

# International Journal of Radiology and Diagnostic Imaging



E-ISSN: 2664-4444  
P-ISSN: 2664-4436  
[www.radiologypaper.com](http://www.radiologypaper.com)  
IJRDI 2020; 3(1): 210-214  
Received: 23-11-2019  
Accepted: 25-12-2019

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## Role of Mr Fistulogram in preoperative assessment of anorectal fistulas and its correlation with intraoperative findings

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DOI: <http://dx.doi.org/10.33545/26644436.2020.v3.i1c.78>

### Abstract

The anorectal fistulas can be inter sphincteric, Trans sphincteric, extra sphincteric or supra sphincteric. Detailed understanding of anorectal anatomy is needed for identification and management of anorectal fistulas. Park's and St James University Hospital classification are used of which the latter gives better details of perianal fistulas. Unenhanced and enhanced MRI helps in identification of primary and secondary tracks, complications like abscesses and hence guides the surgeons to plan appropriate treatment strategy. During the study period, around 30 patients who were diagnosed to have perianal fistula clinically and referred for MR fistulogram to the Department of Radiology were included in the study. In our study, there was significant correlation between the fistulous tracts identified on MRI and the surgical findings. Fistulotomy is the preferred method of management in our institution. And for patients with abscess, abscess drainage is done. Fistulotomy was done in about 24 out of 30 patients which correlated well with the MRI findings for grades III to V. Grade I and II fistulas showed discrepancies in identification. Abscess drainage was also done in 5 patients (8.35%) which were also in accordance with MRI findings.

**Keywords:** Mr Fistulogram, anorectal fistulas, intraoperative findings

### Introduction

A fistula is defined as an abnormal connection between 2 structures or organs or between an organ and the surface of the body. Here, it's an abnormal connection between anal canal and skin of the perineum. Its prevalence is about 0.01%. Perianal fistula is an uncommon, yet important condition of the gastrointestinal tract that leads to significant morbidity<sup>[1]</sup>. It occurs in approximately 10 out of 100000 persons and has a male predominance. Young men are commonly affected. The work in perianal fistulas started with contributions from Good sall and Parks. Tuberculosis and inflammatory bowel disease are also associated with perianal fistulas.

The anorectal fistulas can be inter sphincteric, trans sphincteric, extra sphincteric or supra sphincteric. Detailed understanding of anorectal anatomy is needed for identification and management of anorectal fistulas. Park's and St James University Hospital classification are used of which the latter gives better details of perianal fistulas<sup>[2]</sup>.

Unenhanced and enhanced MRI helps in identification of primary and secondary tracks, complications like abscesses and hence guides the surgeons to plan appropriate treatment strategy.

### Methodology

During the study period, around 30 patients who were diagnosed to have perianal fistula clinically and referred for MR fistulogram to the Department of Radiology were included in the study.

**Design:** Hospital based prospective observational study

**Setting:** Department of Radio Diagnosis in collaboration with department of General Surgery.

### Study Methodology

Patients suffering from anorectal fistulas who were referred to the Department of Radio

Diagnosis are included in this study. After obtaining permission from medical research ethics committee and informed consent from the patients, they were subjected to MR fistulogram using Philips Achieva1.5- Tesla unit system. Different MRI sequences like oblique axial and coronal T1W FSE, T2W FSE, fat suppressed oblique axial and coronal T1 and T2W FSE and contrast enhanced oblique axial, coronal and sagittal FAT SAT T1W FSE images were used. The contrast used was gadolinium DTPA 0.1mmol/kg at a rate of 1 ml/ second.

The following were assessed: type of fistula, position of internal opening, grading of fistula by St. James's University Hospital MRI Classification and the accuracy of MRI findings was correlated with intra operative findings.

## Results

**Table 1:** Age Distribution

Age (Years)	No. of patients	Percentage
< 30	4	13.33%
31 - 40	8	26.67%
41 - 50	10	33.33%
51 - 60	4	13.33%
> 60	4	13.33%
Total	30	100.00%

**Table 2:** External Opening

External opening	No. of patients	Percentage
Single	24	80.00%
Multiple	6	20.00%
Total	30	100.00%

**Table 7:** Diagnosis of Secondary Track Using Contrast Enhancement

Secondary Track	Contrast Enhancement	
	Present	Absent
Present	8	0
Absent	6	16
Chi square test with yates correction		
0.000513		
Significant		

**Table 8:** MRI Grading and Surgical Concordance

St James Grade	No. of patients graded as Per MRI	No. of patients with concordant surgical findings	No. of patients not operated	MRI Surgical Concordance
I	10	8	0	Sensitivity- 100% Specificity-91.66%
II	6	5	0	Sensitivity- 100% Specificity-100%
III	8	7	1	Sensitivity- 100% Specificity-100%
IV	4	4	0	Sensitivity- 100% Specificity-100%
V	2	2	0	Sensitivity- 100% Specificity-100%

A total of 30 patients who were referred for MRI fistulogram were studied with gadolinium enhanced MR fistulogram. They were followed upto surgery and the operative findings were correlated with the preoperative MRI findings.

