Magnetic Resonance Imaging versus Clinical Examination in the Diagnosis of Fistula-in-Ano: A Comparison at a High-Volume Fistula Center

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ABSTRACT

Background: Proper treatment of fistula-in-ano is based on the accurate diagnosis. Digital rectal examination helps delineating the changes associated with the fistula, as well as helps in knowing the course of the same. Magnetic resonance imaging (MRI) is a well-tolerated, painless, and accurate diagnostic modality that helps in predicting the tract-course. Although MRI may be an accurate radiological assessment tool, it may not be accessible to the surgeon and the patients, especially in the interior parts of the country. Hence, we sought to compare the evaluation efficacy of MRI versus clinical examination in the diagnosis of fistula-in-ano at a high-volume fistula center. Aim and Objectives: 1. To analyze the sensitivity of clinical findings viz-a-viz, the operative findings in a prospective study in cases of complex fistula-in-ano 2. To analyze the sensitivity of MRI findings viz-a-viz the operative findings in a prospective study in cases of complex fistula-in-ano 3. To compare the sensitivity of clinical findings and MRI findings in cases of complex fistula-in-ano. Study Design: A prospective, observational study with clearance from the Institutional Ethics Committee was undertaken over the period of 2 years in a tertiary care hospital with a sample size of 50. Results: 1. Fifty patients with a mean age of 40.98 years were included in the study 2. Male predominance was seen in the study as 84% were males to 16% females 3. The most common type of fistula-in-ano detected by all the methods of assessment was anterior trans-sphincteric (19 out of 50 by clinical assessment, 16 out of 50 by intra-operative assessment, 14 out of 50 by MRI assessment) 4. Clinical examination was more sensitive (88%) than the MRI examination (72%) in accurately detecting the type of fistula-in-ano 5. The associated abscesses were more sensitively detected by MRI (75%) as compared to clinical examination (31.25%) 6. The most common location of internal openings of fistula-in-ano was 6 o'clock position (27 out of 50 on clinical examination, 27 out of 50 by intra-operative examination, and 21 out of 50 by MRI examination) 7. The locations of internal openings were detected by clinical examination with 100% accuracy. Conclusion: Clinical examination is a sensitive modality for the diagnosis and classification of fistula-in-ano. In places where MRI is unavailable, good technical skills on the part of the surgeon can help in accurately predicting the type and openings of fistula on clinical examination

Keywords: Clinical examination, comparison, fistula-in-ano, magnetic resonance imaging

INTRODUCTION

Fistula-in-ano is an abnormal hollowtract lined by side the anal canal to a secondary opening in the perianal skin.

Complex fistulas are defined as recurrent fistulas, bilateral fistulas, fistulas with associated abscess, fistulas with extension to adjacent organs, supra-levator fistula, and anterior fistula in females.

The foundation of proper management of fistula-in-ano
is based on the accurate diagnosis.

Physical findings are the mainstay of the diagnosis. Digital rectal examination may expose a fibrous tract underneath the skin. Anoscopy is usually required to recognize the internal opening. Proctoscopy is also an indication in case of rectal disease (like Crohn's disease or other associated conditions).[1]

However, recurrent and complex fistulas may need imaging for a proper preoperative assessment. Magnetic resonance imaging (MRI) is the investigation of choice as it is well-tolerated, noninvasive, painless, and accuratediagnostic modality which predicts the tract-course well, outlines all hidden tracts and define the relationship of the fistula to the anal sphincter.

The MRI based classification, the St James's University Hospital classification, consists of five grades and relates the Parks surgical classification to anatomy seen at MRI in both axial and coronal planes.[2]

MRI has the drawbacks of being comparatively expensive, not always obtainable, and its diagnostic worth rests on the technical conditions. Due to these drawbacks, the credibility of MRI has been questioned in the Indian set-up, especially by highly experienced surgeons who have expertise in clinical examination of anal fistulas. Due to the lack of data, there is always a doubt whether the clinical

examination can be used asan important preoperative evaluation tool, if MRI is unavailable.

Hence, it was thought to compare the evaluation efficacy of MRI versus clinical examination in diagnosis of fistula-in-ano at a high-volume fistula center. The clinical examination as well as the preoperative MRI was done in patients diagnosed with fistula-in-ano, and the results were checked for sensitivity in comparison with the intra-operative findings, which were considered the gold standard.

