can also serve other purposes, such as when physicians, including general practitioners or gastroenterologists, want to detect the presence of fistulas. In such cases, detailed measurements of the fistula's length may not be required, and a simpler MRI approach could be sufficient. Moreover, as non-surgical treatment options continue to evolve, imaging is becoming increasingly important in tracking therapy progress [2].

MRI has emerged as the preferred method for pre-surgery evaluation, often replacing the need for a surgical examination under anesthesia (EUA) [2,3]. Many surgeons, however, still opt for endoanal ultrasound in assessing anal fistulas. While

there is some variability in the findings, hydrogen peroxide-enhanced endoanal ultrasonography may offer results comparable to MRI [4].

In addition to its accuracy in identifying the extent of the disease, MRI helps predict outcomes, guide treatment choices, and monitor the effectiveness of therapy. When fistula extensions are overlooked during surgery, recurrences often happen. In cases where the disease is more widespread, more invasive surgery is usually necessary [5,6].

METHODS

Aims and Objectives:

To evaluate the diagnostic accuracy of MRI in detecting and characterizing perianal fistulas and to assess its correlation with surgical findings for improved treatment planning

Materials:

This retrospective study was conducted over eight months at the Tagore medical college and hospital, involving 62 patients with clinically suspected perianal fistulas. Patients aged above 18 years who consented to undergo MRI and subsequent surgical intervention were included. Those with contraindications to MRI, such as metallic implants or claustrophobia, were excluded. MRI was performed using a 1.5T scanner, with T1-weighted, T2-weighted, and fat-suppressed T2-weighted sequences acquired in axial, coronal, and sagittal planes. The MRI assessed fistula tracts, internal openings, abscesses, and secondary tracts, with fistulas were classified accordingly. Surgical intervention followed within two weeks of MRI, and intraoperative findings, including the type of fistula, extent of tracts, and abscesses, were documented for comparison with MRI results. Diagnostic accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of MRI were calculated, with statistical analysis performed using SPSS software, and significance defined as $p < 0.05$.

Data Analysis:

Data were collected using semi-structured questionnaires, MRI scans, and surgical findings, examining variables such as age, gender, and characteristics of fistulas, including tracts and abscesses. The data were entered in MS Excel 2010 and analyzed using SPSS (version 23.0). Descriptive statistics were used for categorical data, while numerical variables were presented as mean and standard deviation. McNemar’s test assessed the agreement between MRI and surgery, and diagnostic measures such as sensitivity, specificity, and accuracy were calculated. A p-value of <0.05 was considered statistically significant. Top of Form

RESULTS

In our study, approximately 67.7% of the participants were male, indicating a notable male predominance among the patient population. In terms of age distribution, the largest proportion of individuals, around 35.4%, fell within the 41 to 50-year age group. This was followed by 25.8% of patients who were between the ages of 31 and 40. Interestingly, only a small fraction of the participants, specifically two patients, were over the age of 60, highlighting a lower incidence in the older age group.

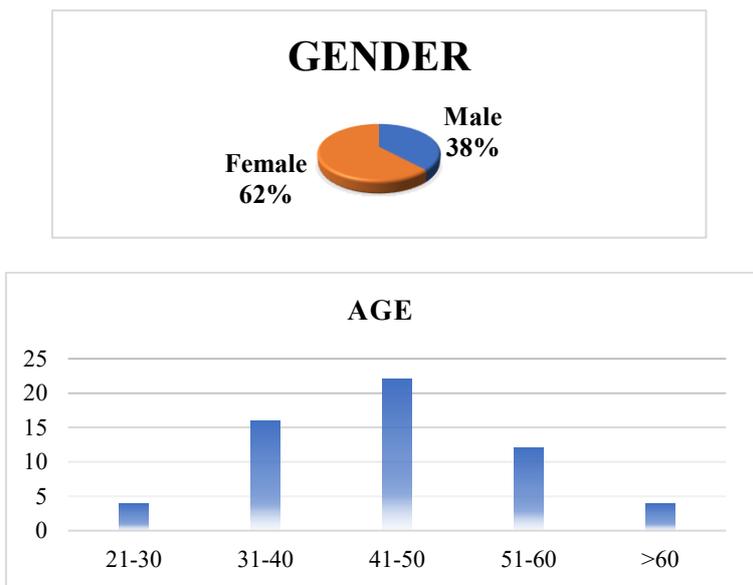


Table 1. demonstrates that

MRI Findings (Inter/Transphincteric Fistula)	Surgical Findings (Inter/Transphincteric Fistula)		p value
	Intersphincteric	Transphincteric	
Intersphincteric	46	0	0.001
Transphincteric	2	14	

MRI Findings (Supralevator/Infralevator Fistula)	Surgical Finding (Supra/Infralevator)		p value
	Infralevator	Supralevator	
Infralevator	60	2	-
Supralevator	0	0	

In our study, two patients showed multiple external openings both in MRI and during surgery, and another two patients had an opening near the scrotum in both MRI and surgical findings. Additionally, another two patients displayed multiple internal openings in both MRI and surgical findings.

