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A study of pre-operative assessment of perianal fistulas using MRI

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Abstract---Anal gland infections most commonly lead to perianal fistulas. With advances in techniques, MR imaging has proven to play an important role in perianal fistula evaluation and is currently considered to be the gold standard. This was a hospital based prospective observational study in which around 100 patients who were diagnosed to have perianal fistula clinically and referred for MR fistulogram to the Department of Radio diagnosis & Imaging, Government Medical College, Srinagar, J&K, India and were included in the study. In this study we concluded that about 26% patients (26 out of 100) had secondary tracks and 31% (31 out of 100) had associated abscesses which showed 86% concordance with surgical findings.

Keywords---Fistula, MRI, abscess, fistulogram.

Introduction

Perianal fistula is a common disease that most commonly originates from anal gland infections. Medical treatment has little treatment value, and patients eventually undergo surgery. The success of the surgery is closely associated with the preoperative evaluation [1]. Evaluation the course of the fistula and the presence of associated findings, are of paramount significance, before surgical intervention because it can influence the surgical approach [2]. Identification of the extensions of the disease with imaging methods aids in the surgical elimination of all sources of infection and ultimately decreases the percentage of recurrent disease [3]. The imaging methods employed to evaluate perianal fistulas are fistulography, computed tomography, three dimensional (3D) endoanal ultrasonography (EAUS) (with or without the instillation of hydrogen peroxide into the track), and magnetic resonance imaging (MRI) with endoanal or pelvic coils or both. With advances in techniques, MR imaging has proven to play an important role in perianal fistula evaluation and is currently considered to be the gold standard [4]. Commonly used MRI protocols consist of T1-weighted spin echo or gradient-echo sequences with or without intravenous gadolinium administration, T2-weighted spin-echo or turbo-spin echo sequences, and short tau inversion recovery (STIR) sequences in the axial, sagittal and plane [5]. This study was aimed to evaluate the role of MR fistulogram in preoperative assessment of anorectal fistulas, identify the fistulous tracks, internal openings and the relationship of perianal fistulas with anal sphincter complex, to identify the secondary tracks and other complications like horseshoe track and abscesses and to grade the fistulas according to St. James University Hospital Classification, assess the usefulness of contrast enhanced MR fistulogram in detecting secondary complications and to correlate MR findings with intra operative findings.

Material and Methods

This Hospital based prospective observational study was carried over a period of 3 years (May 2019 -Jan2022) in the Department of Radiodiagnosis & Imaging in collaboration with the Department of Surgery, Government Medical College, Srinagar, J&K, India. Around 100 patients who were diagnosed to have perianal fistula clinically and referred for MR fistulogram to the Department of Radiodiagnosis & Imaging, Government Medical College, Srinagar and were included in the study. This study was begun after getting the clearance from Institutional Ethics Committee and written consent from the patients.

Inclusion criteria

Clinically diagnosed cases, MRI as the only preoperative imaging modality used, Age group: 16 years and above.

Exclusion criteria

History of Previous Anorectal surgery, Not fit for surgery, Claustrophobic patients or any psychiatric illness, Patients with absolute Contraindication to MRI like implantable cardiac device or cochlear implants, etc.

Methodology

Patients suffering from anorectal fistulas who were referred to the Department of Radiodiagnosis & Imaging were included in this study. Patients were subjected to MR fistulogram using 3 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 0.1 mmol/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. The type of fistula according to Parks classification was assessed by surgeon who was unaware of MRI findings. The MR and surgical findings were correlated and concordance seen.

Observations and Results

Table 1
Shows age distribution of the cohort

Age (in years)	No. of patients	Percentage
<30	15	11.68%
31-40	28	33.33%
41-50	27	31.66%
51-60	16	13.33%
>60	14	10%

In the study group, major age group of patients was from 31-40 years (33.33%) with mean age of presentation 35.5 years. Patients above 60 years comprised of less than 10% of the total group as shown in Table 1

Table 2
Shows gender distribution of the cohort

Gender	Number	Percentage
Male	59	65%
Female	41	35%
Total	100	100%

In our study group, maximum percentage was of male patients, about 65%. There were 35% female patients in our study group as shown in Table 2.

Table 3
Shows the status of external opening in patient cohort

External opening	No. of patients	Percentage
Single	72	86.67%
Multiple	28	13.33%

External opening was single in 72 (86.67%) patients while multiple external opening was found in 28 (13.33%) as shown in Table 3.