Material and Methods

Design of study

A prospective, observational study was conducted over a period of 2 years on 50 patients admitted in the colorectal department of the tertiary care hospital and meeting the inclusion criteria of the study. **Inclusion criteria**

All patients with the clinical diagnosis of complex anal fistula who were scheduled for surgery were considered candidates for the inclusion. Complex fistulas are defined as recurrent fistulas, bilateral fistulas, fistulas with associated abscess, fistulas with extension to adjacent organs, supra-levator fistula, and anterior fistula in females.

Exclusion criteria

1. Patients with simple fistulas
2. Patients having cardiac pacemaker or implants whereMRI could not be performed
3. Non-co-operative patients in whom MRI could notbe performed.

Brief methodology

The present study was initiated after getting permission from the Institutional Ethics Committee.

After informed consent, the demographic details of the patients were noted down at the start of the study. Clinical examination of the patient was done initiallyby per-rectal examination and proctoscopy by a metal fiber-optic proctoscope in an outpatient department by an expert proctology consultant, with the help of which the relevant details were noted. Following the rectal examination, the MRI was conducted on the patient by a blinded radiologist, who noted his/her findings with relevance to the details needed for the study.

The following details are noted down for both the clinical and the MRI examination:

1. Presence of fistula
2. Classification of fistula
3. The positions of the fistula in terms of anterior or posterior, any extensions of the fistula if present were noted down
4. Presence or absence of abscess
5. Location of internal openings, in terms of clock positions.

After the clinical and the MRI investigations, a blinded surgeon who conducted the surgery on the patients in the study noted the findings of the patients intra-operatively in terms of classification, abscess and internal opening location. The intraoperative findings were considered the gold standard for the variables, and clinical as well as MRI examination findings were compared with intraoperative findings.

The sensitivity of clinical findings and MRI examination
was noted with the help of the formula:

$$\text{Sensitivity} = \frac{\text{True positive by the investigative method}}{\text{Number of all positives by intraoperative method}}$$

Statistical analysis

Statistical analysis was done using Graphpad InStat as well as Microsoft Excel. Descriptive statistics were used to assess the demography data. Wherever applicable, the quantitative data were expressed in mean + standard deviation form. All the variables were assessed and noted down after clinical examination, MRI examination as well as intra-operative findings and tabulated relevantly. The sensitivity for clinical examination and MRI examination were calculated based on the matching of results based on classification accuracy with intraoperative findings.

The compliance was noted as:

- Yes: Completely matches with intraoperative classification
- Partial: Partially matches with intraoperative classification
- No: Does not match with intra-operative classification.

Results

Demographic details

a. A total of 50 patients having fistula-in-ano were enrolled in the study. The mean age of these patients was 40.98 ± 13.73 years, with a median of 41 years. Forty-two of the patients were males (84%), whereas 8 of the patients were females (16%)
b. The number of patients with primary fistula was 15 (30%), while that with recurrent fistula were 35

(70%).

Classification of fistula

a. The classification of fistula was done based on the clinical examination, MRI investigation, and the intraoperative finding [Table 1]
b. Posterior fistulae were more common than anterior ones by all methods of assessment
c. Trans-sphincteric fistulae were more common than other types of fistulae by all methods of assessment
d. However, the most common type of fistula was anterior trans-sphincteric with all methods of assessment.

Detection of abscess formation

a. Sixteen of the patients (32%) had abscess by the intra-operative assessment, which was the goldpatients had two internal openings. On the other hand, on MRI examination, location of 48 internal openings was detected with two internal openings detected in one patient, but in three patients, internal openings could not be assessed by MRI.

Compliance of clinical examination and magnetic resonance imaging examination with intra-operative findings

a. The compliance of the two types of investigations was assessed based on the correctness of the classification of the type of fistula in comparison to the intra-operative finding. It was found that 44 (88%) of the clinical examination findings matched, while 36 (72%) of the MRI findings matched with the intra-operative findings. Five of the clinical examination standard method of diagnosis. MRI examination was near this mark in sensitivity (24%) followed by clinical examination (10%).

Location of internal openings

findings and 3 of the MRI findings partially were compliant with intraoperative findings. 1 (2%) of the clinical examination finding while 11 (22%) of the MRI findings were noncompliant [Table 2].

