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Original Research Article

Magnetic resonance imaging for fistulography in perianal fistula: clinicoradiological correlation

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ABSTRACT

Background: This article aims to review the role of magnetic resonance imaging (MRI) fistulography in evaluation of perianal fistula along with its concordance with clinical examination and impact on surgical intervention.
Methods: A retrospective study of 61 patients who underwent surgery for anal fistula in RMLIMS collected from database from January 1, 2017 to September, 2021
Results: The study showed a significant MRI contribution to clinical evaluation in 65.6%. MRI provided significant information for complex fistulas than for simple fistulas (45% vs. 14.6%, p=0.01). Proportion of patients with significant MRI contribution increased with increasing Parks grade (grade 1, 8.3%; grade 2, 52.2%, p=0.001). The concordance between St. James Hospital grade and Parks classification was 0.768 (Kappa coefficient, p<0.00).
Conclusions: Therefore, we propose inclusion of MRI in the preoperative surgical assessment of anal fistulas when recurrent, complex, high grade, or when the external opening is located more than 2 cm from the anal canal.

Keywords: MR fistulography, Perianal Fistula, Concordance

INTRODUCTION

Perianal fistula (PAF) is abnormal tract communicating an external cutaneous opening in the perianal region to an internal opening, most often in the anal canal.[1] PAF is one of common anorectal disorders in surgical practice with high prevalence, which predominantly affects young adult males.[2,3] Most fistulas (approximately 90% of them) non-specific, of cryptoglandular origin resulting from an infection of anal glands.[4] The rest occur are due to a specific etiology like tuberculosis, Crohn's disease, ulcerative colitis, pelvic infections, radiations, carcinomas, and trauma to anorectal region.[5]

The classification of fistula in ano, proposed by sir Allen Parks in 1976 is by far the most followed classification dividing the anal fistula into intersphincteric, transsphincteric, suprasphincteric, and extrasphincteric variety.[6] Standard practice task force (SPTF), by the American society of colon and rectal surgeons, classified fistulas as "simple" and "complex"; latter identifying the increased risk for incontinence after surgery (Table 1).[7]

For successful management of fistula, it is important to delineate the complete anatomy of the fistula which includes the correct identification of internal opening, the primary site of cryptoglandular infection, and the course of the primary and secondary tracks or abscesses if any. Failure to identify may result in recurrence. In cases of simple fistulas, this identification is possible with a careful digital rectal examination (preferably bi-digital). However, problems arise in cases of recurrent and complex fistulae. A fistula which seems complex on physical examination should be evaluated with radio-diagnostic techniques.[8]

Various radiological modalities were applied for evaluation of fistula in ano; conventional fistulography

was used but its diagnostic yield is limited due to its difficulty to recognize the internal opening.[9,10] Endosonography with color Doppler has greater diagnostic value for PAF evaluation.[11] Three-dimensional ultrasonography (3D US) improves PAF detection and delineation, hence it plays a crucial role in optimal treatment planning, but expertise is one of its limitations.[12] Transperineal US is an accurate diagnostic method, due to its simplicity and low cost it is recommended as 1st diagnostic modality for anal fistula.[13]

MRI use in anal fistulas was first reported in the early 1990s which showed 87.5% concordance with the surgery.[14] The association of coloproctology of great Britain and Ireland defined MRI as an imaging technique with high sensitivity and specificity for the diagnosis of the primary fistula tract and recommended it for imaging assessment of the complex or recurrent fistulas.[8] Owing to high soft tissue resolution of MRI, localization of internal opening of anal fistula, definition of primary and secondary tracts and their relationships with the sphincter complex, and presence of horseshoe fistulas and abscesses can be more accurately depicted preoperatively compared with physical examination.[15] A classification based on MRI findings was also developed by St. James hospital (Table 1).[16]

Table 1: Fistula classifications.

Parks	SPTF	St. James hospital
Intersphincteric: Intersphincteric fistula with a high track opening into the lower rectum, simple intersphincteric fistula, intersphincteric fistula with a high blind track, high intersphinteric fistula with a pelvic extension	Simple	Grade 1: Simple linear intersphincteric fistula Grade 2: Intersphincteric fistula with an abscess or secondary tract
Transsphincteric fistula: Uncomplicated Transsphincteric fistula with a high blind track	Complex track crossing more than 30-50% of the external sphincter (high-trans-sphincteric, supra-sphincteric and extra-sphincteric). Anterior fistula in a female, multiple tracks, recurrent fistula, pre-existing incontinence, local irradiation, Crohn's disease	Grade 3: Simple linear transsphincteric fistula Grade 4: Transphincteric fistula with an abscess or secondary tract in the ischiorectal or ischioanal fossa
Suprasphincteric fistula		Grade 5: Supralevator or translevator disease
Extrasphincteric fistula		

SPTF-Standard practice task force.

