

Clinical and Radiological Study of Fistula in Ano in Tertiary Care Centre and Management

R Vidyasagar

Assistant Professor, Department of General Surgery, Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana, India

Abstract

Introduction: Fistula-in-ano form a good majority of treatable benign lesions of the rectum and anal canal. About 90% or so of these cases are end results of crypto glandular infections.

Materials and Methods: Patient placed in the lateral position and the external opening of the fistula is identified and cannulated, and saline is injected. The patient is then placed in a supine position in magnetic resonance (MR) gantry.

Results: Clinical examination less accurate to detect internal opening while MR fistulogram could detect most of the internal openings which were confirmed in surgical findings.

Key words: Crohn's disease, Fistula-in-ano, Magnetic resonance imaging

INTRODUCTION

“More is missed by not looking, then by not knowing “by Thomas M Crae.” Fistula-in-ano forms a good majority of treatable benign lesions of the rectum and anal canal. About 90% or so of these cases are end results of crypto glandular infections. As such, the vast majority of these infections are an acute and significant minority is contributed by chronic, low-grade infections, hence pointing to varying etiologies. The common pathogenesis, however, is the bursting open of an acute or inadequately treated anorectal abscess into the pen-anal skin. Most of these fistulas are easy to diagnose with a good source of light, a proctoscope, and a meticulous digital rectal examination. Despite the easy to diagnosis, establishing a cure is problematic on two accounts. First, many patients tend to let their ailment nag them rather than being subject to examination, mostly due to the site of affection of the disease. The more important second factor is that a significant percentage of these diseases persist or recur

when the right modality of surgery is not adopted or when the post-operative care is inadequate. Hence, these conditions affect the young and middle-aged persons causing loss of valuable productive hours.

The importance of imaging and treatment of a fistula-in-ano are attributed to the complex pelvic floor anatomy and the fistula's notorious reputation of recurrence despite utmost care taken during and after its surgery.

Surgery can be extremely demanding, especially if the fistula is complex. The objectives are to eradicate the tract and drain associated sepsis while simultaneously preserving continence. To achieve this surgeon needs the answer to the following questions:

1. What is the relationship between the fistula and anal sphincter? Will surgery risk incontinence and will sphincter-saving procedures be necessary, and
2. Are there secondary extensions from the primary tract which might cause relapse, and if so where are they?

Merely diagnosing a fistula by imaging is unlikely to help the surgeon, in all probability he has already seen it during an anal inspection. Instead, imaging needs to accurately determine the exact anatomy and roots of the fistula, which is originally the most important management objective. This will define the surgical approach and ensure that treatment is complete.

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Corresponding Author: Dr. R Vidyasagar, Department of General Surgery, Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana, India

Over the years, many imaging modalities have been tried, to achieve those objectives. These are conventional fistulography, anal endosonography (AES), computed tomography, and most recently, magnetic resonance fistulography (MRFG).

Contrast fistulography is the most traditional radiological technique used to define fistula anatomy. It involves catheterization of the external opening and injection of water-soluble contrast media which represent the fistulous tract.

AES, developed at St. Mark's Hospital Northwick Park, Harrow, UK, was the first technique to directly visualize the anal sphincter complex in detail. Modern 10 MHz rectal endoprobes are used to identify and study the sphincteric complex.

Computed tomography has also been utilized to evaluate fistula-in-ano. (However, its ability to image in axial planes only and poor soft tissue differentiation limits its ability to classify fistulae with sufficient accuracy).

The continuing need for a better imaging modality for fistula-in-ano led to the use of magnetic resonance imaging (MRI) as a diagnostic and pre-operative evaluation modality.

MRI is a recently devised modality to study fistula-in-ano. Imaging is done in axial, coronal and sagittal planes using T1, T2, short T1 for fat suppression and TRIM sequences. Various coils, namely, spine array, body array, and special endorectal coils may be used.

The following study involves detailed evaluation of fistula-in-ano, its complications and pelvic floor anatomy using magnetic resonance (MR) fistulography, and comparing it with clinical and surgical results.

Aims and Objectives of the Study

The objectives are as follows:

1. To study the different modes of clinical presentations of the fistula- in-ano.
2. To evaluate the role of MRI and its use as a pre-operative evaluation modality for perianal fistulae. This has been done by analyzing its ability to delineate.
 - a) The primary tract.
 - b) Secondary tracts and its ramifications.
 - c) Abscess/Source of persistent infection.
 - d) Relation of the tract to the sphincter complex.
 - e) Relation of the tract to levator ani.