Sensitivity of clinical examination and magnetic resonance imaging in detecting type of fistula-in-ano

a. Since 44 of the 50 cases were correctly detected by clinical examination, the sensitivity for the examination technique was 88%

Table 1: Fistula classifications by clinical, magnetic resonance imaging and intra-operative assessments

Fistula types	Clinical	MRI	Intra-operative
Anterior (A)			
TS	19	14	16
IS	4	7	5
Trans-sphincteric with high inter- sphincteric extension	-	1	2
Anterior sinus	-	1	-
Posterior (P)			
Trans-sphincteric	5	7	5
Inter-sphincteric	9	8	9
Trans-sphincteric with high inter- sphincteric extension	12	11	12
Extra-sphincteric	-	1	-
A + P			
TS + TS	-	-	1
TS + IS	1	-	-

MRI: Magnetic resonance imaging, TS: Trans-sphincteric, IS: Inter-sphincteric

Table 2: Compliance of intra-operative finding with clinical examination and magnetic resonance imaging

	Compliant with clinical examination	Compliant with MRI

a. The most common position was 6 o'clock followedby 12 o'clock position. Intraoperatively and on clinical examination, the location of 51 internal openings was detected in 50 patients as one of the

Yes	44	36
Partial	5	3
No	1	11

MRI: Magnetic resonance imaging

b. For MRI investigation, the detection was compliant with the intra-operative finding in 36 cases, and hence, the sensitivity was 72%.

DISCUSSION

In developing countries such as India, there is a dearth of MRI machines besides the cost involved in doing an MRI. Although MRI may be an accurate radiological assessment tool, it may not be accessible to the surgeon and the patients, especially in the interior parts of the country. Hence, it was thought to compare the evaluation efficacy of MRI versus clinical examination in diagnosis

Table 3: Demographic details of similar studies

Study done	Sample size	Demographic details
Our study	50 patients	84% males, mean age: 40.98 years
Nasir *et al*.[7]	173 patients	82.6% males, mean age: 43.5 years
Chaudhari *et al*.[6]	35 patients	91.4% males
Rehman *et al*.[5]	11 patients	All males (100%)
Buchanan *et al*.[8]	104 patients	Not described
Beckingham *et al*.[3]	42 patients	85.7% males
Spencer *et al*.[4]	42 patients	not described

of fistula-in-ano.

The mean age of the patients in this study was 40.98 years, with a median of 41 years. In this study, 84% of the fistula cases were found in males. This finding was similar to those found in Nasir *et al.*, Chaudhari *et al.*,and Beckingham *et al.* [Table 3].

In this study, the most common type of fistula was anterior trans-sphincteric as seen in 19 (38%) cases by clinical examination, 14 (28%) cases on MRI examination, and 16 (32%) cases intra-operatively.

In this study, overall posterior fistula tract was more common than anterior tracts. On clinical examination, anterior fistula tract was seen in 23 (46%) cases, posterior fistula tract in 26 (52%) cases, and 1 (2%) case showed the presence of both anterior and posterior fistula.

On MRI examination, anterior in 23 (46%) cases, posterior in 27 (54%) cases. Intra-operatively, anterior in 23 (46%) cases, posterior in 26 (52%) cases, and one (2%) showed both anterior and posterior fistula tract.

Overall, on clinical examination, trans-sphincteric fistula was seen in 36 (72%) cases, inter-sphincteric fistula in 13 cases (26%), and while 1 (2%) case showed both. On MRI examination, 33 (66%) cases showed trans-sphincteric fistula, 15 (30%) cases showed inter-sphincteric fistula, 1 (2%) case showed anterior sinus, and 1 (2%) showed extra-sphincteric fistula. Intraoperatively, 36 (72%) cases showed trans-sphincteric fistula and 14 (28%) cases showed inter-sphincteric fistula.

In the study by Chaudhari *et al.*, the most fistula type was inter-sphincteric (65%).[6] In the study conducted by Nasir *et al.*, the most common type of fistula was the trans-sphincteric type, seen in 49.71% cases.[7] Inter-sphincteric was specifically found only in 25.43% cases, very similar to the numbers in our study. In the study by Rehman *et al.*, inter-sphincteric type was 54.54%.[5] In the study by Buchanan *et al.*, trans-sphincteric type of fistula was 51.92% which was the most common type like that in our study.[8] In the study by Beckingham *et al.*, inter-sphincteric type of fistula was 57.14%, while trans-sphincteric fistula was 16.67%[3] [Table 4].