Of the total 30 patients included in the study, 19 patients were males (63%). And 11 patients were females (37%). Among the 30 patients included in the study group, the most prevalent type of fistula was intersphincteric type which was seen in 16 of the patients (53.33%). Trans sphincteric type of fistula accounted to about 40.00% which was seen in 12 patients. Extra sphincteric type of fistula was seen in 2 patients which accounted for about 6.67%.

**Table 3:** Internal Opening

Internal Opening	No of patients	Percentage
Single	24	80.00%
Multiple	4	13.33%
Others	2	6.67%
Total	30	100.00%

**Table 4:** Contrast Enhancement

Contrast Enhancement	No of Patients	Percentage
Present	14	46.67%
Absent	16	53.33%

**Table 5:** St James Grading

St James Grade	No of Patients	Percentage
I	10	33.33%
II	6	20.00%
III	8	26.67%
IV	4	13.33%
V	2	6.67%

**Table 6:** St James Grade and Enhancement with Contrast

St James Grade	Contrast Enhancement	
	Done	Not Done
I	1	9
II	5	1
III	2	6
IV	4	0
V	2	0
Chi square Test Yates Correction		
0.0019		
Significant		

The age group of the patients included in the study ranged from 20 to 70 years.

There were 4 patients below 30 years (13.33%)

There were 8 patients in age group 31-40 years (26.67%)

There were 10 patients in age group 41-50 years (33.33%)

There were 4 patients in age group 41-60 years (13.33%)

There were 4 patients aged more than 60 years (13.33%).

In our study, when the fistulous tracts were analysed, majority of the patients (24 out of 30) had a single external opening (80.00%). Multiple external openings were seen in 6 patients (20.00%).

Most commonly the opening was found between 4 and 6'o clock position. The next common location being 7 to 9'o

clock position which was found in 05 patients. When analysing the internal opening, it was single in 80% of patients (24 out of 30) and multiple in about 4 patients (13.33%). Most commonly, the internal opening was found in 6'o clock position in 11 patients (45.83%). The operative findings were well correlating with the study with regard to the site of the openings. In our study, 08 out of 30 patients (26.66%) had secondary tracts. Identification of all these tracts is essential for complete eradication of the disease. As already known, active fistulous tracts enhance well with gadolinium contrast. This helps in better delineation of fistulous tracts. Contrast enhancement was present in 14 patients (46.67%).

On contrast study for the demonstration of secondary tracts, it was observed that on the whole, of the 14 patients who had secondary tracts, all of them showed contrast enhancement for demonstration of secondary tracts. Among the remaining 22 patients who did not have secondary tracts, 06 patients showed contrast enhancement that indicated probably active inflammation. This result was statistically significant with a "p value" of 0.000513. So, it could be concluded that contrast study is indispensable for management. In our study, abscesses were identified in 6 out of 30 patients (20.00%). Among them, 4 patients had simple abscess (50.00%), 2 patients had horse shoe abscess (33.33%). One patient had abscess in ischioanal fossa. Contrast study revealed that all the 06 patients showed contrast enhancement that helped in demonstrating the extent of the abscess. This correlation was statistically significant with a "p value" of 0.0496. Hence, it could be concluded that contrast study is absolutely necessary for assessing the complications arising due to perianal fistulas. This is superior to the result given by Maier *et al.* in his study (42) who showed a 84% sensitivity of MRI for the identification of perianal fistulas and abscesses. His study gave 15% false positive results which were eliminated in our study. Our study showed sensitivity and specificity of 100% and 100% for abscesses and 80% and 100% for secondary tracts. The better results of our study may be attributed to the use of contrast enhanced imaging.

It was noted that 08 patients out of 30 showed contrast enhancement of secondary tracts and abscesses and that majority of them (09 patients) were in the age group of 31-50 years in whom the incidence of complications due to perianal fistula was also high. This correlation gave a statistically not significant relationship with a "p value" of 0.3441.

In our study, we classified perianal fistulas on the basis of St James's University Hospital Classification. This revealed that grade I fistulas were the commonest which was found in 10 patients (33.33%). The second most common type is grade III fistulas which were found in 08 patients (26.67%). Grade II fistulas were found in 06 patients (20.00%). Grade IV and grade V fistulas are relatively uncommon and were found in 04 patients (13.33%) and 02 patients (6.67%) respectively.

