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Original Research Article

Role of MR Fistulogram in the Preoperative Assessment of Anorectal Fistulas and Its Comparison with Operative Findings

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Abstract:

Introduction: Anorectal fistula is a connection between the anorectal canal and perianal area. Knowledge on preoperative imaging is essential for the surgical management.

Objective: To evaluate the role of MR Fistulogram in preoperative assessment of Anorectal fistulas and comparison of intraoperative findings with MR findings.

Materials and Methods: The present cross-sectional study was in the Department of Radiodiagnosis in association with Department of General surgery at MNR Medical College and Hospital, Sangareddy from April 2022 to December 2023. A total of 80 clinically suspected cases with perianal fistula of both genders between 25-65 years were included. MR Fistulogram was taken for all the study participants by 1.5 Tesla unit systems. The MRI sequences such as oblique, axial and coronal T2W FSE, T1W FSE, sagittal FAT SAT T1W FASE images and fat suppressed T1W FSE AND T2W FSE were used. The details of fistula such as type, position were assessed by MRI.

Results: Single internal opening was observed in 82.5% cases and double internal openings in 17.5% cases. Whereas 78.75% cases had single external opening, followed by 16.25% cases had two, 2.5% cases had three and 2.5% cases had four external openings. According to St James classification of fistulas, 42.5% cases had grade 1 fistulas and 20% cases had grade 2 fistulas. The contrast enhancement was observed in 36 (45%) cases. The sensitivity and specificity for grade 1 fistulas was 100% and 93.5%, for grade 2 was 100% and 99.8%, for grade 3 & 4 was 100% and 100% and for grade 5 was 100% and 99.9% respectively.

Conclusion: The sensitivity and specificity was high for fistulas of all grades. Hence, MR Fistulogram with contrast enhancement is a useful and recommended diagnostic tool for the preoperative evaluation of anorectal fistulas.

Keywords: Preoperative evaluation, Fistula-In Ano, Sensitivity, Specificity.

Introduction

Precise anatomical mapping of anorectal fistulas is essential for treatment strategies and surgical management [1]. Anorectal fistulas are unusual cavities between the anal canal and perianal skin. It is a chronic inflammatory condition of perianal tissue commonly caused by an abscess [2,3]. Surgical management of fistulas requires knowing the details of primary and secondary tracts. Methods like fistulography, endoanal ultrasonography, MRI and computed tomography (CT) are widely used to describe fistulas [4,5]. MRI has the advantages of resolution and large field of view, especially when a multichannel phased array coil is combined with high field strength of 1.5-Tesla or 3-Tesla [6].

Anorectal fistulas occur commonly when the anal glands become occluded and infected, which results in a crypto glandular abscess. MRI plays an important role in preoperative assessment of anorectal fistulas. MRI helps in the identification of fistulous tracks, secondary infections and relationship of fistula with the anal sphincteric complex. A study by Buchanan et al. stated that surgeon's awareness of MRI results prior to fistula surgery resulted in decrease in the recurrence rate of anal fistulas [7].

The St. Jame's University hospital classification was used anal fistulae in to five grades i.e. Grade 0 (normal appearance of fistulas), grade 1 (simple linear intersphincteric fistula), grade 2 (intersphincteric fistula with intersphincteric abscess), grade 3 (Trans sphincteric fistula), grade 4 (Trans sphincteric fistula with abscess) and grade 5 (supralevator and translevator disease) (8). The Present study was designed to evaluate the role of MR Fistulogram in preoperative assessment of An-

orectal fistulas and its comparison with intraoperative findings.

Materials and Methods

The present cross-sectional study was conducted in the Department of Radiodiagnosis in association with Department of General surgery at MNR Medical College and Hospital, Sangareddy from April 2022 to December 2023.

The written informed consent was obtained from all the study participants and the study protocol was approved by institutional ethics committee. Study contains a total of 80 cases with Anorectal fistulas referred by Department of general surgery were recruited.

Inclusion criteria: Cases who had clinically suspected perianal fistulas and willing to participate in the study were included.

