

The Predictive Accuracy of Magnetic Resonance Imaging (MRI) Findings in Identifying Anorectal Fistula over Intraoperative Findings

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Abstract:

Introduction: Fistula-in-ano, also referred to as the anal fistula, is an abnormal tract or cavity between the anal canal and perianal skin. The treatment of fistulas requires surgery. Proper manipulations, such as curettage and drainage of blind sinuses, abscess cavities, and accessory tracts, are the key for successful treatment. Owing to high soft tissue resolution of MRI, radiologists can provide detailed anatomic descriptions of the relationship between the fistula and the anal sphincter complex, localization of the site of internal opening of anal fistula, definition of the primary and secondary tracts and their relationships with the sphincter muscles, and presence of horseshoe fistulas and abscesses, thereby allowing surgeons to choose the best surgical treatment, significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence

Methodology: Diagnostic test evaluation to compare the predictive accuracy of MRI findings in identifying anorectal fistula over intraoperative findings in 30 patients referred with clinical diagnosis of perianal fistula from Department of Surgery, Govt TD Medical College, Alappuzha.

Result: The study sample included 22 males and 8 females. MRI had 100% sensitivity and specificity in identifying external opening, type of ano rectal fistula and in detecting abscesses. MRI and surgery correlation was excellent for St James hospital university classification Grades 3, 4 and 5 perianal fistula with sensitivity and specificity of 100%. For grade 1 and 2 perianal fistula, MRI and surgery finding had significant correlation; with sensitivity of 87.5% and specificity of 100% for grade 1 and for grade 2 fistulas the sensitivity was 100% and specificity 95.7%. For identifying secondary tract MRI had sensitivity of 84.6% and 88.2%. For all statistical interpretations, $p < 0.05$ was considered the threshold for statistical significance.

Conclusion: Correct identification of perianal fistulae and proper grading of fistulae are possible by MRI with very good predictive accuracy and thereby ensuring best surgical outcome to patient.

Keywords: MRI- Magnetic Resonance Imaging.

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Introduction

Fistula is an abnormal connection between two epithelized surfaces. Fistula-in-ano, also referred to as the perianal fistula, is an abnormal tract or cavity between the anal canal and perianal skin [1] Many anal fistulae are suspected to arise from infected anal glands that open into the anal crypts at the dentate line, a theory known as the crypto glandular hypothesis [2], whereby inter sphincteric gland infection represents the initial event, which leads to formation of an inter-sphincteric fistula track or abscess if the draining duct becomes obstructed.

Chronic infection in the primary site in the inter-sphincteric plane produces a persistently discharging fistula or recurrent abscess. [3] Around 35% of patients develop recurrent disease after

initial presentation for crypto glandular perianal abscess [2]. Perianal fistulas may also be caused by several inflammatory conditions and events including Crohn's disease, pelvic infection, tuberculosis, and diverticulitis, trauma during childbirth, pelvic malignancy, and radiation therapy.

However, most are idiopathic. [3] The incidence of perianal fistula ranges from approximately 1 to 2 per 10,000 individuals with an approximate 2:1 male to female predominance and causes significant morbidity to the patient. The treatment of fistulas requires surgery. [3] Proper manipulations, such as curettage and drainage of blind sinuses, abscess cavities, and accessory tracts, are the key for successful treatment. [1] While this

is successful in most cases, it is associated with a significant prevalence of recurrence. Successful surgical management of anal fistulas requires accurate preoperative assessment of the course of the primary fistulous track and the site of any secondary extension or abscesses. [3] Physical examination alone may not be sufficient in detecting these features of the fistula, and imaging modalities play a very important complementary role. [1]

Although imaging techniques played a limited role in evaluation of perianal fistulas in the past, it is now increasingly recognized that imaging techniques, especially magnetic resonance imaging, may play a crucial role. [3] MRI use in anal fistulas was first reported in the early 1990s.