PATIENTS AND METHODS

A prospective study of 30 patients with suspected fistula in ANO, primary or recurrent presenting to the Mahatma

Gandhi Memorial Hospital, Warangal, between June 2016 and September 2018 admitted in the Department of General Surgery. All 30 patients will be examined clinically and later subjected to MRFG.

MRFG will be performed using GE 1.5 Tesla using HDX using PA coils.

Method

Patient placed in the lateral position and the external opening of the fistula is identified and cannulated, and saline is injected. The patient is then placed in a supine position in magnetic resonance (MR) gantry.

MR Technique Used

A scout sagittal section is obtained through the anal canal region which will be used for planning of coronal, sagittal, and axial views.

1.	STIR	Coronal
2.	T1	Coronal
3.	T2	Sagittal
4.	T1	Axial
5.	T2	Axial
6.	T2 fat sat	Axial

STIR: Short T1 for fat suppression

These sections will be taken extending from perianal region to above the level of the levator ani muscle.

Inclusion Criteria

All the patients included in the study presented to the surgery department for any of the following indications.

- Age group from 30 to 80 years.
- Pre-operative evaluation for all clinically proven fistula-in-ano.
- Single/Multiple discharging sinuses in the perianal region.
- Recurrent perianal abscess for detection of undetected tracks.

Exclusion Criteria

The following criteria were excluded from the study:

- Patients with MR incompatible devices or implant
- Patients on the life support system.
- Patients with profound septicemia with an inability to lie down in supine position.
- Patient with claustrophobia.

RESULTS

Distribution of Cases by Age and Sex

There are 30 cases undergone for MRFG for suspicion of fistula-in-ano Table 1.

Table 1: Age distribution in patient with fistula-in-ano

Age group (Years)	No. of cases	Percentage
31–40	4	13.33
41–50	10	33.00
51–60	11	36.66
61–70	4	13.33
71–80	1	3.33
Total	30	100

Table 2: Sex incidence of 30 patients with fistula-in-ano

Sex	No. of cases	Percentage
Male	26	86.6
Female	4	13.4

Table 3: Incidence of primary and recurrent fistulas in 30 patients

Types	No. of cases	Table N%
Primary	12	39.96
Recurrent	18	60.0

Table 4: Primary cases with risk factors

Associated diseases	No. of cases	Table N%
DM	3	25
Nil	4	33.33
TB	4	33.33
TB, DM	1	8.33

DM: Diabetes mellitus, TB: Tuberculosis

There were 4 females in the age group 50–75 years Table 2. Out of 26 males, 13 (50%) were in the age group of 41–60 years. The number of male patients is significantly higher when compared to females.

In our study, majority of the cases (60%) reviewed by MRFG had recurrent fistulas Table 3.

It was observed that at least 67% of the patients with primary fistulas had some associated risk factor Table 4. This shows the importance of the presence of risk factors in the occurrence of fistula-in-ano.

It was observed that at least 39% of the patients with recurrent fistulas had some associated risk factor Table 5. This shows the importance of the presence of risk factors in recurrence.

Most of the patients (83%) were found to have complicated fistula, i.e., Grade-II and above Table 6.

Only 30% of the patients with no risk factors were found to have higher grade fistulas, i.e. \geq Grade II, whereas the

Table 5: Recurrence rate with high-risk factors

Associated diseases	No. of cases	Table N%
DM	4	22.22
Nil	11	61.11
TB	2	11.11
TB, DM	1	5.55

DM: Diabetes mellitus, TB: Tuberculosis

Table 6: Distribution of cases according to various MRI grades of fistula-in-ano

Grade	No. of cases	Percentage
1	5	16.66
2	9	30.00
3	4	13.33
4	6	20.00
5	6	20.00

MRI: Magnetic resonance imaging

high-risk population had more cases, 46.6% with higher grade fistula Table 7. Patients with risk factors (tuberculosis [TB]/diabetes mellitus [DM]/Both) were found to have more incidence of higher grade fistulas as compared to fistulas at low risk.

Almost half (50%) of the patients evaluated by MRFG were found to have abscess collections in various sphincteric planes Table 8. It was observed that in 17% of the patients, abscess collections occurred in multiple planes, the detection of which has significant implications on the outcome of the surgery.

Distribution of abscess collection with regard to type of presentation does not appear to be significantly different Table 9.

It was observed that the majority (70%) of the patients who underwent MRFG were found to have secondary tracts which have utmost importance in surgical planning Table 10.

It was observed that the occurrence of secondary tracts was significantly higher in recurrent cases, which were almost 77.77%. Hence, it is important to look for secondary tracts in recurrent cases Table 11.

