



Role of Mri in the Diagnosis and Preoperative Classification of Perianal and Anal Fistulas

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(Received: 05 October 2023

Revised: 12 November

Accepted: 07 December)

KEYWORDS

MRI, Diagnosis,
Perianal fistula, Anal
Fistulas, Pre-
operative staging.

Abstract

Introduction: A fistula is described as an irregular connection between two surfaces that are coated in epithelium. Anal and perianal fistulas are aberrant connections between the anal canal and the skin's epithelium-lined surface. They are typically accompanied by one or more external openings in the perianal skin. It typically has an inflammatory component.

Aims: to assess the importance of MRI in the diagnosis and pre-operative staging of perianal and anal fistulas

Materials and method: In the radiology department of the Jorhat Medical College, a prospective comparative study was carried out on patients who were clinically diagnosed or suspected to have anal or perianal fistulas in both sexes and patients of all ages. The research timeframe was from JUNE 2021 to MAY 2022. This study had 47 patients in total.

Result: In our analysis, the majority of patients [38 (80.9%)] had a single internal opening. However, it was also discovered that there were several internal openings [4 (8.5%)] and internal openings in the rectum [2 (4.3%)] that were statistically significant ($p < .00001$) ($z = 7.51$). We found that, lower number of patients had secondary tracts (MRI Findings) [12 (25.5%)] and it was statistically significant ($p < .00001$) ($z = 4.7445$). Our investigation revealed that, statistically significantly ($p < .00001$), the majority of patients had no abscess (MRI Findings) [36 (76.6%)] and no supralelevator extension (MRI Findings) [42 (89.4%)]. In our investigation, a higher percentage of patients [32 (68.1%)] showed no contrast enhancement, which was statistically significant ($p = .00044$). We demonstrated that the majority of patients had neither secondary tracts nor abscesses, which was statistically significant ($p = .00034$) in [27 (57.4%)] of the patients. According to our analysis, more patients (32, or 68.1%) did not have supralelevator extension (surgical association), and this finding was statistically significant ($p < .00001$).

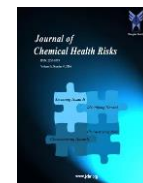
Conclusion: When it comes to the diagnosis and pre-operative staging of perianal and anal fistulas, MRI is a crucial diagnostic imaging technique. Particularly in the detection of complex diseases characterized by the development of abscesses, the presence of secondary tracts, and supralelevator extension, MRI has proven to be effective. In order to create a good road map and blueprint for an efficient and successful surgical outcome, an MRI examination of the perianal fistula is a crucial imaging modality.

INTRODUCTION

An improper connection between two surfaces coated in epithelium is known as a fistula. The skin's epithelium-lined surface and the anal canal are connected abnormally by fistulas, which are typically accompanied by one or more external openings in the perianal skin. Typically, it is an inflammatory disorder.¹

Perianal fistulas occur between one and two times per 10,000 people on average, with men predominating by about 2:1 over women. The third and fourth decades of life are when the incidence is highest.²

The perianal fistula can be spontaneous or related to iatrogenic (post-surgical complication), childbirth & pelvic malignancies. Diverticulitis, inflammatory bowel



disease & tuberculosis are the most common cause in spontaneous group.

Patients with type 2 diabetes were more likely to develop perianal abscesses than those with type 1 diabetes, indicating that metabolic abnormalities may be more significant than immunological causes. A increased incidence of perianal abscess was associated with poor glycemic control.³

An aberrant tract connecting an external cutaneous opening in the perianal region to an interior opening, most frequently in the anal canal, is known as a perianal fistula (PAF). PAF, which primarily affects young adult men, is one of the main anorectal diseases in surgical treatment with a high prevalence.

Anal glands are located inside the anal canal in the intramuscular plane at the level of the dentate line. The risk of anorectal sepsis is considerable, and chronic infection may spread axially or circumferentially, leading to diverse types of fistulas within the first year of abscess appearance.⁴ Clinically, it is possible to see the Parks classification and Perianal disease activity Index (PDAI) as the benchmark for identifying patients with PAF and as the gold standard for judging its complexity and severity.⁵

To stop the recurrence of perianal fistula, PAF must receive effective surgical treatment. However, it can occasionally be difficult to perform a successful surgical procedure due to the difficulties in identifying the internal opening and the fistula tract's path.

MATERIALS AND METHODS

Study type: Prospective comparative study.

Study period: JUNE 2021 to MAY 2022.

Study population: The patients in the radiology department of the Jorhat Medical College who were

clinically determined to have anal or perianal fistulas in both sexes and patients of all ages.