Exclusion criteria: Cases that had developed fistulas due to crohn's disease, which refused surgical interference and not willing to participate, were excluded from the study. The gadolinium-based contrast agent was used as medium and was administered into the fistulous tract. The fistulas were graded by St, James's University Hospital MRI classification [8]. All the study participants underwent MR Fistulogram taken by using 1.5 Tesla unit systems. The following MRI sequence such as oblique axial and coronal fat-suppressed T2-weighted and oblique axial and coronal fat-suppressed T1-weighted images were acquired with 6mm slice thickness. The details of fistula such as type, position were assessed by MRI. The SPSS version 23 was used to carry out statistical analysis relevant to the study. The frequency and percentages (%) were calculated. The chi-square test was used to check the association between MRI findings and intraoperative findings. P-value of <0.05 was considered as statistically significant.

Results

A total of 80 clinically suspected cases with perianal fistula of both genders i.e. 72.5% males and 27.5% females between age group 25 to 65 years were included. Among the 80 cases, 30% were in between 31-40 years followed by 41-50 years (26.25%), 51-60 years (17.5%), above 60 years (13.75%) and 12.5% cases in between 25-30 years.

Table 1: Details of clinical characteristics of study participants

	Internal opening		External opening	
	Number	**Percentage**	**Number**	**Percentage**
Number				
Atleast one	66	82.5%	63	78.75%
Atleast Two	14	17.5%	13	16.25%
Atleast Three	-	-	02	2.5%
Atleast Four	-	-	02	2.5%
Position (Clockwise) (Atleast one internal opening n=66, Atleast one external opening n=63)				
$1\text{-}3^0$	10	15.15%	17	26.9%
$4\text{-}6^0$	40	60.6%	32	50.7%
$7\text{-}9^0$	12	18.18%	08	12.6%
$10\text{-}12^0$	04	6.06%	06	9.52%
St James Hospital classification				
Grade 0	02		2.5%	
Grade 1	34		42.5%	
Grade 2	16		20%	
Grade 3	14		17.5%	
Grade 4	10		12.5%	
Grade 5	04		5%	

Single internal opening was observed in 82.5% cases and double internal openings in 17.5% cases. Whereas 78.75% cases had single external opening, followed by 16.25% cases had two, 2.5% cases had three and 2.5% cases had four external openings (Tab/Fig 1).

Table 2: Details of MRI findings among the study cases

Parameter	Number	Percentage
Abscess formation		
Present	15	18.75%
Absent	65	81.25%
Types of abscess		
Simple	07	46.6%
Horse shoe shaped	06	40%
In Ischiorectal fossa	02	13.3%
Contrast enhancement		
Present	36	45%
Absent	44	55%

Abscess formation was observed in 18.75% cases. Among them 7 cases had simple abscess, 6 cases had horse shoe shaped abscess and 2 cases had abscess in Ischiorectal fossa (Tab/Fig 2). Majority cases in grade 2,4 and 3 had contrast enhancement (Tab/Fig 3).

Table 3: Association of St James Hospital grading with contrast enhancement

Contrast enhancement	St James Hospital grading					
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Enhanced	-	6 (7.5%)	12 (15%)	7 (8.75%)	8 (10%)	3 (3.75%)
Not enhanced	2 (2.5%)	28 (35%)	4 (5%)	7 (8.75%)	2 (2.5%)	1 (1.25%)
p-value	0.00272*					

*Chi-square value <0.005 considered as statistically significant.