Table 4
Shows position of single external opening

Clock position	No. of Patients	Percentage
1° - 3°	11	11.5%
4° - 6°	35	57.7%
7° - 9°	15	19.3%
10° - 12°	11	11.5%

While analysing the fistulous tracks, majority of the patients (72 out of 100) had a single external opening (86.67%). Multiple external openings were seen in 28 patients (13.33%). 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 15 patients as shown in Table 4.

Table 5
Shows the status of internal opening of perianal fistula

Internal Opening	No. of Patients	Percentage
Single	71	85%
Multiple	16	10%
Others	13	5%

When analyzing the internal opening, it was single in 85% of patients (71 out of 100), multiple in about 16 patients (10%) and other in about 13 patients (5%) as shown in Table 5.

Table 6
Shows positioning of Single Internal Opening in study cohort

Internal Opening	No. of Patients	Percentage
1°-3°	18	24%
4° - 6°	28	8%
7° -9°	17	10%
10° -12°	8	26%

When analyzing the internal opening, it was single in 85% of patients (71 out of 100) and multiple in about 16 patients (10%). Most commonly, the internal opening was found in 6'o clock position in 13 patients (26%). The operative findings were well correlating with the study with regard to the site of the openings as shown in Table 6.

Table 7
Shows distribution of secondary track in study cohort

Secondary track	No of patients Based on MRI findings	No of patients based on surgical findings	MRI- surgery concordance
Present	36	20	Sensitivity- 80% Specificity- 100%
Absent	64	40	

In our study, 36 out of 100 patients (36%) 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 as shown in Table 7.

Table 8
Shows distribution of abscess in study cohort based on MRI

Abscesses	No of patients basedon MRI	Percentage	Concordance based on surgery
Present	31	18.33%	Sensitivity-100% Specificity-100%
Absent	69	81.67%	

Table 9
Shows types of abscesses in study cohort

Type of Abscess	No. of Patients	Percentage
Horse Shoe Abscess	11	36.36%
Simple Abscess	13	54.54%
Abscess in IRF	7	9.10%

In our study, abscesses were identified in 31 out of 100 patients (18.33%). Among them, 13 patients had simple abscess (54.54%), 11 patients had horse shoe abscess (36.36%). About seven patients had abscess' in ischiorectal fossa as shown in Table 9.

Table 10
Shows grading of perianal fistula in study cohort

St James Grade	Number of Patients	Percentage
I	24	33.33%
II	15	18.33%
III	20	26.66%
IV	12	13.33%
V	9	8.35%

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 24 patients (33.33%). The second most common type is grade III fistulas which was found in 20 patients (26.66%). Grade II fistulas were found in 15 patients (18.33%). Grade IV and grade V fistulas are relatively uncommon

and were found in 12 patients (13.33%) and 9 patients (8.35%) respectively as shown in Table 10.

Table 11
Shows correlation in surgery

Correlation insurgery	No. of Patients	Percentage
Done	66	86.65%
Not Done	16	5%
Other	18	8.35%
P VALUE - 0.008 (Significant)		

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 72 out of 100 patients which correlated well with the MRI findings for Grades 3 to 5. Grade 1 and 2 fistulas showed discrepancies in identification. Abscess drainage was also done in 8 patients (8.35%) which were also in accordance with MRI findings. No surgical procedure was attempted on another 16 patients (5%) out of which 8 patients (6 intersphincteric and one trans-sphincteric) had no complaints of discharge and were not willing for surgery.

Table 12
Shows correlation of the St James's University Hospital MRI grading with the sex distribution

St James Grade	SEX	
	MALE	FEMALE
I	17	11
II	9	10
III	16	8
IV	9	7
V	8	5
KRUSKAL WALLIS TEST P VALUE - 0.555 NOT SIGNIFICANT		

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 17 patients and 16 patients respectively. Among females, the most common grades were grade I and II which were recorded in 11 patients and 10 patients respectively.

Table 13
Shows correlation of age group with grading of fistula

St James Grade	Age Distribution in Years				
	<30	31-40	41-50	51-60	>60
I	5	6	10	5	4
II	0	8	4	3	4
III	6	5	9	3	3
IV	0	8	3	3	0
V	0	3	3	4	1

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.

