

Diagnostic Accuracy of Magnetic Resonance Imaging(Mri) For Perianal Fistula Tract Taking Operative Findings as Gold Standard

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ABSTRACT

Objective: To find the diagnostic accuracy of magnetic resonance imaging in detection and characterization of perianal fistula taking surgical findings as gold standard.

Study Design : Cross sectional study.

Place And Duration of Study: Radiology Department of Pakistan Institute of Medical Sciences (PIMS), Islamabad Pakistan from January 2018 to 2020.

Methodology: Magnetic Resonance Imaging procedure and protocol were clearly explained to the patients. The procedure was performed on 1.5Tesla (T)superconducting magnet (Philips) Magnetic Resonance Imaging scanner using body coil. In our study 90 patients with clinical suspicion of perianal fistula having one or more external opening were selected for Imaging evaluation. Findings were interpreted by the consultant radiologist according to St James's University hospital classification and PARKS classification systems and correlated with surgical observations.

Results: Total 90 patients were enrolled for examination. Out of these 90,83 were males (92%) and 7 were females (8%) . Mean age was 43+/-16SD. Out of 90 patients,76 were positive for perianal fistula on imaging and 74 on surgery. The calculated sensitivity was 94.9%,specificity 83.3%,positive predictive value 97%,negative predictive value 71% and diagnostic accuracy was 93%.

Conclusion: Magnetic Resonance Imaging is highly accurate, non invasive and less time consuming modality in preoperative evaluation, assessment and characterisation of perianal fistulas especially the complex fistulas associated with abscess and ramifications. It is especially helpful in preventing recurrences and operative complications.

Keywords: Diagnostic accuracy , Magnetic Resonance Imaging(MRI), Perianal fistula.

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INTRODUCTION

A perianal fistula is an abnormal connection between the epithelialised surface of the anal canal and the skin¹. It's a granulation tissue lined tract which connects anal or rectal mucosa to the perianal skin².

The exact prevalence of perianal fistula is not known however it is more common in adult males with maximum incidence between 3rd and 5th decade^{3,4}. There is high reported recurrence rate of perianal fistula

Most anal fistulas originate in anal crypts, which become infected, with ensuing abscess formation. When the abscess is opened or when it ruptures, a fistula is formed⁵. Other causes of anal fistulas include opened perianal or ischiorectal abscesses, which drain spontaneously through these fistulous tracts⁶. Fistulas are also found in patients with inflammatory bowel disease, particularly Crohn disease^{7,8}. Obstruction of

ducts of anal glands located in intersphincteric space leads to abscess formation⁹. The disease process spread in intersphincteric space and reaches the perianal skin taking different routes and thus delineating various types of fistula⁸. Fistula can either be a simple tract or it may give extensions / ramifications along its course.

The treatment and surgical outcomes are highly dependent on accurate preoperative imaging evaluation of primary fistulous tract with its associated complications³⁻⁸. Conventional radiography, proctosigmoidoscopy, endoanal ultrasound and fistulograms were insufficient in revealing the anatomic details¹⁰. Because of its three dimensional imaging capability and higher soft tissue resolution MRI plays a crucial role in detection, delineation of anatomy, identification of secondary tracts and abscesses that would otherwise remain undetected.^{7,10}

MRI has gained a worldwide acceptance in preoperative management of perianal fistula, its extent, complications related to it and assist in confirming the diagnoses or proposing the alternative. However in Pakistan, because of its high

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cost and non availability in many areas it is still not the mainstay of diagnosis and fistulography is still in practice¹⁰.The purpose of this study is to find the diagnostic accuracy of MRI in detection and characterisation of fistula taking surgical findings as gold standard.

METHODOLOGY

The cross sectional prospective study was conducted in diagnostic radiology department of PIMS hospital over a time period of 2 years from January 2018 to January 2020.Patients with clinical suspicion of perianal fistula were included in study.Total 90 patients fulfilling the inclusion criteria enrolled in study with non probability sampling technique.

Sample size was calculated keeping the expected sensitivity of 95%,specificity of 100%,expected prevalence of 84% from reference study⁸.

Inclusion Criteria: The patients who presented with clinical suspicion of perianal fistula and had thorough clinical examination for external, internal openings and associated complications were booked for MRI examination were included.

Exclusion Criteria: None

MR procedure and protocol were clearly explained to the patients.The procedure was performed on 1.5Tsuperconducting magnet (Philips) MR scanner using body coil by a chief MR technician in PIMS radiology department. Slice thickness was kept 3mm.

Standard MR imaging protocol including T1,T2,T2 FAT SAT FSE, PD SPAIR and post contrast T1 FSE images were obtained in axial, coronal and sagittal planes. Images were interpreted on MR console by the consultant radiologist having atleast 10 year of experience in body MR imaging.The images were evaluated for primary fistulous tract,its internal, external openings and relation to the sphincters.Type and grading were determined according to the St James’s University hospital classification and PARKS classification systems. Associated complications including collections and secondary ramifications were also recognised.These patients were then followed for surgical outcomes.Per operative findings were independently recorded by the surgeon and were accepted as a gold standard.The data was entered and analysed on SPSS version 22.A 2x2 table was generated to determine specificity,sensitivity,diagnostic accuracy, PPV and

NPV.The quantitative variables like age were presented as a mean while standard deviation and qualitative variables like gender,perianal fistula on MRI and per operative findings were presented as percentages and frequencies.(Table1)

RESULTS

A total 90 patients were enrolled for MR examination. Out of these 90,83 were males (92%) and 7 were females (8%).Mean age was 43±16SD.