MRI demonstrated a sensitivity and specificity of 100% in detecting secondary tracts, with a positive predictive value (PPV) of 76.9% and a negative predictive value (NPV) of 85.7%. For identifying abscesses, MRI also showed a sensitivity of 100%, while the specificity was slightly lower at 85.7%. The PPV for abscess detection was 42.9%, with a perfect NPV of 100%. Additionally, MRI exhibited 100% sensitivity and specificity in identifying horseshoe-shaped fistulas.

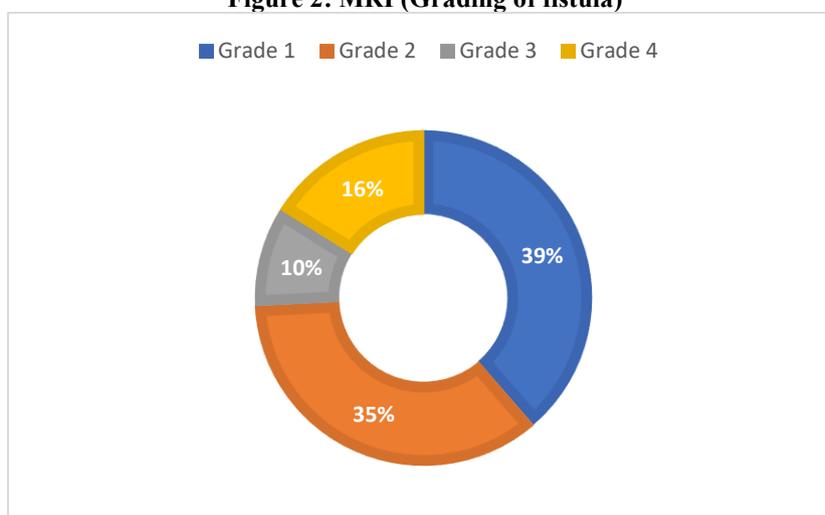
Table 3: Sensitivity analysis (Secondary tract, abscess and horseshoe Formation)

MRI Finding (Secondary Tract)	Surgical Finding (Secondary Tract)		p value
	Present	Absent	
Present	20	0	0.001
Absent	0	36	

MRI Finding (Abscess)	Surgical Finding (Abscess)		p value
	Present	Absent	
Present	6	8	0.008
Absent	0	48	

MRI Finding (Horshoeing)	Surgical Finding (Horshoeing)		p value
	Present	Absent	
Present	2	0	0.003
Absent	0	62	

Figure 2: MRI (Grading of fistula)



In our study, MRI staging revealed that 24 patients had Grade 1 fistula, 22 patients had Grade 2, while 6 and 10 patients were categorized under Grades 3 and 4, respectively. No cases of Grade 5 were observed.

In our study in the detection of intersphincteric and transsphincteric fistulas, MRI exhibits an impressive sensitivity of 95.8% and a specificity of 100%. This is complemented by a positive predictive value (PPV) of 100% and a negative predictive value (NPV) of 87.5%, highlighting the statistical significance of these findings. (Table

When evaluating infralevator fistulas, MRI demonstrates a perfect sensitivity of 100% alongside a PPV of 96.8%. Furthermore, MRI showcases a sensitivity and specificity of 100% in detecting secondary tracts, with a PPV of 76.9% and an NPV of 85.7%. (Table

In terms of abscess identification, MRI also excels, achieving a sensitivity of 100% and a specificity of 85.7%. The PPV for abscess detection is 42.9%, while the NPV remains perfect at 100%. Additionally, MRI confirms its reliability by achieving 100% sensitivity and specificity in the detection of horseshoe-shaped fistulas. (Table

Table. Summary of Validity Indicator of MRI Vs Surgica Findings.