Table 14
Shows diagnosis of secondary track using contrast enhancement

Contrast Enhancement	Secondary Track	
	Present	Absent
Present	16	12
Absent	0	32
Mann Whitney 'U' test P value - 0.001 Significant		

Table 15
Shows diagnosis of abscess using contrast enhancement

Contrast enhancement	Abscess	
	Present	Absent
Present	11	17
Absent	0	32
Mann Whitney U test p value - 0.001 Significant		

Table 16
Shows contrast enhancement based on sex

Contrast Enhancement	SEX	
	MALE	FEMALE
Present	18	10
Absent	21	11
Mann Whitney 'U' test P value - 0.914 Not significant		

In our study, it was demonstrated that among the 24 grade I patients with simple linear inter-sphincteric fistulas, 1 only 2 showed contrast enhancement for delineation of the tract. Among the 15 grade II patients, 10 showed contrast enhancement for demonstration of secondary tracts and abscesses. Among the 20 grade III patients with trans sphincteric fistulas, only 4 revealed contrast enhancement. On the other hand, all the 12 patients falling into grade IV showed contrast enhancement. Among the 9 grade V patients, 4 of them showed contrast enhancement. This correlation was significant with a “p value” of 0.001. Thus, it could be concluded that contrast study is indispensable for demonstration of abscess and secondary fistulous tracts.

Table 17
Shows MRI grading and surgical concordance of perianal fistula in patient cohort

St James grade category	No of patients graded as per MRI	No of patients with concordant surgical findings	No of patients not operated	MRI- surgical concordance
I	24	19 (5 patients per- operatively categorized as grade II)	1	Sensitivity- 100% Specificity-91.66%
II	15	15	-	Sensitivity- 100% Specificity-100%
III	20	19	1	Sensitivity -100% Specificity- 100%
IV	12	12	-	Sensitivity -100% Specificity- 100%
V	9	8	1	Sensitivity -100% Specificity- 100%

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



Grade 1. Inter-sphincteric fistula



Grade 2. Inter-sphincteric fistula with perianal abscess



Grade 3. Trans-sphincteric fistula



Grade 4. Trans-sphincteric fistula with associated secondary tracks and horseshoe abscess



Grade 5. Supralelevator disease



Fistulotomy in lithotomy position with identifications of track using methylene blue dye

Discussion

A total of 100 patients who were referred for MRI fistulogram to Department of Radio diagnosis & Imaging, Government Medical College, Srinagar were studied with and without gadolinium enhanced MR fistulogram. They were followed up to surgery and the operative findings were correlated with the preoperative MRI findings. Of the total 100 patients included in the study, 59 patients were males (65%). And 41 patients were females (35%). Among the 100 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 [6]. The results were also consistent with the study done by Morris et al [7]. who in their study mentioned that about 70% of all perianal fistulas were intersphincteric fistulas, while trans sphincteric fistulas constituted 20% of the total. 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 (72 out of 100) 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 (71 out of 100). 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 24 patients. The second most common type is grade III fistulas which was found in 20 patients. This is in accordance with the study done by Ozdil Baskan et al [8]. 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, 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. Extra sphincteric 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, 26 out of 100 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 [9]. 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 26 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 [10].

In our study, abscesses were identified in 31 out of 100 patients. Among them, 13 patients had simple abscess, 11 patients had horse shoe abscess. Seven patients had abscess in ischioirectal fossa. Contrast study revealed that all the 11 patients showed contrast enhancement that helped in demonstrating the extent of the abscess. Hence, it could be concluded that contrast study is necessary for assessing the complications arising due to perianal fistulas. This is superior to the result given by Maier et al in his study [11] who showed an 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 [12]. It was noted that 28 patients out of 100 showed contrast enhancement of secondary tracts and abscesses and that majority of them (21 patients) 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.

In our study, there was significant correlation between the fistulous tracts identified on MRI and the surgical findings. Fistulotomy was done in 66 out of 100 patients preoperative findings correlated well with the MRI findings for grades 3 to 5. Grade 1 and 2 fistulas showed discrepancies in identification of tracts. MRI in our study, could not delineate the secondary tracts in grade 2 intersphincteric type which was missed in 4 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 [13] which reported a concordance rate of 86- 88% between MRI and surgical findings. In another study by Beets- Tan et al [5], who compared the results of MRI with that intraoperative finding, 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. 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. Of the total 100 patients included in the study, 69 patients were males (65%). And 31 patients were females (35%). The most prevalent type of fistula was intersphincteric type which was seen in 53 of the patients (53.33%). Common age group affected by perianal fistulas were 31 to 40 years (33.33%). Fistulas are commonly seen in males. The operative findings were well correlating with the study regarding the site of the openings. Identification of secondary tracts is essential for complete eradication of the disease. Active fistulous tracts enhance well with gadolinium contrast. Contrast study helps in better delineation of fistulous tracts and also in demonstration of secondary complications like abscesses. Our study has concluded that contrast study is indispensable for management.