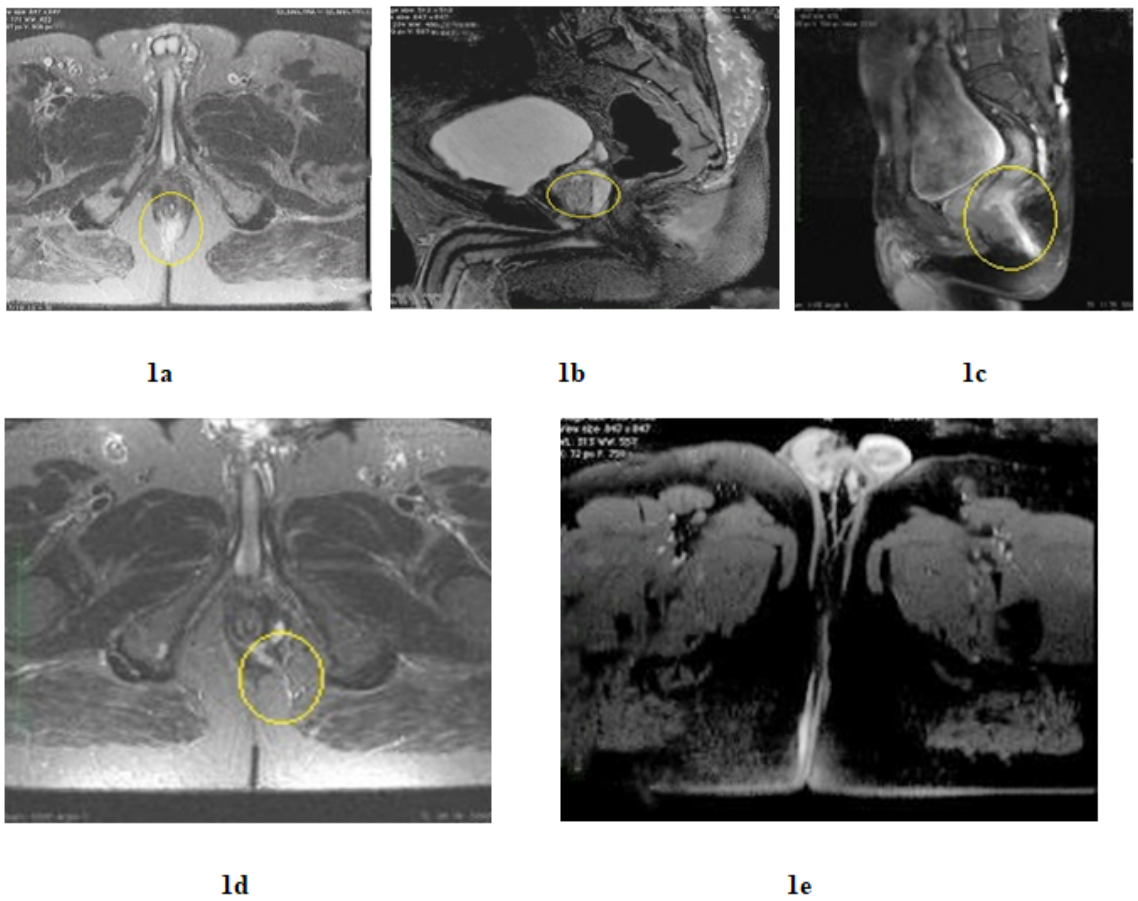

Figure 1: MRI images representing St James grading of fistulas in the study cases. 1a- Grade 1 simple linear intersphincteric fistula, 1b- Grade 2 intersphincteric fistula with abscess, 1c- Grade 3 transsphincteric fistula, 1d- Grade 4 transsphincteric fistula with abscess, 1e- Grade 5 supralevator and translevator disease

Table 5: Evaluation of outcome of the present study

MRI vs surgical concordance	St James Hospital grading					
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Sensitivity	100%	100%	100%	100%	100%	100%
Specificity	95.8%	93.5%	99.8%	100%	100%	99.9%

The sensitivity and specificity for grade 1 fistulas was 100% and 93.5%, for grade 2 was 100% and 99.8%, for grade 3 & 4 was 100% and 100% and for grade 5 was 100% and 99.9% respectively (Tab/Fig 5).

Discussion

Anorectal fistulas are unusual cavities between the anal canal and perianal skin. It is a chronic inflammatory condition of perianal tissue commonly caused by an abscess. Computed tomography, fistulography and MRI are the available techniques which accurately describes the anal fistulas [2,3]. Fistulography alone has not gained popularity due to its low diagnostic accuracy [9]. The Present study was designed to evaluate the role of MR Fistulogram in preoperative assessment of Anorectal fistulas and association of MR findings with intraoperative findings.

In this study, Single external and internal opening was common in the study groups (Tab/Fig 1). A study by Konan A et al. found single external opening in 83.1% cases, two openings in 12.5% cases, three openings in 2.9% and four openings in 1.5% cases [10]. Duc Vo et al. found one external opening in 81.9% and multiple external openings in 18.1% cases. Around 385 internal openings were identified in 367 cases [11]. The above findings were consistent with the findings of present study where single external opening was observed in majority cases.

In majority cases, internal opening was noticed at 4-6'o clock position (60.6%) and external opening at 4-6'o clock position (50.7%) (Tab/Fig 1). Duc Vo et al. found 385 internal openings in 367 cases. In that, 179 cases had internal openings at 6'o clock position [11]. A study by Satish Patil et al. noticed external opening at 7'o clock position and there was no internal opening in to anal canal noticed [12].

