



Role of MRI Fistulogram in Preoperative assessment of Fistula-in-ano and its Clinical correlation: An Observational study

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KEYWORDS	ABSTRACT:
Magnetic Resonance Imaging, Fistula-in-ano, Preoperative assessment, Surgical management, Anal sphincter complex	<p>Background: Fistula-in-ano, characterized by an abnormal connection between the anal canal and the surrounding skin, poses significant clinical challenges due to its high risk of recurrence and complications. Effective surgical intervention requires precise preoperative assessment to eradicate the fistula while preserving anal sphincter function. Conventional diagnostic methods often fail to provide the necessary anatomical detail, particularly in complex cases with multiple tracts or abscesses.</p> <p>Objective: To evaluate the effectiveness of MR fistulography in the preoperative assessment of anorectal fistulas, focusing on grading and clinical correlation. Methods: A prospective observational study was conducted in the Department of General Surgery at Aarupadai Veedu Medical College and Hospital, Puducherry, involving 60 patients aged 18–60 years (mean age: 39; SD: 8.3) with various forms of fistula-in-ano. Patients with contraindications to MRI were excluded. Each participant underwent an MR fistulogram using a 1.5-Tesla MRI system, employing various sequences to obtain detailed images of the fistulous tracts and their relationship to the anal sphincter complex. Data were analyzed using SPSS v23.0, with statistical significance set at $p < 0.05$. Results: The study included 60 patients with an average age of 39 ± 8.3 years, with the majority (73.3%) from rural areas. Clinical symptoms included pain (23.3%), discharge (90%), itching (25%), and fever (8.3%). Common comorbidities were diabetes mellitus (26.7%) and hypertension (8.3%). Most fistulas were classified as low anal (88.3%) with single external openings (86.7%). MRI predominantly categorized fistulas as grade 1 (60%), which significantly influenced surgical planning. Fistulectomy was the primary procedure performed (86.7%). Conclusion: MR fistulography proves to be highly effective in the preoperative evaluation of fistula-in-ano, showing a strong correlation with clinical findings and improving surgical management. Its ability to provide detailed imaging enhances diagnostic accuracy, optimizes surgical planning, and improves patient outcomes, establishing it as an essential tool for managing complex anorectal fistulas.</p>

Fistula-in-ano, defined by an abnormal connection between the anal canal and perianal skin, presents a challenging clinical issue due to its propensity for

recurrence and complications.(1, 2) Accurate preoperative assessment is essential for effective surgical intervention, aiming to eradicate the fistula



while preserving the integrity of the anal sphincter. Traditional diagnostic methods, such as clinical examination and probing, often lack the ability to provide comprehensive anatomical details, particularly for complex fistulas with multiple tracts or associated abscesses.

Magnetic resonance imaging (MRI) has emerged as an indispensable tool in the preoperative evaluation of perianal fistulas due to its capacity to produce high-resolution images that clearly depict the fistulous tracts and their relationship with the anal sphincter complex.(3, 4) This detailed visualization is critical for surgical planning and helps reduce the risk of recurrence.(5, 6)

The clinical significance of MRI fistulography lies in its superior sensitivity and specificity compared to other imaging techniques, such as endoanal ultrasound or traditional fistulography, particularly for high-grade and recurrent fistulas. Studies indicate that incorporating MRI findings into surgical strategies enhances the correlation between preoperative assessments and intraoperative observations, facilitating more precise surgical interventions and yielding improved patient outcomes.(7-10)

Materials & Methods

The study was conducted in the Department of General Surgery at Aarupadai Veedu Medical College and Hospital, Puducherry, and was designed as a prospective, cross-sectional observational study. Participants included patients attending the outpatient department. Inclusion criteria encompassed individuals of any gender, aged 18–60 years, presenting with various types of fistula-in-ano, including high, low, and complex fistulas. Exclusion criteria applied to patients with contraindications to MRI, such as those with cardiac pacemakers, metallic implants, or radiation-induced fistulas. The study duration was two years, and the sample size was based on a similar study, targeting a sensitivity of 96.6% with an absolute precision of 5% and a significance level of 5%. Convenience sampling was used for participant selection.

Data collection included obtaining a comprehensive preoperative history, conducting routine investigations, acquiring informed consent, and performing MRI fistulography using a 1.5-Tesla MRI system. Imaging sequences comprised oblique, axial, and coronal T1-weighted (T1W) fast spin echo (FSE) and T2-weighted

(T2W) FSE images, fat-suppressed oblique axis views, and contrast-enhanced oblique axial, coronal, and sagittal views, with gadolinium DTPA as the contrast agent.

Study procedures involved securing written consent from patients, with no special bowel preparation required. MRI was performed using endoanal or phased-array coils with patients positioned prone. The fistula site was cleansed with 7.5% w/v betadine, and cannulation was performed using an infant feeding tube or a 23-gauge butterfly cannula lubricated with lignocaine jelly. Gadolinium mixed with saline was gradually injected, and images were captured across various MRI sequences. Funding for the study was provided by institutional and self-funding sources. Independent variables included age and sex, while outcome variables included the location of the internal opening, ST James grading of the disease, presence of abscesses or collections, secondary tracts, fistula characteristics on MRI, and MRI diagnostic accuracy.