In our study, there was significant correlation between the fistulous tracts identified on MRI and the surgical findings. Fistulotomy is the preferred method of management in our institution. And for patients with abscess, abscess drainage is done. Fistulotomy was done in about 24 out of 30 patients which correlated well with the MRI findings for grades III to V. Grade I and II fistulas showed discrepancies in identification. Abscess drainage was also done in 5 patients

(8.35%) which were also in accordance with MRI findings. No surgical procedure was attempted on another 3 patients (5%) out of which two patients (one intersphincteric and one trans sphincteric) had no complaints of discharge and not willing for surgery. Another one patient was a 60 year old male with extrasphincteric type perianal fistula and underlying crohn's disease with multiple fistulous tracts and external openings and internal opening on the rectal wall and was not willing for surgery.

In all those who underwent surgery, the per operative findings correlated exactly with the MRI findings for grades III to V. Correlation between surgical and MRI findings was significant in our study with a "p value" of 0.001. When the St James's University Hospital MRI grading according to which patients were classified was compared with that of the per operative findings, the correlative value was the best for the fistulas of grades III, IV and V. It was observed that 08 patients were reported with grade III, 04 patients with grade IV and 02 patients with grade V fistulas. It was also found in our study that only 10 out of 30 patients who were classified as grade I had this type of fistula. The remaining 06 patients belonged to grade II based on the per operative finding. On analysis, all these 4 patients were found to have secondary tracts as an additional per operative finding. The sensitivity and specificity of MRI for grade I and II fistulas were in the order of 100%, 91.66% and 78.94%, 100% respectively. For other grades, the sensitivity and specificity were 100% and 100%. MRI is effective in imaging primary tracts of intersphincteric fistulas but misses some of the secondary tracts which contributes to reduced sensitivity for MRI in grade II fistulas.

On correlating the St James's University Hospital MRI grading with the sex distribution, it was found that among males, the most common grades were grade I and III which was seen in 06 patients and 06 patients respectively. Among females, the most common grades were grade I and II which were recorded in 04 patients and 03 patients respectively.

As already mentioned, the active fistulous tracts show enhancement. In our study, it was demonstrated that among the 10 grade I patients with simple linear intersphincteric fistulas, only 01 showed contrast enhancement for delineation of the tract. Among the 06 grade II patients, 05 showed contrast enhancement for demonstration of secondary tracts and abscesses. Among the 08 grade III patients with trans sphincteric fistulas, only 02 revealed contrast enhancement. On the other hand all the 04 patients falling into grade IV showed contrast enhancement. Among the 02 grade V patients, both of them showed contrast enhancement. This correlation was significant with a "p value" of 0.0019. Thus, it could be concluded that contrast study is indispensable for demonstration of abscess and secondary fistulous tracts. Also in our study, when the age group of patients was correlated with the grading of fistula, it was observed that the grade V suprasphincteric fistulas common in age more than 40 years. Also, the grade II and IV fistulas with complications (secondary tracts and Abscesses) were common in the age group of 30-50 years and that these group of patients also showed contrast enhancement for clear demonstration of tracts and the extent of abscesses and active inflammation. This is necessary preoperatively because it is known that incomplete excision of tracts result in recurrent disease.

On correlating St James's University Hospital Grading with the sex of the patients under study, it was found that among

both males and females, inter sphincteric fistulas are common which is seen in 09 male and 07 female patients followed by trans sphincteric type which was seen in 09 males and 03 female patients. Thus in our study, it was observed that inter sphincteric and trans sphincteric fistulas are common in the age group of 30-50 years. Extrasphincteric fistulas secondary to other etiologies are common in age group above 40 years.

### Discussion

A total of 30 patients who were referred for MRI fistulogram were studied with gadolinium enhanced MR fistulogram. They were followed upto surgery and the operative findings were correlated with the preoperative MRI findings.

Of the total 30 patients included in the study, 19 patients were males (63%). And 11 patients were females (37%).

Among the 30 patients included in the study group, the most prevalent type of fistula was intersphincteric type followed by trans sphincteric type. This was correlated with the results of study done by Parks *et al.* (1976) who also reported intersphincteric type of fistula to be the commonest in their study (45). The results were also consistent with the study done by Morris *et al.* who in their study mentioned that about 70% of all perianal fistulas were intersphincteric fistulas, while transsphincteric fistulas constituted 20% of the total [3].

The age group of the patients included in the study ranged from 20 to 70 years. Most of them were in the age group of 30- 50 years.

In our study, when the fistulous tracts were analysed, majority of the patients (24 out of 30) had a single external opening. Most commonly the opening was found between 4 and 6'o clock position. The next common location being 7 to 9'o clock position.