Inclusion criteria:

1. Patients of all ages and both sexes who had been clinically determined to have anal or perianal fistulas underwent MR imaging evaluation with their agreement.
2. Patients who gave their agreement to participate in the study and were clinically suspected to have anal or perianal fistulas were assessed by MR imaging.

Exclusion criteria:

1. Fistulas caused by rectum, anus, or prior radiation therapy are seen in patients.
2. Congenital anal and perianal fistulas are all
3. Patients who might not be a good candidate for an MRI, such as those with claustrophobia, metallic implants, pacemakers, or contrast allergy.
4. those patients who decline to take part in the study.

Study setting: Department of Radio Diagnosis in collaboration with department of General Surgery in Jorhat, Assam.

Study duration: 12 Months

Sample size: As per record only 0-1 patient per week with perianal fistula attend in Radio diagnosis Department on an average. That means in twelve months period of data collection (in 52 weeks) approximately 40-50 patients may attend. Therefore, all the patients reporting to Radio diagnosis Department was included in the study. So, as such no sampling technique was adopted for this study. So, the final sample size for the study was 47.

RESULT

Table 1: Distribution of Fistulas according to Park's Type and St James' University Hospital Classification

		Frequency	Percent
Park's Type	ES	2	4.3%
	IS	28	59.6%
	SS	5	10.6%
	TS	12	25.5%
	Total	47	100.0%
St James' University Hospital Classification	Grade I	17	36.2%
	Grade II	10	21.3%
	Grade III	9	19.1%
	Grade IV	4	8.5%
	Grade V	7	14.9%



	Total	47	100.0%
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Table 2: Distribution of Location of External opening and Location of Internal opening (MRI Findings)

		Frequency	Percent
Location of External opening (O'clock)	1	2	4.3%
	2	1	2.1%
	3	7	14.9%
	4	4	8.5%
	5	5	10.6%
	6	3	6.4%
	7	4	8.5%
	8	4	8.5%
	9	3	6.4%
	10	2	4.3%
	11	4	8.5%
	12	3	6.4%
	Multiple	5	10.6%
	Total	47	100.0%
Location of Internal opening (O'clock)	1	3	6.4%
	2	5	10.6%
	3	3	6.4%
	4	2	4.3%
	5	6	12.8%
	6	2	4.3%
	7	6	12.8%
	8	2	4.3%
	9	4	8.5%
	10	2	4.3%
	11	1	2.1%
	12	2	4.3%
	Multiple	4	8.5%
	Not Visualised	3	6.4%
	Rectum	2	4.3%
	Total	47	100.0%

Table 3: Distribution of Internal opening, Secondary Tracts, Abscess, Supralelevator extension and Contrast Enhancement (MRI Findings)

		Frequency	Percent
Internal opening (MRI Findings)	Single	38	80.9%
	Multiple	4	8.5%
	Rectum	2	4.3%
	Not Visualised	3	6.4%
	Total	47	100.0%
Secondary Tracts	Present	12	25.5%



(MRI Findings)	Absent	35	74.5%
	Total	47	100.0%
Abscess (MRI Findings)	Present	11	23.4%
	Absent	36	76.6%
	Total	47	100.0%
Suprlevator extension (MRI findings)	Present	5	10.6%
	Absent	42	89.4%
	Total	47	100.0%
Contrast Enhancement (MRI Findings)	Present	15	31.9%
	Absent	32	68.1%
	Total	47	100.0%

Table 4: Distribution of Secondary Tracts, Abscess and Suprlevator extension (Surgical correlation)

		Frequency	Percent
Secondary Tracts (Surgical correlation)	Present	10	21.3%
	Absent	27	57.4%
	Not Done	10	21.3%
	Total	47	100.0%
Abscess (Surgical correlation)	Present	10	21.3%
	Absent	27	57.4%
	Not Done	10	21.3%
	Total	47	100.0%
Suprlevator extension (Surgical correlation)	Present	5	10.6%
	Absent	32	68.1%
	Not Done	10	21.3%
	Total	47	100.0%

In our study, there were 4 (8.5%) patients under the age of 20, 11 (23.4%) patients between the ages of 21 and 30, 11 (23.4%) patients between the ages of 31 and 40, 7 (14.9%) patients between the ages of 41 and 50, 8 (17.0%) patients between the ages of 51 and 60, and 6 (12.8%) patients between the ages of 61 and 70. The patients' average age was 40.4894 ± 15.2042 . 38 patients (80.9%) were male and 9 (19.1%) were female in our study.