Statistical Analysis: Data were recorded in Excel and analyzed using SPSS version 21.0. An unpaired t-test was used for comparing mean levels, and the chi-square test was applied for categorical data. For all statistical purposes, a p-value of <0.05 was considered statistically significant.

Results

This study included 60 patients with a mean age of 39 ± 8.3 years, with an equal gender distribution. Of the participants, 73.3% were from rural areas, and 26.7% from urban areas. Clinical presentations included pain (23.3%), discharge (90%), fever (8.3%), itching (25%), swelling (10%), constipation (13.3%), recurrent cases (10%), and a history of previous surgery (10%). Comorbidities included diabetes mellitus (26.7%) and hypertension (8.3%). The majority of fistulas were classified as low anal (88.3%) and had single external openings (86.7%), with an average fistulous tract length of 38.7 ± 15.5 mm. MRI fistulography classified 60% of cases as grade 1, 23.3% as grade 2, 13.3% as grade 3, and 3.3% as grade 4. The most common surgical procedure performed was fistulectomy (86.7%), followed by other procedures such as fistulectomy with incision and drainage (I&D), seton placement, fistulotomy, and ligation of the intersphincteric fistula tract (LIFT). MRI fistulography significantly contributed to diagnosis and management in 96.7% of cases.



Discussion

A study of 60 patients (mean age 39 ± 8.3 years, with equal gender distribution) found that the majority (73.3%) were from rural areas. Clinical symptoms included discharge (90%), pain (23.3%), itching (25%), fever (8.3%), swelling (10%), and constipation (13.3%). Recurrence and previous surgeries were each reported in 10% of cases. Comorbidities included diabetes (26.7%) and hypertension (8.3%). Most fistulas were classified as low anal (88.3%) with single external openings (86.7%), with an average fistulous tract length of 38.7 ± 15.5 mm.(11-13)

MRI fistulography classified 60% of cases as grade 1, significantly influencing surgical planning in 96.7% of cases. The most common surgical procedure performed was fistulectomy (86.7%). Similar studies have demonstrated MRI's high diagnostic accuracy and strong correlation with surgical findings, emphasizing its value in the preoperative assessment and management of fistula-in-ano.(14-16)

Other research has highlighted MRI's capability to accurately identify fistulous tracts, internal openings, and associated abscesses, showcasing its superior diagnostic precision and alignment with intraoperative findings.(17-20)

Overall, this study underscores MRI fistulography's critical role in diagnosing, assessing disease extent, and planning appropriate surgical interventions for fistula-in-ano, leading to improved patient outcomes and quality of care.

Conclusion

The majority of fistulas were low anal with single external openings, with most cases classified as grade 1. This classification significantly influenced surgical interventions, with fistulectomy being the most commonly performed procedure. Overall, MRI fistulography played a vital role in diagnosing, assessing the extent of the disease, and guiding the surgical approach. Its capability to provide detailed imaging of fistulous tracts and associated complications, such as abscesses, renders it indispensable in the management of fistula-in-ano, leading to improved surgical outcomes and enhanced patient care.

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Table 1: Showing the mean level of the parameters

	Mean	SD
Age (in years)	39.0	8.3
Hb	12.0	1.5
TC	9338.3	989.9
RBS	120.6	31.3
Urea	27.2	5.5
Creatinine	1.1	.4

Table 2: Showing demographic and clinical presentation of patients

		Count	%
Gender	Female	30	50.0
	Male	30	50.0
Residence	Rural	44	73.3
	Urban	16	26.7
Pain	No	46	76.7
	Yes	14	23.3
Discharge	No	6	10.0
	Yes	54	90.0
Fever	No	55	91.7
	Yes	5	8.3
Itching	No	45	75.0
	Yes	15	25.0
Swelling	No	54	90.0



	Yes	6	10.0
Constipation	No	52	86.7
	Yes	8	13.3
Recurrent case	No	54	90.0
	Yes	6	10.0
Previous surgery	No	54	90.0
	Yes	6	10.0
DM	No	44	73.3
	Yes	16	26.7
HTN	No	55	91.7
	Yes	5	8.3

Table 3: Showing the features of fistula and surgical management

		Count	%
Site of fistula	High anal	7	11.7
	Low anal	53	88.3
No. of external opening	Multiple	8	13.3
	Single	52	86.7
External opening greater 2cm	No	54	90.0
	Yes	6	10.0
Internal opening	Abscess	1	1.7
	Blind ending	1	1.7
	Multiple	11	18.3
	Single	47	78.3
Discharge	Absent	3	5.0
	Present	57	95.0
Perianal abscess	Absent	55	91.7
	Present	5	8.3
Classification grading	Grade 1	36	60.0
	Grade 2	14	23.3
	Grade 3	8	13.3
	Grade 4	2	3.3
Surgery type	Fistulectomy	52	86.7
	Fistulectomy & I&D	2	3.3
	Fistulectomy with seton	2	3.3
	Fistulotomy	2	3.3
	I&D	1	1.7
	LIFT	1	1.7
Influence of MRI on surgery	Not significant	2	3.3
	Significant	58	96.7