When analysing the internal opening, it was single in majority of patients (24 out of 30). Most commonly, the internal opening was found in 6'o clock position. The operative findings were well correlating with the study with regard to the site of the openings.

In our study, we classified perianal fistulas on the basis of St James's University Hospital Classification. This revealed that grade I fistulas were the commonest which was found in 10 patients. The second most common type is grade III fistulas which was found in 08 patients. This is in accordance with the study done by Ozdil Baskan *et al.* [4]

On correlating St James's University Hospital Grading with the sex of the patients under study, it was found that among males and females, intersphincteric fistulas are the commonest followed by trans sphincteric type.

In our study, it was observed that inter sphincteric and trans sphincteric fistulas are common in the age group of 30-50 years. Extrasphincteric fistulas secondary to other etiologies are common in age group above 40 years.

On correlating the St James's University Hospital MRI grading with the sex distribution, it was found that among males, the most common grades were grade I and III. Among females, the most common grades were grade I and II.

In our study, 08 out of 30 patients had secondary tracts. Identification of all these tracts is essential for complete eradication of the disease. Failure of preoperative identification of secondary tracts is the most common cause for recurrence of the disease. As already known, active

fistulous tracts enhance well with gadolinium contrast. This helps in better delineation of fistulous tracts. On contrast study for the demonstration of secondary tracts, it was observed that on the whole, of the 14 patients who had secondary tracts, all of them showed contrast enhancement for demonstration of secondary tracts. So, it could be concluded that contrast study is indispensable for management. This is in concordance with the study done by Dariusz *et al.* [5]

Among them, 04 patients had simple abscess, 02 patients had horse shoe abscess. One patient had abscess in ischiorectal fossa. Contrast study revealed that all the 06 patients showed contrast enhancement that helped in demonstrating the extent of the abscess. Hence, it could be concluded that contrast study is absolutely necessary for assessing the complications arising due to perianal fistulas. This is superior to the result given by Maier *et al.* in his study [6] who showed a 84% sensitivity of MRI for the identification of perianal fistulas and abscesses. His study gave 15% false positive results which were eliminated in our study. The better results of our study may be attributed to the use of contrast enhanced imaging. So, contrast enhanced imaging should be routinely included in MRI protocols of anal fistula examination, even with no abscess or collection seen at the precontrast images. This was in correlation with the study done by M.E. Agha *et al.* [7]

It was noted that 08 patients out of 30 showed contrast enhancement of secondary tracts and abscesses and that majority of them were in the age group of 31- 50 years in whom the incidence of complications due to perianal fistula was also high. Thus, it could be concluded that all the middle age group patients need contrast study as the prevalence of complications is high.

Also it was noted that contrast enhanced fat suppressed 3D T1 sequence detected almost all the fistulous and branch tracts.

In our study, there was significant correlation between the fistulous tracts identified on MRI and the surgical findings. Fistulotomy was done in 24 out of 30 patients preoperative findings correlated well with the MRI findings for grades 3 to 5. Grade I and II fistulas showed discrepancies in identification of tracts. MRI in our study, could not delineate the secondary tracts in grade II intersphincteric type which was missed in 01 patients and wrongly classified as grade 1. Abscess drainage was also done in 5 patients which were also in accordance with MRI findings. The result obtained (86.78%) was comparable with the result obtained from the previous study conducted by Lunniss *et al.* which reported a concordance rate of 86-88% between MRI and surgical findings [8]. In another study by Beets-Tan *et al.* who compared the results of MRI with that intraoperative findings, the sensitivity and specificity were 100% and 86% respectively. For a horse shoe fistula sensitivity and specificity were 100% and 100% and for internal openings, 96% and 90% respectively [9, 10].

As already mentioned, the active fistulous tracts show enhancement. In our study, it was observed that the enhancement was greater for grades II and IV types of fistulas. Thus, it could be concluded that contrast study is indispensable for demonstration of abscess and secondary fistulous tracts.

### Conclusion

Perianal fistula, though an uncommon problem may be

chronic and recurrent. It may present with numerous complications like secondary tracks and abscess cavities. Incomplete evaluation of these complications can result in residual and recurrent disease. So, complete preoperative evaluation of perianal fistulas is warranted. Also to prevent the injury to external sphincter and resultant fecal incontinence, it is necessary to establish the relationship of sphincter with the fistulous tracks. MRI satisfies all these needs of surgeons and helps in planning of surgery. MRI provides finer anatomic details of fistula and also identifies secondary tracks and abscesses. Contrast enhanced MRI can identify active inflammation of tracks. It can also distinguish between scar and granulation tissue. 3D T1 FAT SAT sequence is the best and time saving sequence for imaging perianal fistulas. Correct identification of perianal fistulae and proper grading of fistulae are necessary for ensuring optimum surgical outcome.

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