In that initial report, MRI showed 87.5% concordance with the surgery. MRI has the ability to differentiate soft tissues, identify tracts outside the anal canal, and demonstrate the images compatible with the surgically relevant plane. [1] 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 this technique for imaging assessment of the complex or recurrent fistulas.

Owing to high soft tissue resolution of MRI, localization of the site of internal opening of anal fistula, definition of the primary and secondary tracts and their relationships with the sphincter muscles, and presence of horseshoe fistulas and abscesses can be more accurately depicted preoperatively compared with physical examination. [1]

MR imaging allows identification of infected tracks and abscesses that would otherwise remain undetected. Furthermore, radiologists can provide detailed anatomic descriptions of the relationship between the fistula and the anal sphincter complex, thereby allowing surgeons to choose the best surgical treatment, significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence.

Materials and Methods

Aim: To assess the diagnostic accuracy of MRI in delineation of anorectal fistula tract.

Objectives

Primary Objective: Comparison of the predictive accuracy of MRI findings in identifying anorectal fistula over intraoperative findings in patients

referred with clinical diagnosis of perianal fistula from Department of Surgery, Govt TD Medical College, Alappuzha.

Secondary Objective:

- Assess the type of anorectal fistula
- Position of internal opening
- Grading of fistula by St James University hospital MRI classification.

Inclusion Criteria:

- All patients referred from Department of Surgery with clinical diagnosis of perianal fistula
- All patients presenting with local pain and discharge through perianal region with a past history of perianal abscess.
- Patient who had given consent for this study.
- No contraindication for MRI study.

Exclusion Criteria:

- General contraindications for MRI (metallic implants in their body, foreign body in their eyes, pacemaker, pregnancy and claustrophobia).
- All congenital fistulas.
- Fistula associated with Malignancy.
- Inflammatory bowel disease patients 54.
- Incontinent patients.
- Patients with rectovaginal fistula.
- Patient with deranged renal function test.
- Cases unfit or refused for surgery.

Study Design: Diagnostic test evaluation.

Study Period: 1 year.

Study Setting: The study was conducted in Department of Radiodiagnosis of Govt. TD Medical College, Alappuzha in patients referred from department of Surgery with clinical diagnosis of perianal fistula.

Study Population: All patients who came to Department of Radiodiagnosis with clinical diagnosis of anorectal fistula.

Sampling Method: Probability sampling.

Sample Size: Sample size of 30 was used in the study.

Result

In our study, the youngest patient was aged 17 years and oldest was 68 years. The age distribution in the patient population studied was between 17-68 years with the most number of patients (33.3%) falling in the groups 21- 30 and 41-50 years.

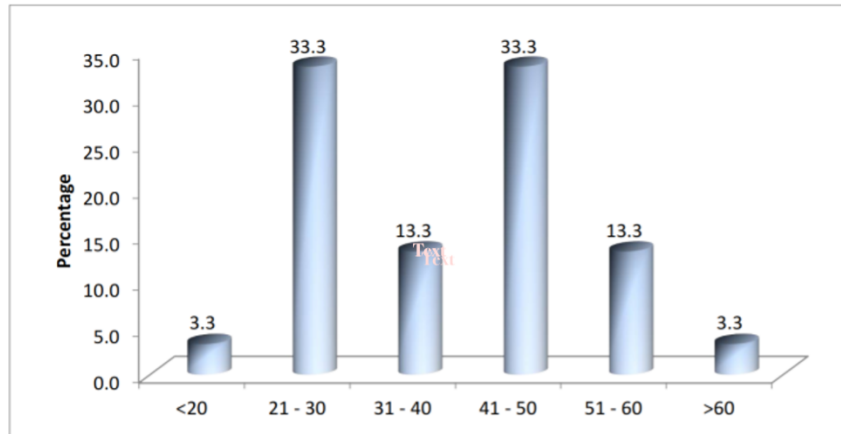


Figure 1: Percentage distribution of the sample according to age

In this study of 30 patients with perianal fistula, majority of patients were males constituting 73.3 % and 26.7 % were females.