Validity Indicator (MRI)	Inter/ Transphincter Fistula	Supra/ Infralelevator Fistula	Secondary Tract	Abscess	Horshoeing
Sensitivity (%)	95.8	100	100	100	100
Specificity (%)	100	-	100	85.7	100
PPV (%)	100	86.8	76.9	42.9	100
NPV (%)	87.5	-	85.7	100	100

DISCUSSION

Several studies have established MRI as a crucial imaging technique for the preoperative evaluation and management of perianal fistulas. MRI is particularly valuable due to its ability to provide highly detailed images of fistulas, associated abscesses, and secondary extensions—areas that are often difficult to assess using other imaging methods. Additionally, MRI can clearly define the anatomical relationships between fistulas and surrounding structures such as the anal sphincters, pelvic floor, and levator ani muscle. This detailed information is vital for surgical planning to ensure the complete removal of infected tissues and to minimize the risk of complications and recurrence. Research has also shown that surgery guided by MRI significantly lowers recurrence rates [14].

Our findings align with those of Duc Vo et al., who also reported a higher prevalence of fistula-in-ano among men aged 40-50 years [14]

In our study of 31 patients, MRI and surgery both identified intersphincteric fistulas in 23 patients and transsphincteric fistulas in 7 patients. No cases of supralelevator extension were found in either MRI or surgical evaluation, whereas 30 patients had infralelevator extensions confirmed by both methods. This supports the cryptoglandular theory of perianal fistula development, which posits that infection originates in the anal glands within the intersphincteric plane and then spreads into the sphincter muscles, leading to fistulas and anorectal abscesses.

Regarding diagnostic accuracy, MRI demonstrated a sensitivity and specificity of 100% for detecting secondary tracts, with a positive predictive value (PPV) of 76.9% and a negative predictive value (NPV) of 85.7%. For abscess detection, MRI showed 100% sensitivity, 85.7% specificity, a PPV of 42.9%, and an NPV of 100%. These findings are consistent with previous research by Mahjoubi et al. and Singh K et al., who reported similar levels of sensitivity and specificity for the detection of abscesses and secondary tract [12,15].

Horseshoe tracts are secondary tracts characterized by circular extensions on both sides of an internal opening. A typical horseshoe-shaped fistula involves two tracts and a single internal opening, usually positioned near the midline at the inferior border of the puborectalis muscle. These fistulas can extend into the intersphincteric, ischioanal, or supralelevator regions as tracts or abscesses. In our study, MRI demonstrated 100% sensitivity and 100% specificity for detecting horseshoe tracts. These findings are consistent with the research by Beets-Tan et al., who reported 100% sensitivity, specificity, and positive predictive value. Similarly, Barker et al. found a sensitivity of 97%, and Singh K et al. reported a sensitivity of 87.5% and a specificity of 95.24% [12, 16, 17].

MRI can sometimes make it challenging to distinguish between the internal sphincter and the anal mucosa. Consequently, the location of the tract within the intersphincteric space is often used as an indicator of the internal opening's position. The site of maximal intersphincteric infection is usually the most probable location for the internal opening. When this opening is identified at the appropriate level in the anal canal and the correct quadrant, it is considered accurately located [16-18].

Some limitations in our study include the fact that only patients with a clinical diagnosis of perianal fistula were considered for an MRI fistulogram, which may have led to inflated sensitivity and specificity rates for MRI. Additionally, surgery may not be the definitive gold standard, as not all secondary tracts are explored during the procedure. Other limitations include the short duration of the study and the small number of participants.

CONCLUSIONS

MRI plays a pivotal role in enhancing the treatment of perianal fistulas by providing detailed anatomical information, such as the degree of sphincter involvement above the fistula tract and the precise location of the internal opening. This level of detail greatly improves the chances of surgical success. In this study, men in their 40s and 50s were more frequently diagnosed with fistula-in-ano. MRI demonstrated exceptional sensitivity and specificity in identifying secondary tracts, with strong predictive values, and proved highly reliable in detecting both abscesses and horseshoe fistulas. Moreover, the study revealed that Grade 1 and Grade 2 fistulas were more commonly identified through MRI.

These findings underscore the essential role of MRI as a preoperative diagnostic tool, improving diagnostic accuracy and enabling more targeted and effective treatment strategies for fistula-in-ano.

Declaration:

Conflicts of interests: The authors declare no conflicts of interest.