15 participants (31.9%) in our study had comorbidity. The number of patients with extra-sphincteric (ES), inter-sphincteric (IS), supra-sphincteric (SS), and trans-sphincteric (TS) fistulas in our study was 2 (4.3%), 28, (59.6%), 5, (10.6%), and 12 (25.5%). In our investigation, Grade I fistulas were present in 17 (36.2%) patients, Grade II fistulas in 10, Grade III fistulas in 9, Grade IV fistulas in 9, Grade V fistulas in 7, and Grade I fistulas in 9.

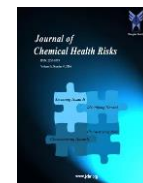
In our study, 5 (10.6%) patients had multiple location of External opening. In our study, 4 (8.5%) patients had

multiple internal opening and 2 (4.3%) patients had internal opening in rectum.

In our study, 38 patients (80.9%) had single internal openings, 4 (8.5%) had multiple internal openings, and 2 (4.3%) had internal openings near the rectum. 12 patients (25.5%) in our research had secondary tracts as determined by MRI. 11 patients (23.4%) in our study had abscesses based on MRI results. In our investigation, MRI results showed that 5 (10.6%) individuals exhibited suprlevator extension. In our investigation, contrast enhancement (MRI Findings) was present in 15 (31.9%) participants.

In our study, 10(21.3%) patients had Secondary Tracts (Surgical correlation). In our study, 27 (57.4%) patients had Abscess (Surgical correlation). In our study, 5 (10.6%) patients had Suprlevator extension (Surgical correlation).

We found that the sensitivity and specificity of MRI were 100.0 and 92.6 in detecting secondary tracts, respectively. Accuracy was 94.60%, Positive Predictive



Value was 83.3, and Negative Predictive Value was 100.0.

In our investigation, MRI has a sensitivity and specificity of 100.0 and 96.3 in detecting abscess (MRI results). The accuracy was 97.29%, the positive predictive value was 90.9, and the negative predictive value was 100.0.

We demonstrated that MRI has a Sensitivity of 100.0, Specificity of 100.0, Positive Predictive Value of 100.0, Negative Predictive Value of 100.0, and Accuracy of 100.0% for the detection of supralelevator extension.

DISCUSSION

In the radiology department of the Jorhat Medical College, a prospective comparative study was carried out on patients who were clinically diagnosed or suspected to have anal or perianal fistulas in both sexes and patients of all ages. The research timeframe was from JUNE 2021 to MAY 2022. This study had 47 patients in total.

Sainio P et al⁶ (1984) had done a study focussing on the prevalence and epidemiology of anal fistula among the 510,000 residents of the City of Helsinki between 1969 and 1978. In their investigation, the patients' average age was 38.3 years. All of the patients were under the age of 15.

Mohamed S. Elzawawi et al⁷ (2018) did a study to clarify evaluate the added clinical value of preoperative MRI and its benefit or support to the surgeon as well as the significance of MRI in the diagnosis and categorization of perianal fistula. Twenty patients were enrolled in this prospective trial; their ages ranged from 19 to 59; the mean was 36.85.

The majority of the 47 patients in our study, out of 47, were between the ages of 21 and 40. ($p=.04884$) The statistical significance of age. The patients' average age was $[40.4894 \pm 15.2042]$.

Sainio P et al⁶ (1984) had done a study focussing on the prevalence and epidemiology of anal fistula among the 510,000 residents of the City of Helsinki between 1969 and 1978. For nonspecific and fistula, the mean incidence per 100,000 people was 8.6, 12.3 for men, and 5.6 for women. when the nonspecific anal fistulae were diagnosed. The ratio of men to women was 1.8 to 1. All of the patients were male and under the age of 15.

We discovered that there were more men than women in the population. The ratio of men to women was

4.22:1. Statistically speaking, gender was significant ($p<0.00001$; $z=5.9822$).

The majority of patients (68.1%) did not have any concomitant conditions, which was statistically significant ($p=0.00044$).

A higher percentage of patients were found to have IS Park's Type, which was statistically significant ($p0.00001$) ($z=5.7529$).

According to the St. James' University Hospital Classification, the majority of the patients had Grade I, followed by Grade II and Grade III, as shown by our observations. According to statistics ($p=0.00128$, $z=3.2191$), this was significant.

Sarda H et al⁸ (2022) had done a study The inclusion of MRI in the preoperative surgical assessment of anal fistulas was found to be helpful when they were recurrent, complex, high grade, or when the external opening were located more than 2 cm from the anal canal over the course of more than 4 years of research on magnetic resonance imaging for fistulography in perianal fistula: clinico-radiological correlation.