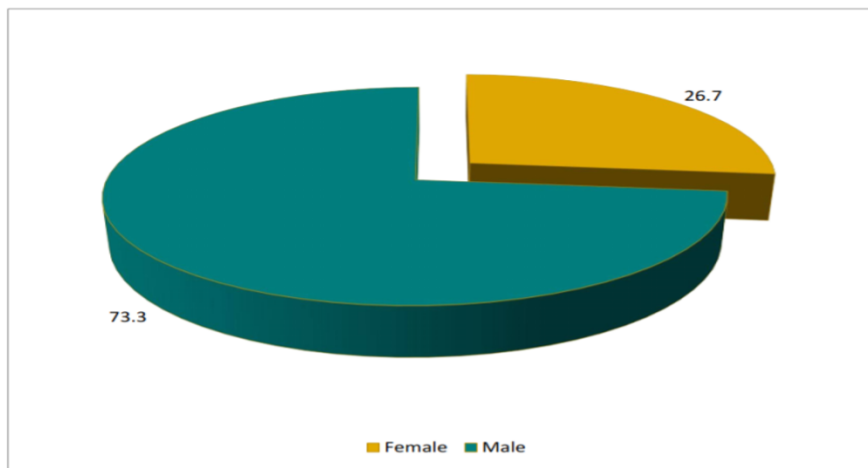


Figure 2: Pie chart showing sex distribution

In our study, when the fistulous tracts were analysed, majority of the patients (29 out of 30) had a single external opening (96.67%). Multiple external openings were seen in 1 patient (3.33%)

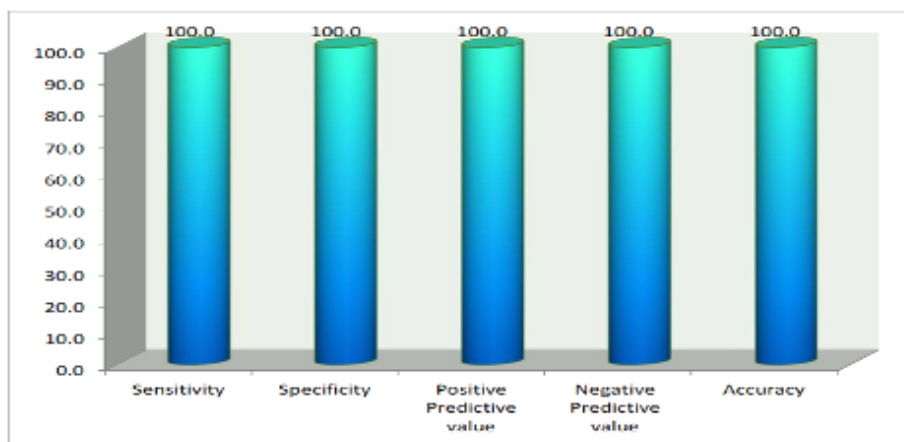


Figure 3: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for number of external opening.

Most commonly the opening was found between 4 and 6'o clock position (11 patient).The next common location being 7 to 9'o clock position which was found in 8 patients. One patient in the study had 2 external openings one between 1 to 3 'o' clock and other between 4 to 6 'o' clock position in MRI and was categorized in column named 1-3/ 4-6 'o' clock position of table 6 and 7. The intraoperative findings were in agreement with MRI finding.