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REFERENCES

1. Read DR, Abcarian H. A prospective survey of 474 patients with anorectal abscess. *Dis Colon Rectum*. 1979;22(8):566–568. doi: 10.1007/BF02587008
2. Saino P. Fistula-in-ano in a defined population: incidence and epidemiological aspects. *Ann Chir Gynaecol*. 1984;73:219–224.
3. Lunniss PJ, Armstrong P, Barker PG, Reznick RH, Phillips RK. Magnetic resonance imaging of anal fistulae. *Lancet*. 1992;340:394–396. doi: 10.1016/0140-6736(92)91472-K.
4. West RL, Zimmerman DD, Dwarkasing S, Hussain SM, Hop WC, Schouten WR, Kuipers EJ, Felt-Bersma RJ. Prospective comparison of hydrogen peroxide-enhanced three-dimensional endoanal ultrasonography and endoanal magnetic resonance imaging of perianal fistulas. *Dis Colon Rectum*. 2003;46(10):1407–1415. doi: 10.1007/s10350-004-6758-z.
5. Maier AG, Funovics MA, Kreuzer SH, Herbst F, Wunderlich M, Teleky BK, Mittlböck M, Schima W, Lechner GL. Evaluation of perianal sepsis: comparison of anal endosonography and magnetic resonance imaging. *J Magn Reson Imaging*. 2001;14(3):254–260. doi: 10.1002/jmri.1181.
6. Buchanan GN, Halligan S, Bartram CI, Williams AB, Tarroni D, Cohen CR. Clinical examination, endosonography, and MR imaging in preoperative assessment of fistula in ano: comparison with outcome-based reference standard. *Radiology*. 2004;233(3):674–681. doi: 10.1148/radiol.2333031724.
7. Ziech M, Felt-Bersma R, Stoker J. Imaging of perianal fistulas. *Clin Gastroenterol Hepatol*. 2009;7(10):1037–1045. doi: 10.1016/j.cgh.2009.06.030.
8. Morris J, Spencer JA, Ambrose NS. MR imaging classification of perianal fistulas and its implications for patient management. *Radiographics*. 2000;20(3):623–635.
9. Torkzad MR, Karlbom U. MRI for assessment of anal fistula. *Insights Imaging*. 2010 May;1(2):62-71. doi: 10.1007/s13244-010-0022-y. Epub 2010 May 27. PMID: 22347906; PMCID: PMC3259332.
10. Chapple KS, Spencer JA, Windsor AC, Wilson D, Ward J, Ambrose NS. Prognostic value of magnetic resonance imaging in the management of fistula-in-ano. *Dis Colon Rectum*. 2000;43(4):511–516. doi: 10.1007/BF02237196
11. Baskan O, Koplay M, Sivri M, Erol C. Our Experience with MR Imaging of Perianal Fistulas. *Pol J Radiol*. 2014 Dec 24;79:490-7. doi: 10.12659/PJR.892098. PMID: 25550766; PMCID: PMC4278700.
12. Singh K, Singh N, Thukral C, Singh KP, Bhalla V. Magnetic resonance imaging (MRI) evaluation of perianal fistulae with surgical correlation. *J Clin Diagn Res*. 2014 Jun;8(6):RC01-4. doi: 10.7860/JCDR/2014/7328.4417. Epub 2014 Jun 20. PMID: 25121040; PMCID: PMC4129264
13. Schaefer O, Lohramann C, Langer M. Assessment of anal fistulas with high-resolution subtraction MR-fistulography: Comparison with surgical findings. *JMRI*. 2003 Dec; 19(1) 91-98.
14. Vo, D., Phan, C., Nguyen, L.I. The role of magnetic resonance imaging in the preoperative evaluation of anal fistulas. *Sci Rep* 9, 17947 (2019). <https://doi.org/10.1038/s41598-019-54441-2>
15. Mahjoubi B, Kharazi H, Mirzaei R, Moghimi A, Changizi A. Diagnostic accuracy of body coil MRI in describing the characteristics of perianal fistulas. *Colorectal Dis*. 2005;8:202–7.
16. Beets-Tan RH, Beets GL, van der Hoop AG, Kessels AH, Vliegen RA, Baeten CI, et al. Preoperative MR imaging of anal fistulas: does it really help the surgeon? *Radiology*. 2001;218:75–84. 6
17. Barker PG, Lunniss PJ, Armstrong P, Reznick RH, Cottam K, Phillips RK. Magnetic resonance imaging of fistula-in-ano: technique, interpretation and accuracy. *Clin Radiol*. 1994;49:7-13
18. Halligan Steve, Jaap Stoker. Imaging of fistula in ano. *Radiology*2006;239:18-33.