Table 4: Fistula types in similar studies

Study done	Trans-sphincteric (%)	Inter-sphincteric (%)	Other types (%)
Our study	72	28	-
Nasir *et al.*[7]	49.71	25.43	24.86
Chaudhari *et al.*[6]	35	65	-
Rehman *et al.*[5]	45.46	54.54	-
Buchanan *et al.*[8]	51.92	36.53	11.55
Beckingham *et al.*[3]	16.67	57.14	26.19

The clinical as well as the MRI examination was utilized to assess the presence of abscess. Though 16 cases (32%) had abscess presentation related to fistula intraoperatively, only five (10%) cases were detected to have it on clinical examination. MRI was found to be more sensitive in detecting abscesses (12 cases, 24%). If we talk about the sensitive nature of MRI in detecting abscess, it was 75% (12 out of 16) compared to 31.25% of clinical examination (5 out of 16). In a study by Rehman *et al.*, 16% of the cases of anal fistula had associated abscess formations.[5] In a study by Buchanan *et al.*, 48 of the 104 cases presented with abscess.[8] 12 of the 42 patients in the study by Spencer *et al.* had abscess presentation (28%).[4]

In this study, the positions of internal openings were also deciphered with the aid of both clinical examination and the radiological assessment. This was a novel thing done in this study, which was not done in any of the studies found in the literature.

It was found that the position of the internal openings was predicted by the clinical examination with 100% accuracy as the findings matched with those found intraoperatively. MRI had a mis-match in 23 cases (46% inaccuracy) in predicting the internal opening positions successfully.

Table 5: Sensitivity of clinical examination and magnetic resonance imaging in similar studies

Study done	Clinical examination sensitivity (%)	MRI sensitivity (%)
Our study	88	72
Nasir *et al.*[7]	-	95
Rehman *et al.*[5]	-	90
Buchanan *et al.*[8]	61	90
Beckingham *et al.*[3]	-	100
Spencer *et al.*[4]	-	97

- Majority of the fistula were of recurrent type (35 patients) while the rest were primary type (15 patients)

MRI: Magnetic resonance imaging

The main objective of this study was to assess the sensitivity of clinical examination and MRI in predicting the type of fistula. It was found that on clinical examination, 88% cases were completely compliant with intraoperative findings, 10% were partially compliant

and 2% noncompliant. Based on MRI examination, 72% were completely compliant, 6% partially compliant while 22% were noncompliant with the intraoperative findings. This showed that the sensitivity of clinical examination was found to be greater (88%) as compared to MRI examination (72%). In the study by Nasir *et al*., the sensitivity of MRI was 95%, but it was not compared with clinical examination sensitivity.[7] In the study by Rehman *et al*., the sensitivity of MRI was 90% while in the study by Buchanan *et al*., the sensitivity for MRI examination was 90% while that for clinical examination was 61%.[5,8] Beckingham *et al.* in their study found that MRI has 100% sensitivity in predicting the type of fistula.[3] Similar findings were noted in the study by Spencer *et al*.[4] [Table 5].

Indian literature is sparse, and our study shows that clinical examination, if it's used in the right way with the right technical abilities can accurately predict the type of fistula-in-ano in most of patients. This can help avoid the disadvantage of having no MRI set-ups in the interior parts of India, and help in accurate diagnosis, albeit with proper surgical training.

Among the limitations associated with this study, the sample size was small over the study period. A larger cohort can be considered either at one center or multiple centers to get a more robust evidence. Nevertheless, the strengths of the study include taking into consideration the position of tracts, the classification of fistula in detail including inter-sphincteric and trans-sphincteric with the identification of anterior and posterior nature as well and presence of the abscess cavity.

CONCLUSIONS

- Majority of patients with fistula-in-ano were males (84%) with a mean age of early 40 s
- The most common type of fistula found was the trans-sphincteric type, specifically the anterior one
- Clinical examination was more sensitive (88%) than the MRI examination (72%) in accurately detecting the type of fistula-in-ano
- The associated abscesses were more sensitively detected by MRI (75%) as compared to clinical examination (31.25%)
- The most common location of internal openings of fistula-in-ano was 6 o'clock position
- The locations of internal openings were detected by clinical examination with 100% accuracy
- To conclude, clinical examination is a sensitive modality for the diagnosis and classification offistula-in-ano. In places where MRI is unavailable, good technical skills on the part of the surgeon can help in accurately predicting the type and openings of fistula on clinical examination. However, for deep seated abscess, clinical examination had a limited role.

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Conflicts of interest

There are no conflicts of interest.

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