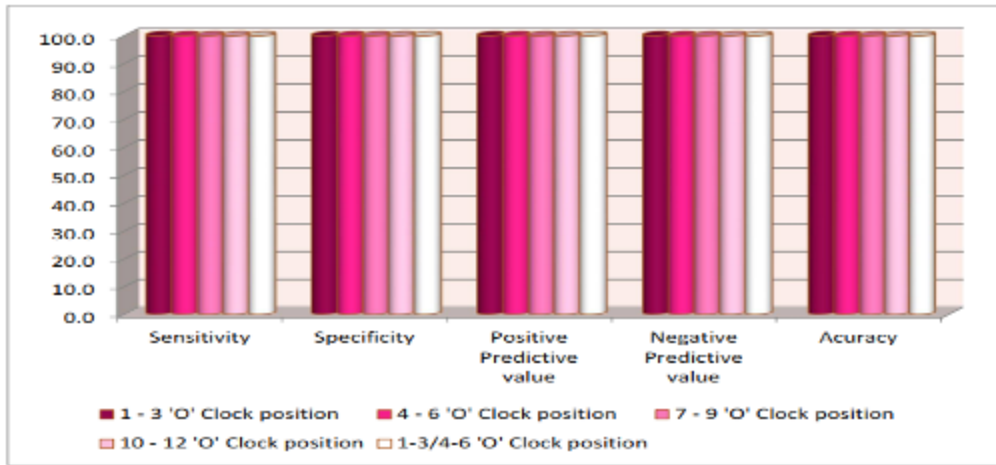


Figure 4: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for number of external opening clock position.

When analyzing the internal opening, it was single in 96.67 % of patients (29 out of 30) and multiple in about 1 patient (3.3 %) (Table 8, figure 31). 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 internal openings.

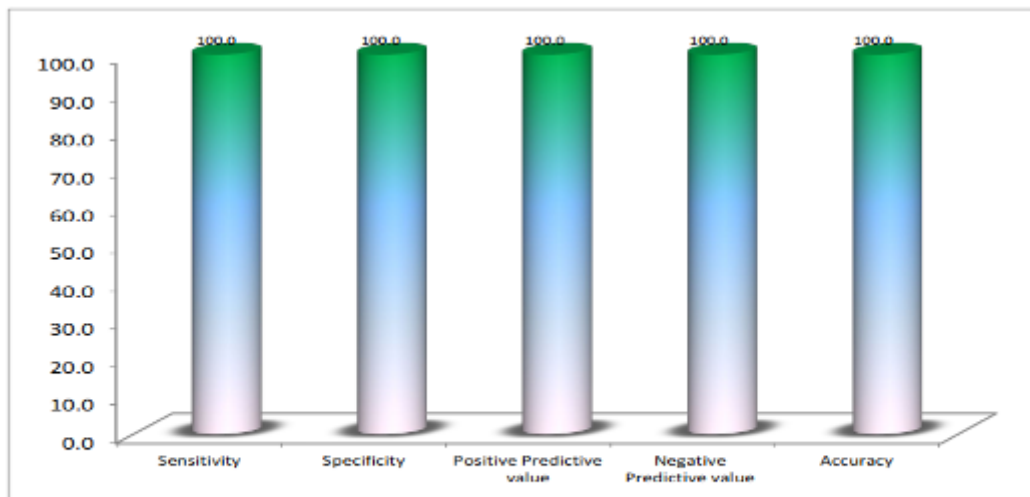


Figure 5: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for internal opening

In our study MRI was not able to delineate secondary tract in 2 cases which was found to be present during surgery. In 2 other cases reported to have secondary tract in MRI, the operating surgeon could not find any secondary tract In our study the predictive accuracy of MRI in identifying secondary tract had a sensitivity of

84.6 % and specificity of 88.2 % In our study, abscesses were identified in 17 out of 30 patients (56.67 %). Our study showed sensitivity and specificity of 100% and 100% for abscesses.