The objective of this article is to review the role of MRI fistulography in the diagnosis and evaluation of fistula in ano along with its concordance with clinical examination and impact on surgical intervention.

METHODS

This retrospective study was conducted in the department of surgical gastroenterology, Dr. Ram Manohar Lohia institute of medical sciences, Lucknow. All patients who were operated for Fistula in Ano in the department between the below mentioned period were included in the study. Data of all patients who underwent surgery for anal fistula from January 1, 2017 to September, 2021 in department of surgical gastroenterology was collected from a database management system hence ethical committee approval is not required for our study. It included the physical examination notes, preoperative surgical plan, MRI findings and operative findings derived from the personal identifiers, which were retrieved from the electronic records department of the hospital. The following characteristics were assessed for each fistula-in-ano: the location of primary tracts, the presence of secondary tracts and abscess formation and the site of internal and external openings. Fistulas were classified according to the Parks and St. James's university hospital classifications.[6,16] In the image interpretation, it was assumed that a fluid collection larger than 10 mm in diameter with rim enhancement on post-contrast T1W TSE images was an abscess as per the criteria of Singh et al and Torkzad et al.[17,18] All surgeries were performed by or under the supervision of surgeons with at least 5 years of experience in Surgical gastroenterology. During surgery, the characteristics of each fistula-in-ano were also carefully documented, Parks grade and SPTF classifications were obtained from the operative notes and then used as a reference standard to compare to MRI findings.

Statistical analysis

For the primary endpoint, the study aims to determine the clinical characteristics (history and physical examination) that are likely to benefit from preoperative MRI. The study cohort of 61 patients (categorized into significant vs. non-significant MRI contribution groups) provides 80% power with 5% type I error level to statistically identify significant differences ranging between 15% and 25% for the clinical findings observed in these two groups. As a secondary endpoint, the concordance between the classification schemes with and without the

use of information from MRI (Parks and St. James classifications, respectively) was analyzed.

Descriptive statistics were provided as mean and standard deviation for age and as percentages for the categorical variables. The concordance between the two grading schemes was analyzed using Kappa coefficient. The difference between groups was analyzed using chi-square or Fisher's test for nominal variables and Mantel-Haenszel test for ordinal variables. A $p<0.05$ was used as the cutoff to infer statistical significance.

RESULTS

The total number of eligible patients was 61. There were 51 females (83.6%). In total, 15 patients suffered from recurrent fistulas (24.6%). MRI was concordant with operative findings in 83.1% of the patients (Table 2).

MRI contribution to clinical evaluation was significant in 65.6% (40/61) of the patients. MRI more frequently provided significant information for complex fistulas than for simple fistulas (45% vs. 14.6%, p=0.01). Proportion of patients with significant MRI contribution increased with increasing Parks grade (grade 1, 8.3%; grade 2, 52.2%, p=0.001). Preoperative MRI contribution was also more frequent if the external opening was more than 2 cm away from the anal canal (28.9% vs. 9.5%) but the results were not found to be significant. Although not statistically significant contribution of MRI was slightly more for recurrent fistulas than for primary fistulas (40% significant contribution vs. 19.6%, p=0.11) (Table 3).

Table 2: Demographic and clinical characteristics of patient.

Variables		N (%)
Gender	Male	10 (16.4)
	Female	51 (83.6)
SPTF	Simple	41 (67.2)
	Complex	20 (32.8)
Primary/ recurrent	Primary	46 (75.4)
	Recurrent	15 (24.6)
No of external openings	1	55 (90.2)
	2	4 (6.6)
	3	2 (3.3)
External opening distance (cm)	<2	21 (34.4)
	≥2	38 (62.3)
St. James hospital classification	Grade 1	27 (44.3)
	Grade 2	6 (9.8)
	Grade 3	18 (29.5)
	Grade 4	8 (13.1)
	Grade 5	2 (3.3)
Concordance with PE	0	21 (34.4)
	1	40 (65.6)
Parks classification	Grade 1	36 (59)
	Grade 2	23 (37.7)
	Grade 3	1 (1.6)

Table 3: Association of clinical findings with significant contribution of MRI on surgical management.