About 83% of the cases found to have supralelevator (SLA) collection had recurrent fistulas, and 17% of cases found to have SLA collection had primary fistula. It is important to look for SLA collection in the recurrent fistula Table 12.

It was observed that 83% of the cases with SLA collections had an associated high-risk factor, whereas only 17% of the cases had no risk factor Table 13.

Table 7: Evaluation of different grades of fistula in risk group as compared to the non-risk group

Associated diseases	No. of cases in each MR grade				
	1	2	3	4	5
DM	1	2	1	2	1
Nil	4	6	2	2	1
TB	0	1	1	2	2
TB, DM	0	0	0	0	2

DM: Diabetes mellitus, TB: Tuberculosis, MR: Magnetic resonance

Table 8: Breakup of cases with abscess collection in relation to the various sphincteric planes (IS/ES/SL) as seen on MRFG

Collection plane	No. of cases	Percentage
ES	3	10.0
ES+SL	2	6.7
IS	5	16.7
IS+ES	1	3.3
IS+ES+SL	1	3.3
IS+SL	1	3.3
Nil	15	50.0
SL	2	6.7

MRFG: Magnetic resonance fistulography

Table 9: Distribution of abscess collection by type of presentation (Primary/Recurrent)

Types	ES		ES+SL		IS		IS+ES		IS+ES+SL		IS+SL		SL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Primary	1	3	1	3	3	10	0	0	0	0	0	0	0	0
Recurrent	2	7	1	3	2	7	1	3	1	3	1	3	2	7

Table 10: Distribution of secondary tracts

Types	Present	
	No. of cases	Percentage
Primary	7	58.33
Recurrent	14	77.72

Table 11: Distribution of secondary tracts in various grades of fistula

MR grade	Secondary tract	
	Primary	Recurrent
1	0	0
2	3	6
3	1	0
4	2	4
5	1	4

Among the 30 patients diagnosed to have primary tracts by MRFG the diagnosis for the internal opening was found to match with the surgical report in 24 patients, which gives the 86% for detection of internal opening by MRFG Table 14.

Table 12: Percentage of primary and recurrent fistulas with supralelevator collection

Type	No. of cases	Percentage
Primary	1	17
Recurrent	5	83

Table 13: SLA collections in relation to high-risk factors

SLA abscess	No. of cases	Percentage
TB	2	33.33
DM	1	16.66
Both	2	33.33
None	1	16.66

SLA: Supralelevator, DM: Diabetes mellitus, TB: Tuberculosis

Table 14: Comparison between findings of MRI and surgery

Internal opening	Detected by MRFG	Confirmed by surgery
Primary	11	11
Recurrent	17	13
Total	28	24

MRFG: Magnetic resonance fistulography, MRI: Magnetic resonance imaging

Table 15: Male female ratio

My study	9:1
Suraj <i>et al.</i>	7:1
Spencer <i>et al.</i>	7:1

DISCUSSION

MRFG was performed on 30 patients for the confirmation and grading of fistula-in-ano. Out of the 30 patients, 26 (86.6%) were male patients and 4 (13.4%) were female patients male:female – 9:1.

Male preponderance may be related to an increased number of anal glands, which also tend to be more cystic and ramified when compared with women Table 15.^[1,2]

These patients were in the age groups ranging from 31 to 80 years.

Out of the 26 males, 13 (50%) were in the age group of 41–60 years.

Broadly, the patients fell into two groups, i.e., primary and recurrent. Patients in the primary group were those who had a fistula-in-ano for the first time and had never been operated for the same. Patients in the recurrent group were those whose fistulae had been operated on at least once previously.

In our study, the majority of the patients, (60%), had recurrent fistulas. This was probably due to our center is a tertiary center referred from the periphery.

Two risk groups were identified in our study of 30 patients. These were TB and DM. In our study group, six patients were found to have TB and seven patients had DM. Two of these patients had both TB and DM. In all 39% of recurrent fistulas had some associated risk factor.

It was consecutively observed that of the 18 (60%) patients with recurrent fistula, 2 (11%) had TB, 5 (22%) had DM, 1 (5.5%) had DM and TB. Totally, 39% of the recurrent cases were found to have some associated risk factor which signified the influence of these risk factors on the morbidity of fistula-in-ano and especially its recurrence.

It was noted that in almost all grades of fistula the accuracy of MRFG grading tallied more closely with surgical grading in comparison to the correlation of clinical grading with surgical grading.

In the studies conducted by Beets-Tan *et al.*^[3] (12 of 56) and others, Crohn's disease was found to be the major risk factor. The reason being that the studies were conducted in western countries. Crohn's disease, which is relatively uncommon in the Indian subcontinent, was not found to be a risk factor in any of the patients.