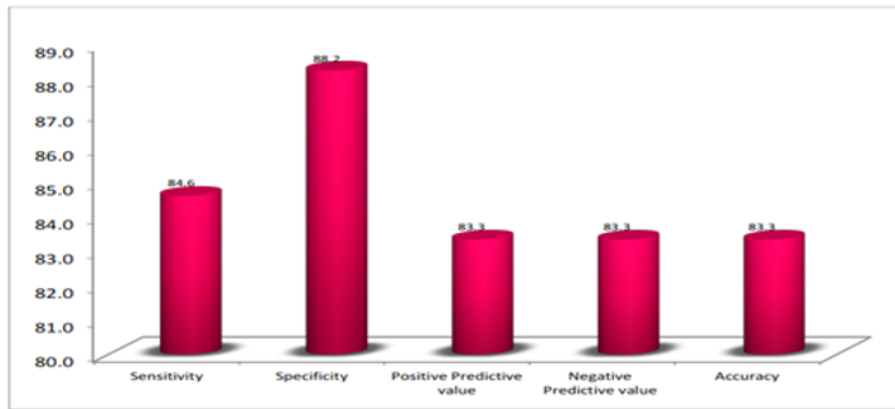


Figure 6: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for number of secondary tract

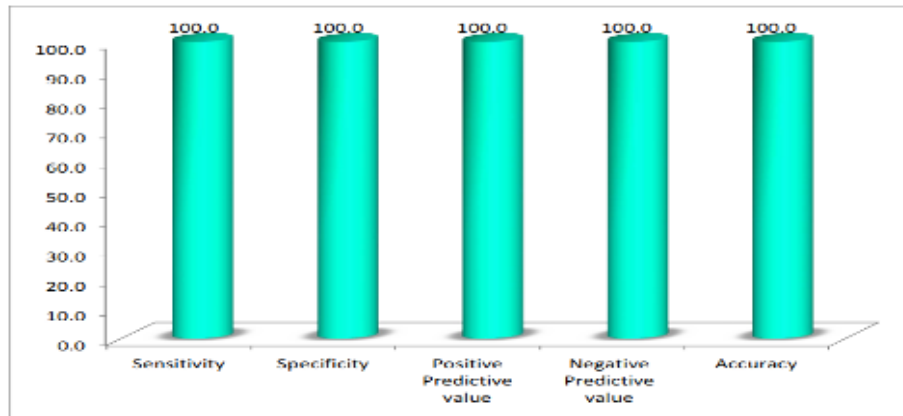


Figure 7: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for number of abscess.

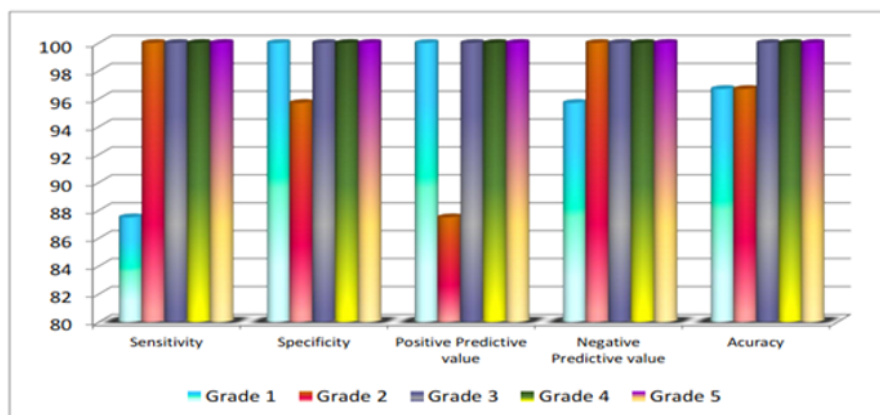


Figure 8: Predictive accuracy of MRI finding in identifying anorectal fistula over intra operative finding in patients for ST James grading of fistula

MRI findings for Grade 1 and 2 fistulas showed discrepancies in identification (One patient classified as St James grade I as per MRI was found to be St James grade II intraoperatively as the operating surgeon found an additional secondary tract). When the St James's University Hospital MRI grading according to which patients were classified was compared with that of the peroperative findings, the correlative value was the best for the fistulas of grades III, IV and V. The peroperative findings correlated exactly with the MRI findings for grades 3 to 5.