Variables		Impact of MRI on surgery (%)		Total (%)	P value
		No effect	Significant		
SPTF classification	Simple	35 (85.4)	6 (14.6)	41 (100)	0.01
	Complex	11 (55)	9 (45)	20 (100)	
Parks classification	Grade 1	33 (91.7)	3 (8.3)	36 (100)	0.001
	Grade 2	11 (47.8)	12 (52.2)	23 (100)	
	Grade 3	1 (100)	0	1 (100)	
Number of ext. opening	1	41 (74.5)	14 (25.5)	55 (100)	0.364
	2	4 (100)	0 (0)	4 (100)	
	3	1 (50)	1 (50)	2 (100)	
External opening >2 cm	No	19 (90.5)	2 (9.5)	21 (100)	0.109
	Yes	27 (71.1)	11 (28.9)	38 (100)	
Recurrent case	No	37 (80.4)	9 (19.6)	46 (100)	0.110
	Yes	9 (60)	6 (40.05)	15(100)	
Previous surgery	No	34 (85)	6 (15)	10 (100)	0.016
	Yes	12 (57.1)	9 (42.9)	21 (100)	
Current surgery	Fistulectomy	37 (94.9)	2 (5.1)	39 (100)	<0.001
	Seton	8 (42.1)	11 (57.9)	19 (100)	
	Others	1 (33.3)	2 (66.7)	3 (100)	

The concordance between St. James hospital grade and Parks classification 0.768 (Kappa coefficient, $p<0.00$).

DISCUSSION

The surgical treatment of anal fistula requires identification of primary as well as secondary tracts and relation with the sphincteric musculature for proper management of the fistula and drainage of any abscess, if present. Physical examination alone may not be enough to delineate these features and recurrence is usually due to missed infective foci at the first surgery.[19-21] MRI is the most accurate imaging modality to define anal canal anatomy and anal fistulae.[22,23] With 61 patients, our study

identifies the group of patients for which MRI fistulography significantly contributes to the surgical management of the disease. In our study, MRI provided important additional information for nearly one-third of the patients. Detection of higher Parks grades, distance of external opening of the fistula from the anal canal and complex fistulas are indicative of significant MRI contribution following clinical examination.

Garg et al in a study evaluating MRI contribution to surgical management in 229 patients reported that MRI added significant information in patients with additional tracts, horseshoe tracts, supralevator extension, unsuspected abscess, and multiple internal openings.[24] Using these parameters, they inferred that MRI added significant information to 46.7% of the surgeries. In a study by Beets-Tan et al when the investigators delivered MRI results to the surgeon just before his decision to conclude the surgery, the surgeon decided to continue the surgery in 21% (12/56) of patients based on information obtained from the MRI.[25]

In our study, MRI changed the operation when it identified fistula characteristics, which could not be identified by physical examination or when the fistula grade was assessed to be higher than that of Parks classification after MRI. With these criteria, MRI changed the management in 24.6%. We have also shown a significant contribution of MRI in detecting complex fistulas. This is mainly due to the increased incidence of blind tracts in Parks grade 3 and 4 or complex fistulas. The association of coloproctology of Great Britain and Ireland recommends preoperative MRI for recurrent and complex fistulae.[2] The parameters for complex fistulas are listed in Table 1. Especially for primary fistulas, predicting whether a fistula is complex or not preoperatively may be difficult with physical examination alone.[29] In our experience if the external opening is farther away from the anal canal, the fistula tends to have a more complex course. In our research, the benefit of MRI was significantly more for fistulas in which external opening was more than 2 cm far from the anal canal. In some fistulas, the location of the external opening may be the only physical examination finding; thus, our finding may be important to justify a preoperative MRI for this group of patients.

We found 76.8% concordance between St James hospital grade and Parks classification. This confirms that the two assessments are correlated but not equally informative. The correlation of MRI findings with operative findings was investigated in other studies and ranged from 89% to 100%.[19,26-28] Recurrence of anal fistula is the only widely accepted indication for preoperative MRI evaluation currently. In our study, we observed that MRI significantly contributed to 40.05% of the cases.

The limitation of this study is that the data is being evaluated retrospectively, representing our past experience with preoperative MRI for primary fistulas. Although we can precisely identify the cases for which MRI provided additional information to the clinical examination and intraoperative findings, we could not define prospectively for which patients the surgical management has definitely changed.

CONCLUSION

In conclusion, our study is valuable in linking the findings of preoperative clinical examination and surgical exploration with preoperative MRI findings for the surgical management of anal fistulas. Therefore, we propose inclusion of MRI in the preoperative surgical assessment of anal fistulas when they are recurrent, complex, high grade, or when the external opening is located more than 2 cm from the anal canal.

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