After per rectal examination of the 30 patients, they were subjected to MRFG and each patient was evaluated by scrutinizing the coronal, axial, and sagittal sections.

According to the presence and position of the primary tracts, secondary tracts, presence and absence collections, and their locations, each fistula was graded according to the St. James University Hospital classification.^[4] The distribution of cases according to various MRI grades is depicted in.

Almost half (50%) of the patients evaluated by MRFG were found to have abscess collections in various sphincteric planes. It was observed that in 17% of the patients, abscess collections occurred in multiple planes, the detection of which has significant implications on the outcome of the surgery.

It was observed that the majority of the cases, i.e., 83%, had a complicated fistula Table 16. Grades-II and above were designated as complicated because of the presence of secondary tracts or abscess collections and/or involvement of the planes other than the intersphincteric plane. In the study conducted by Beets-Tan *et al.*,^[3] the percentage of complex fistulas was 57% and in the study by Spencer *et al.*^[5] 40% of patients had complex fistulas.

It was felt that the higher percentage of complex fistulas in our study was due to our institute being a tertiary care center, more number of complex and recurrent cases tend to be referred.

Only 30% of the patients with no associated risk factor were found to have higher grade fistulas, (i.e., Grade II and above), whereas 60% of the high-risk population had higher grade fistulas. Hence, patients with risk factors (TB/DM/Both) were found to have increased incidence of higher grade fistulas as compared to fistulas in low-risk population.

The detection and prevalence of the surgically relevant criteria have been separately dealt with Table 17. These include internal opening of the fistula, primary tract, secondary, and abscess collections, SLA extensions, and additional findings.

The correct location of the internal opening of the fistula, as diagnosed on MRFG and confirmed by surgery was evaluated. Although the exact opening was not seen in all the cases, it was inferred according to the course and plane of the primary tract.

An internal opening was considered as correctly identified when it was at the correct level in the anal canal and was within the correct quadrant.

Among the 30 patients diagnosed to have primary tracts by MRFG, the diagnosis for internal opening was found to match with the surgical report in 24 patients, which gave the sensitivity of 86% for detection of internal opening by MRFG, compared to 96% sensitivity obtained in the study by Beets-Tan *et al.*^[3]

As regard the detection of primary tracts, we obtained sensitivity and specificity of 100%, in comparison to a sensitivity of 100% and specificity 86% in the study of Beet-Tan *et al.*^[3]

Table 16: Complicated fistulas

My study	83%
Beet-Tan <i>et al.</i>	57%
Spencer <i>et al.</i>	40%

Table 17: Comparison of various studies

Studies	Sensitivity for internal opening (%)	Sensitivity for primary tracts (%)
My study	86	100
Beet-Tan <i>et al.</i>	100	86
Suraj <i>et al.</i>	96	100

As the detection of secondary tracts has significant implications on the prognosis and outcome of surgery for fistulae-in-ano, their detection by MRFG is crucial.

If not identified and properly eradicated, these extensions and tracts may lead to recurrences. Results of the study by Lunniss *et al.*^[6,7] suggested that MR imaging could depict more extensions than could surgical exploration. In the study by Beets-Tan *et al.*^[3] they concluded that pre-operative MR imaging was 100% accurate in the detection of secondary extensions.

Secondary tracts are ramifications from the primary tract. Because the presence of horseshoe tracts greatly alters the surgical approach and its outcome, they have been separately mentioned.

About 70% of the patients in our study were found to have secondary tracts. Comparatively in a study of 56 patients by Beets-Tan *et al.*^[2] 39% of the cases had secondary tracts.

It was observed that the occurrence of secondary tracts was significantly higher in recurrent cases, which were almost 50% Table 18. Hence, it is important to look for secondary tracts in recurrent cases.

It was also observed that the majority (78%) of the cases with secondary tracts were those who had recurrent fistulas. It was felt that secondary tracts were more common in recurrent cases.

Out of the 30 patients with primary tracts, the grading was found to be surgically correct in 28 patients, which gives an agreement of grading in 93%. The two remaining patients were found to have fistulas of lower grades on surgery. Hence, it was observed there was a tendency for over grading (7%) by MRFG.

Abscess collections were found in 50% of the cases evaluated. The presence of collections was divided according to their location in relation to the various sphincteric planes. These planes were intersphincteric, extrasphincteric, and the supralelevator planes. It was observed that in 17% of the patients, the abscess collections occurred in multiple planes (i.e. in combination). The detection of these collections, especially those present in multiple planes, has significant implication on the outcome of the surgery for complete eradication of the disease process.