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 24 patients (33.33%), the second most common type being grade III fistulas which was found in 20 patients (26.66%). 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 72 out of 100 patients. Surgical findings correlated well with the MRI findings for grades 3 to 5. Grade 1 and 2 fistulas showed discrepancies in identification. Abscess drainage was also done in 15 patients (8.35%) which were also in accordance with MRI findings. Correlation between surgical and MRI findings was significant in our study with a "p value" of 0.008. Hence, MR fistulogram with contrast enhancement can give comprehensive for the surgeons in the management of perianal fistulas.

References

1. Beets-Tan RG, Beets GL, van der Hoop AG, et al. Preoperative MRI of anal fistula: Does it really help the surgeon? *Radiology*. 2001; 218: 75-84.
2. Intriago, C. Z., & Posligua, T. I. Q. (2020). Telecommunications and virtualization in times of pandemic: impact on the electrical engineering career. *International Journal of Physical Sciences and Engineering*, 4(3), 38-44. <https://doi.org/10.29332/ijpse.v4n3.630>
3. Jordán J, Roig JV, García-Armengol J, et al. Risk factors for recurrence and incontinence after anal fistula surgery. *Colorectal Dis*. 2010;12: 254-60.
4. Lestari, Y. D., Armi, A., Koniasari, K., Setiawan, Y., Sartika, M., Rohmah, H. N. F., Nurpratiwi, Y., & Fahrudin, A. (2022). Effectiveness of the emotional freedom techniques to reducing stress in diabetic patients. *International Journal of Health Sciences*, 6(2), 555-562. <https://doi.org/10.53730/ijhs.v6n2.6728>
5. Lilus HG. Fistula-in-ano, an investigation of human foetal anal ducts and intramuscular glands and a clinical study of 150 patients. *Acta Chir Scand Suppl*. 1968; 383:7-88.
6. Lunnis PJ, Armstrong P, Barker PG, Reznick RH, Philips RK. MR imaging of the anal fistulae. *Lancet* 1992; 340:394-6.

7. Maeir AG, Funovics MA, Kreuzer SH, et al. Evaluation of perianal sepsis: Comparison of anal endosonography and magnetic resonance imaging. *J Magn Reson Imaging*. 2001; 14:254- 60.
8. Mahmoud E, Eid M, Mansy H, Matarawy K, Wally M. Preoperative MRI of perianal fistula: Is it really indispensable? Can it be deceptive? *Alexandria Journal of Medicine* 2013; 49:133-44.
9. Morris J, Spencer JA, Ambrose NS. MR imaging classification of perianal fistulas and its implications for patient management. *Radiographics*. 2000; 20:623-35.
10. Ozdil Baskan, Mustafa Koplay, Mesut Sivri, Cengiz Erol. Our experience with MR imaging of perianal fistulas. *Pol J Radiol*. 2014; 79: 490-97.
11. Sainio P. Fistulo –in –ano in a defined population: incidence and epidemiological aspects, *Ann chir Gynaecol* 1984;73(4):219-24.
12. Seow-choen, Phillips RK. Insights gained from the management of problematical anal fistulae at St Mark's Hospital, 1984-88. *Br J. Surg* 1991; 78(5): 539-41.
13. Spencer JA, Chapple K, Wilson D, Ward J, Windsor AC, Ambrose NS. Outcome after surgery for perianal fistula: predictive value of MR imaging. *Am J. Roentgenol* 1998;171(2):403-406.
14. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, 6(1), i-v. <https://doi.org/10.53730/ijhs.v6n1.5949>
15. Waniczek D, Adamczyk T, Arendt J, Kluczevska E, Kozińska- Marek E. Usefulness assessment of preoperative MRI fistulography in patients with perianal fistulas. *Pol J Radiol*. 2011 Oct-Dec; 76(4): 40-44.
16. Zimmerman DD, Delemarre JB, Gosselink MP, et al. Smoking affects the outcome of transanal mucosal advancement flap repair of transsphincteric fistulas. *Br J Surg*. 2003;90(3):351-54.