Out of the 90 patients,76(84.4%) were fistula positive on MRI and remaining 14(15.6%) turned out to be fistula negative.MRI positive fistulous tract was further classified according to St James and PARKS classification (Table-I).

Table-I: Distribution of study parameters, type and nature of perianal fistula on Magnetic Resonance Imaging. (n=90)

Parameters	n(%)
Mean age +/-SD	43+/-16
Gender	
Male	83(92%)
Female	7(8%)
Perianal fistula on magnetic Resonance	
Imaging	
Positive cases:	76(84.4%)
Type:	
Intersphincteric	46(51%)
Trans-sphincteric	24(26.7%)
Suprasphincteric	3(3.3%)
Extrasphincteric	3(3.3%)
Nature:	38(42.2%)
Simple	14(15.6%)
Complex	
Negative cases:	
Perianal fistula on surgery	78(86.6%)
Positive	12(13.3%)
Negative	

Fistula with associated abscess formation or secondary extensions or both were further categorised as complex fistula and those with only primary fistulous tract were recognised as simple fistula. Out of 76 MR positive fistulous tracts 25(27.8%) were associated with abscess formation and 26(28.9%) were associated with ramifications(Table-II).

Table-II: Comparison of Magnetic resonance imaging findings with surgical findings taken as gold standard

Parameters	Perianal fistula on surgery	
	Positive on surgery	Negative on surgery
Perianal fistula on Magnetic Resonance imaging		
Positive	74(94.9%)	2(16.7%)
Negative	4(5.1%)	10(83.3%)

Comparison with surgical findings showed 74(94.9%) true positive cases,10(83.3%)true negative, 4(5.1%) false negative and 2(16.7%)false positive cases.Our diagnostic accuracy was 93%,sensitivity of 94.9% and specificity of 83.3%(Table-III).

Table-III: Diagnostic parameters

Diagnostic Parameters	Percentage
Sensitivity= True Positive/(True Positive +False Negative)	74/74+4 =94.9%
Specificity= True Negative / (True Negative +False Positive)	10/10+2=83.3%
Positive Predictive Value= True Positive/(True Positive+ False Positive)	74/74+2=97%.
Negative Predictive Value= True Negative/ (True Negative +False Negative)	10/10+4=71%
Diagnostic Accuracy=(True Positive +True Negative)/ All Patients	74+10/74+10+2+4=93%

DISCUSSION

Perianal fistula is relatively a common disease¹.The most common etiological factor mentioned in literature is cryptoglandular inflammation. However it may also occur secondary to other causes like crohn’s disease⁴.MRI gives a detailed insight into the anatomy of anal sphincter and fistulous tract⁷⁻¹².Preoperative assessment and characterization of fistulous tract and associated complications are critical for effective surgical outcomes.¹³⁻¹⁴

Our study included 90 patients with clinical suspicion of perianal fistula. Majority of these patients were adult male, with mean age of 43 with +/-16 SD,which was in agreement with Halligan *et al.*,¹and Rehman *et al.*, studies¹⁰.Our experience showed that appropriate combination of sequences increases the diagnostic accuracy.T2axial and coronol sequences are especially helpful in identifying linear high signal tract,its ramifications,its relation to sphincters along with proper delineation of different types of fistula^{6,15}.Our experience showed that majority of fistulous tracts were of intersphincteric type. Out of 76 MR positive fistula, 46(51%) were intersphincteric type which was comparable to most of previous studies⁷.

The overall accuracy of MRI in relation to surgical findings reached 93% in our study which was consistent with Elzawawi MS study²which showed accuracy of 93.9%.The reported sensitivity of MRI in detection of primary fistulous tract was 94.9% that was

consistent with a previous Ishfaq s study¹⁶(sensitivity 92.94%). The specificity of 83.3% in our case was comparable to phan *et al.*,^(85%)¹⁷. In our study the MRI accuracy in depiction of abscesses was high with sensitivity of 93.3% and specificity of 83%,these results were comparable with phan *et al.*,¹⁷

In our study 3 intersphincteric fistulas were missed on MRI. It may have been because of chronicity and associated fibrotic changes and probably the technique related issues.

Magnetic resonance imaging of perianal fistulas has superseded fistuography,CT and endoanal ultrasound and has the greatest concordance with clinical and surgical findings^{10,5}.Recent techniques mentioned in literature have also been added to MR protocol including dynamic MRI which evaluates the fistulous tract in arterial, venous and delayed phase.However in our setup the innovation is yet not added to the protocol. Another new technique mentioned in literature is additional use of endoanal coil to demonstrate the sphincter damage and atrophic changes nevertheless it suffers from field of view,cost and associated pain related limitations.^{10,14} Recent studies have evaluated the feasibility of DWI sequence in evaluation of fistula activity.Yoshizaku *et al.*,¹⁸concluded that DWI is more reliable in evaluating the fistula activity than T2weighted image.Hesham *et al.*,¹⁹documented that addition of DWI sequence increase the overall accuracy. In another study Bakan *et al.*, concluded that visibility of fistula was greater with combined T2W and diffusion weighted imaging.²⁰

CONCLUSION

MRI is highly accurate in depicting the primary fistulous tract and its types,relation to internal sphincter, pelvic diaphragm and ischiorectal fossa,associated abscesses and relevant anatomical details required to guide preoperative management and surgical planning of perianal fistulas and aiming to reduce complications and recurrences.

Conflict of Interest: None.

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Authors’ Contribution

Following authors have made substantial contributions to the manuscript as under:

RI & AI: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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