Discussion

Of the total 30 patients included in the study, 22 patients were males 73.3% and 8 patients were females (26.7%). Most of them were in the age group of 21 to 30 years (10 out of 30) and 41 to 50 years (10 out of 30).

Among the 30 patients included in the study group, the most prevalent type of fistula was intersphincteric type 50% (15 out of 30 patients) followed by trans sphincteric type 43.33% (13 out of 30 patients).

The operative findings were well correlating with the study with regard to type of fistula. 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. [5] The results were also consistent with the study done by Morris et al. who in their study mentioned that most common perianal fistulas were intersphincteric fistulas. [6]

In our study, when the fistulous tracts were analyzed, majority of the patients (29 out of 30) had a single external opening. Most commonly the opening was found between 4 and 6'o clock position (11 out of 30 patients). The next common location being 7 to 9'o clock position (7 out of 30 patients). The operative findings were well correlating with the study with regard to the site of the openings.

When analyzing the internal opening, it was single in majority of patients (29 out of 30). Most commonly, the internal opening was found in 4 to 6'o clock position (13 out of 30 patients). There was discrepancy between MRI and operative findings in 2 cases with regard to clock position of internal opening. One case reported to have internal opening at 4 to 6'o' clock position in MRI, during surgery was found to have internal opening at 7 to 9'o'clock position.

And another case reported to have internal opening at 7 to 9'o' clock position in MRI, during surgery was found to have internal opening at 4 to 6'o'clock position In our study, we classified perianal fistulas on the basis of St James's University Hospital Classification. This revealed

that grade IV fistulas were the commonest which was found in 9 patients. The second most common type is grade II fistulas which were found in 8 patients. This is in accordance with the study done by Esra Ozakavukcu et al. [7]

In our study, 13 out of 30 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. [8] As already known, active fistulous tracts enhance well with gadolinium contrast.

This helps in better delineation of fistulous tracts. In our study MRI was not able to delineate secondary tract in 2 cases which was found to be present during surgery. In 2 other cases reported to have secondary tract in MRI, the operating surgeon could not find any secondary tract. Retrospective Radiodiagnosis – surgery interdepartmental discussion and analysis was done about these 2 cases and the conclusion made was that, these 2 patients had underwent fistulotomy 3 months after MRI during which they were on conservative medical management and the secondary tracts might have healed.

In our study the predictive accuracy of MRI in identifying secondary tract had a sensitivity of 84.6 % and specificity of 88.2 %. In our study, abscesses were identified in 17 out of 30 patients. MRI and surgery correlation had 100 % sensitivity and 100% specificity for detecting abscesses. This is superior to the result given by Maier et al in his study [9] that 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. [10]

In our study, there was significant correlation between the fistulous tracts identified on MRI and the surgical findings. Fistulectomy was done in all 30 patients and intraoperative 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 1 patient and was wrongly classified as grade 1. The result obtained (86.78%) was comparable with the result obtained from the previous study conducted by Lunniss et al which reported a concordance rate of 86- 88% between MRI and surgical findings. [11] In another study by Beets- Tan et al, who compared the results of MRI with that intraoperative findings, the

sensitivity and specificity were 100% and 86% respectively. [12]

Conclusion

Perianal fistula, though an uncommon problem may be chronic and recurrent. It may present with numerous complications like secondary tracks and abscess cavities. Incomplete evaluation of these complications can result in residual and recurrent disease. So, complete preoperative evaluation of perianal fistulas is warranted. Also, to prevent the injury to external sphincter and resultant fecal incontinence, it is necessary to establish the relationship of sphincter with the fistulous tracks. MRI satisfies all these needs of surgeons and helps in planning of surgery. MRI provides finer anatomic details of fistula and also identifies secondary tracks and abscesses. Contrast enhanced MRI can identify active inflammation of tracks. Correct identification of perianal fistulae and proper grading of fistulae are possible by MRI with very good predictive accuracy and thereby ensuring best surgical outcome to patient.

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