In the present study, the classification of perianal fistula based on St James hospital classification showed that majority cases had grade 1 fistulas (42.5%) followed by grade 2 (20%) (Tab/Fig 1). A study by Konan A et al. noticed grade 0 fistulas in 6.6% cases, grade 1 fistulas in 33.1%, grade 2 fistulas in 18.4%, grade 3 fistulas in 25% cases, grade 4 fistulas in 11.8% cases and grade 5 fistulas in 5.1% cases [10]. A study by Duc Vo et al. found grade 1 fistulas in 24.1% cases, grade 2 in 6.5% cases, grade 3 in 42.4% cases, grade 4 in 23.8% cases and grade 5 fistulas in 3.2% cases [11]. A study by Infant Pushpa Venisha X et al. found grade 1 fistulas in 33.33% cases, grade 2 in 18.33% cases, grade 3 in 26.66% cases, grade 4 in 13.33% cases and grade 5 fistulas in 8.35% cases [13]. In the present study, grade 1 fistulas are more prevalent which was consistent with the results of Konan et al., Infant Pushpa Venisha et al., however, Duc Vo et al., stated that grade 3 fistulas are more common [11,13]. In this study abscess was seen in 15 (18.75%) cases. Among them 7 cases had simple abscess, 6 cases had horse shoe shaped abscess and 2 cases had abscess in Ischiorectal fossa (Tab/Fig 2). In this study, contrast study showed that all the 15 cases showed contrast enhancement which helped in depicting the extent of abscess. In a study by Konan A et al. abscess formation was present in 33.1% cases [10]. A study by Duc Vo et al. found abscess formation in 41 (11.2%) cases. The present study finding was lower than the above studies.

In 16 cases abscess was located in ischioanal fossa, another 16 cases had abscess in intersphincteric space, 10 cases had perianal space, 4 cases had at supralevator area and 1 case had abscess at deep postanal space [11].

Among the study cases, 21 cases had secondary tracts and all the 21 cases showed contrast enhancement for secondary tract demonstration. In remaining cases that are negative for secondary tracts, 18 cases showed contrast enhancement. This is an indication for active inflammation in those cases. In this study abscess was noticed in 15 cases and contrast enhancement was needed for all the cases to depict the extent of abscess. A study by Duc Vo et al. noticed secondary tracts in 101 (27.5%) cases [11].

The sensitivity and specificity for grade 1 fistulas was 100% and 93.5%, for grade 2 was 100% and 99.8%, for grade 3 & 4 was 100% and 100% and for grade 5 was 100% and 99.9% respectively (Tab/Fig 5). The comparison of predictive validity of the present study with previous studies was given in Tab/Fig 6.

Table 6: Comparison of predictive validity of the present study with previous studies

Previous studies	Sensitivity						Specificity					
	G0	G1	G2	G3	G4	G5	G0	G1	G2	G3	G4	G5
Present study (2021)	100 %	100 %	100 %	100 %	100 %	100 %	95.8 %	93.5 %	99.8 %	100 %	100 %	99.9 %
Duc Vo et al., 2019 (11)	100%						100%					
Shruti Santosh Patil et al., 2020 (12)	100 %	100 %	100 %	100 %	100 %	100 %	91.6 %	100%	100%	100 %	100 %	100%
Infant Pushpa Venisha et al., 2019 (13)	100 %	100 %	100 %	100 %	100 %	100 %	91.6 %	100%	100%	100 %	100 %	100%
Garg P et al., 2017 (15)	98.6%						99.7%					
Siddiqui MR et al., 2012 (16)	87%						69%					
Spencer JA et al., (1998) (17)	89%						68%					

Konan A et al. concluded that inclusion of MRI in the preoperative surgical assessment of anal fistulas when they are recurrent, complex, high grade or when the external opening is located more than 2 cm from the anal canal was effective [10].

A study by Satish patil et al. concluded that MRI fistulography is a useful and recommended diagnostic method to point the location of the fistula, identifying internal orifice [12]. A study by Shruti Santosh Patil and Richesh S Tathode concluded that contrast enhanced MRI can distinguish active inflammation of tracts [14]. The present study results were in agreement with the above studies that MR Fistulogram recommended diagnostic tool for the preoperative evaluation of anorectal fistulas.

Limitations: This single centric study was conducted on small sample, further large multicenter studies required.

Conclusion

The results of this study concluded that MR Fistulogram with contrast enhancement is a useful and recommended diagnostic tool for the preoperative evaluation of anorectal fistulas and to distinguish inflammation of tracts which can direct the surgeon towards the successful management of fistulas.

The study findings showed significant association in tracts identification between MRI and surgical findings.

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