The other most important additional finding for which MRFG was evaluated was for the detection of SLA collections or extensions. Those cases in which there is SLA collection or tract fall into the Grade-V. This has very high surgical significance, as it alters the surgical approach, and also it has serious implications on the outcome of the surgery.

Table 18: Secondary tracts

My study	70%
Beet-Tan <i>et al.</i>	39%

In our study, 6 cases were found to have SLA component by MRFG. About 83%^[5] of these had an associated risk factor (TB/DM/Both) which was quite significant.

Patients with risk factors (TB/DM/Both) were found to have more incidence of higher grade fistulas as compared to fistulas in low-risk population.

On clinical exam, the presence of SLA collection was suspected in only one patient. MRFG gave a diagnosis of SLA extension in an additional five patients.

On surgery, 6 of the six patients detected by MRFG (sensitivity of 100%) were found to have a SLA component of fistula/abscess collections. In comparison, 100% sensitivity for the detection of SLA collections was observed in the study by Beets-Tan *et al.*^[3] Importantly, no case with SLA extension was missed by MRFG. MRFG was thus found to be more sensitive than clinical grading for detection of SLA extensions.

Finally, the correlation between MRFG grading and surgical grading was done. The surgical findings (grading) were considered a gold standard. The MRFG findings and grades were discussed with the radiologist before the surgery. The MRFG findings were then confirmed on surgery.

Out of the 30 patients with suspected fistula-in-ano, MRFG grading was found to be surgically correct in 28 patients, which gave a concordance of 93% similar to the study by Morris *et al.*^[4]

In 7% of the cases with non-concordance, 1 case was diagnosed to be of Grade II was found to be only Grade I. The other case was diagnosed as Grade IV which were subsequently found to be Grade III on surgery. Hence, it was observed that there was a slight tendency for over grading by MRFG. The overdiagnosis may be due to epithelialized tracts.

Similarly, out of the 30 patients with suspected fistulas, grading by pre-operative clinical assessment was found to be surgically correct in 8 patients only, which is significantly lower than MRFG correlation. Complete concordance between clinical and surgical grading was found in 26% of the patients only. It was also observed that there was a tendency for under grading by the pre-operative clinical assessment method.

In almost all the grades of fistulae, the accuracy of MRFG grading was observed totally more closely with surgical grading in comparison to clinical grading.

In addition to the 6 cases with SLA components, 4 other cases were detected to have additional findings on MRFG, which significantly altered the surgical approach and final prognosis. Three of these patients were found to have scrotal abscesses and 1 patient who was a diabetic had an abscess in the thigh. In all these cases, there was no clinical suspicion of any additional finding. Therefore, in at least 30% of the cases, additional information was provided by MRFG.

MRFG was performed in 30 patients for pre-operative evaluation of fistula-in-ano. Male to female ratio was 9:1. The patients belonged to age groups ranges from 31 to 60.

A majority (60%) of the 30 patients were patients with recurrent fistula-in-ano.

TB and DM were the two major risk factors and were found to be important contributory factors for recurrence of the lesion. About 83% of the patients had a complicated fistula (i.e., Grade II).

MRFG was extremely useful in identifying the internal opening of the fistula (86% sensitivity), presence of secondary tracts 100% sensitivity, detecting abscess collection in multiple planes, and in visualizing SLA extensions of the lesion.

However, in our study, MRFG was seen to overestimate the grading for fistula in 2 patients as confirmed on surgery.

MRFG grading was found to have a 93% concordance with surgical (pre-operative) grading compared to 26% concordance of pre-operative clinical assessment method to surgery.

MRFG significantly altered the surgical approach due to its ability to demonstrate clinically undetectable abscesses and secondary tracts.

CONCLUSION

Clinical examination is less accurate to detect internal opening while MR fistulogram could detect most of

the internal openings which were confirmed in surgical findings.

High spatial resolution MR imaging with HDX PA coils is accurate for the detection of perianal fistulas. It shows the surgical anatomy and maps out the perianal fistulas accurately and provides additional information on secondary extensions in patients with complex fistulas.

The largest additional value from preoperative MRFG was obtained in patients with complex fistulas that were associated with TB and DM and in patients with recurrences. Our study showed that the surgical approach and procedure were drastically affected by MR findings of additional tracts and abscess.

Long term follow-up is required to evaluate the impact of MRFG in patients with recurrent fistulas. However, our study clearly showed that pre-operative MRFG led to more aggressive surgery for the removal of complex tracts which may have a significantly long-term effect.

Finally, we conclude that MRFG is a rapid, well-tolerated accurate technique with excellent surgical correlation but less concordance with clinical assessment and is, therefore, an ideal pre-operative imaging modality for fistula-in-ano.

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