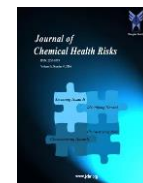
Ali konan et al⁹(2018) performed a study to determine the role that MRI plays in treating anal fistulas surgically. They were in favor of utilizing MRI for fistulas with external openings that were more than 2 cm away from the anus. The majority of the patients, 14.9%, had exterior openings in the third location, it was discovered. External opening at the 5 o'clock position and various external opening positions both contributed 10.6%, which was statistically significant ($p=.02642$) ($z=2.2178$).

We demonstrated that patients having external openings at the 5 and 7 o'clock positions were equally represented, and this was not statistically significant ($p=.05$) ($z=1.9644$).

DucVo et al¹⁰ (2019) found that In a retrospective examination of 367 individuals with fistula-in-ano, there was excellent agreement between MRI and surgery for identifying major tracts ($k = 0.89$) and classifying secondary tracts ($k = 0.94$). While MRI had a sensitivity and specificity of 99% and 85.2% for finding interior openings, respectively.

In our study, majority number of patients had single internal opening 80.9%. However, multiple internal opening and internal opening in rectum were also found which was statistically significant ($p< .00001$) ($z=7.51$).

DucVo et al¹⁰ (2019) found that In a retrospective examination of 367 individuals with fistula-in-ano,



there was excellent agreement between MRI and surgery for identifying major tracts ($k = 0.89$) and classifying secondary tracts ($k = 0.94$).

We discovered that fewer patients (25.5%) had secondary tracts, which was statistically significant ($p.00001$) ($z=4.7445$).

Kumar Ashok Charan & Srikanth Vankineni et al ¹¹ (2019) showed that In their prospective investigation, MR imaging helped in the identification of secondary tracts and abscesses and provided accurate location of the fistulous tract and its link to pelvic floor and sphincter complex.

Mohamed RE et al ¹² [2014] found that 12.5% of patients had a Grade 2 (inter-sphincteric fistula with abscess with abscess or secondary track) fistula, while 37.5% of patients had a Grade 1 (simple linear inter-sphincteric fistula).

Our investigation revealed that the majority of patients had neither a supralelevator extension nor an abscess, which was statistically significant ($p<.00001$).

In our investigation, a higher percentage of patients (68.1%) did not exhibit any contrast enhancement, which was statistically significant ($p=.00044$).

We demonstrated that 57.4% of patients had no secondary tracts and no abscess, both of which were surgical correlations and statistically significant ($p=.00034$).

In our analysis, a higher percentage of patients (68.1%; surgical correlation) did not have supralelevator extension, which was statistically significant ($p<.00001$).

Singh K et al ¹³ (2014) found that The sensitivity and specificity of MRI were reported to be 95.56% and 80% for detecting and grading the main tract, and 87.50% and 95.24% for an abscess. The identification of the secondary tract showed high sensitivity (93.75%).

DucVo et al¹⁰ (2019) found that In a retrospective examination of 367 individuals with fistula-in-ano, there was excellent agreement between MRI and surgery for identifying major tracts ($k = 0.89$) and classifying secondary tracts ($k = 0.94$). While MRI had a sensitivity and specificity of 99% and 85.2% for finding interior openings, respectively. For displaying internal openings and secondary tracts, T2-weighted turbo spin-echo (T2W TSE) and post-contrast fat saturated T1-weighted turbo spin-echo (FS T1W TSE) sequences both shown good sensitivity (96.6% and

98.4%, respectively) and specificity (92.6% and 81.5%, respectively).

We found that the sensitivity and specificity of MRI were 100.0 and 92.6 in detecting secondary tracts, respectively. Accuracy was 94.60%, Positive Predictive Value was 83.3, and Negative Predictive Value was 100.0.

In our investigation, MRI has a sensitivity and specificity of 100.0 and 96.3 in detecting abscess (MRI results). The accuracy was 97.29%, the positive predictive value was 90.9, and the negative predictive value was 100.0.

We demonstrated that MRI has a Sensitivity of 100.0, Specificity of 100.0, Positive Predictive Value of 100.0, Negative Predictive Value of 100.0, and Accuracy of 100.0% for the detection of supralelevator extension.

CONCLUSION

We come to the conclusion that MRI is a valuable diagnostic imaging technique for the early detection and staging of perianal and anal fistulas. Particularly in the detection of complex diseases characterized by the development of abscesses, the presence of secondary tracts, and supralelevator extension, MRI has proven to be effective. In order to create a good road map and blueprint for an efficient and successful surgical outcome, an MRI examination of the perianal fistula is a crucial imaging modality.

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