

ORIGINAL ARTICLE

DIAGNOSTIC ACCURACY OF MAGNETIC RESONANCE IMAGING IN PREOPERATIVE ASSESSMENT OF PERIANAL FISTULAE AND ABSCESES**Fakiha Zabit, Sadaf Fasih*, Asad Bilal Arif**, Omair Ahmed Zahoor***, Rimsha Khan[†], Aamna Naeem***Department of Radiology, Fazaia Medical College, Islamabad, *Dermatology, Abu Umara Medical and Dental College, Lahore, **Department of Surgery, M. Islam Medical College, Gujranwala, ***Department of Surgery, PAF Hospital, Lahore, [†]Foundation University Medical College, Islamabad, Pakistan

Background: Perianal fistulae and abscesses are the different manifestations of the same clinical disease. They have been afflicting humans since ages. Although the disease is benign, it still adversely affects the patient's quality of life. Up to 38% *fistulae in ano* arise from perianal abscesses. This study is aimed at determining the diagnostic accuracy of magnetic resonance imaging (MRI) in preoperative assessment of *fistula in ano* and perianal abscess, taking surgical confirmation as gold standard for the diagnosis. **Methods:** This cross-sectional validation study was conducted at Department of Radiology, Pakistan Institute of Medical Sciences, Islamabad, over a period of 6 months. In this study a total of 121 patients were enrolled using WHO software for sample size determination and by consecutive sampling (non-probability) technique. **Results:** The mean age of the patients was 43±12.77 years. Sixty-eight percent patients were male while 32% patients were female. Diagnostic accuracy of MRI for perianal fistula assessment was 95.04%, Sensitivity 95.72%, Specificity 75%, Positive predictive value 99.11%, and Negative predictive value was 37.50%. Diagnostic accuracy of MRI of abscess on the basis of surgical findings turned out to be 90.08%, Sensitivity 91.45%, Specificity 50%, Positive predictive value 98.16%, and Negative predictive value 16.66%. **Conclusion:** MRI is quite an accurate, non-invasive imaging technique for determination of type and extent of peri-anal fistula and abscess.

Keywords: Diagnostic accuracy, magnetic resonance imaging, perianal fistula, abscess, surgical findings

Pak J Physiol 2024;20(4):65–7, DOI: <https://doi.org/10.69656/pjp.v20i4.1552>**INTRODUCTION**

Perianal fistulae and abscesses are the different manifestations of the same clinical disease. They have been afflicting human race since ages. Although the disease is benign, it still adversely affects a patient's quality of life.¹ Perianal abscesses begin with suppurative of anal glands in intersphincteric space followed by fistula formation in two thirds of cases.² They range from superficial, submucosal abscesses to deeply seated ischioanal and supralelevator abscesses. Multiple types of fistulae result due to perforation of preceding abscess with varying degree of sphincter complex involvement. The incidence of fistula arising from anal abscess is up to 38%.^{3,4}

Majority are idiopathic in aetiology. Secondary causes include Crohn's disease, tuberculosis, steroid therapy, previous radiation therapy, HIV infection and diverticulitis.⁵ Adult males are twice as likely to develop an abscess and/or fistula with male to female ratio of 2:1.^{2,6} and mean age of presentation being 40 years.

Detailed preoperative assessment of primary fistula is crucial along with accurate mapping of potential perianal suppurative, and its relationship to sphincter complex, pelvic floor and adjacent pelvic

structures. These details are important for treatment planning and choice of surgery ranging from fistulotomy to seton placement.^{7,8}

Currently, various modalities are used for investigation of fistula and associated suppuration. Transrectal ultrasonography (TRUS), Computed tomography exposes patient to considerable radiation dose.⁹ Magnetic resonance imaging (MRI) is considered as the modality of choice to evaluate perianal fistula and abscess as it has three dimensional imaging capability, wide range of anatomical coverage, higher soft tissue contrast resolution, and the ability to be performed on an out-patient basis.¹⁰ It is an accurate investigation for characterization of intersphincteric fistula, with reported sensitivities of 88–95% and 50–79% for MRI and TRUS respectively.¹¹ It is a non-invasive and highly accurate method for detection of perianal suppuration.¹²

This study will be a highlight in devising protocol in the diagnosis and classification of perianal fistulae and abscesses. It will aid in choosing suitable surgery, guide adequate exploration and drainage, reduce complications such as faecal incontinence and sepsis, thereby reducing patient's morbidity and hospital burden for surgeons as well as for dermatologists.

METHODOLOGY

This cross sectional validation study was conducted at Department of Radiology, Pakistan Institute of Medical Sciences (PIMS), Islamabad in collaboration with Surgery and Dermatology Departments over a period of 6 months from 30 Sep 2020 to 29 Mar 2021.

Using sensitivity specificity sample size calculator the total sample size was calculated as 121, taking sensitivity as 95.56%, specificity 80%¹³, prevalence 38%^{3,4} desired precision 5% for sensitivity, desired precision 10% for specificity and confidence interval of 95%. It was a consecutive sampling (non-probability). Patients of both genders, aged 18–65 years with clinical diagnosis of perianal fistula or perianal abscess with/without an obvious fistulous opening were included. Previously operated patients, patients in whom contrast agent (gadolinium) was contraindicated (e.g., acute or chronic renal failure), patients with claustrophobia or metallic implants and patients who refuse and/or were unfit for surgery (e.g., due to contraindication to anaesthesia or uncontrolled diabetes) were excluded.

Patients with the clinical diagnosis of perianal fistulae and/or abscess were enrolled for MRI of pelvis after obtaining written informed consent. Philips 1.5 Tesla Achieva Nova was used. Using phased array Body Coil, T1-weighted fast spin echo (T1W FSE) images before and after gadolinium injection and fat suppressed T2-weighted fast spin echo (T2W FSE) images was obtained in transverse and coronal planes along the long axis of anal canal with slice thickness of 4 mm and interspaces gap of 0.4 mm. Levator plate and the entire perineum was part of the study to identify septic foci and infected tracks. The scans were viewed by a single/same consultant radiologist. The patients were followed till he/she was operated upon by a single/same consultant surgeon. Surgical findings were then recorded independently. Comparison between MRI and surgical findings of perianal fistulae and/or abscess was then filled in the performa. The data was analysed on SPSS-17, and 2x2 tables were used to determine diagnostic accuracy, sensitivity, specificity, positive predictive value, negative predictive value of MRI for both fistula and abscess.

RESULTS

A total of 121 patients, 82 (68%) males and 39 (32%) females were included in the study. Mean age of the patients was 43±12.77 years, and 12 (10%) patients were in age range 20–30 years, 38 (31%) were in age range 31–40 years, 42 (35%) were in age range 41–50 years, and 29 (24%) patients were in age range 51–65 years. (Table-1).

Diagnostic accuracy of MRI of fistula on the bases of surgical findings was 95.04%, sensitivity was

95.72%, specificity was 75%, positive predictive value was 99.11%, and negative predictive value was 37.50%. On cross-tabulation of MRI with surgical findings in fistulae cases, 112 patients were found to be true positive, and 1 was false positive. Five patients were false negative and 3 were true negative. (Table-2).

Diagnostic accuracy of MRI of abscess on the bases of surgical findings was 90.08%, sensitivity was 91.45%, specificity was 50%, positive predictive value was 98.16%, and negative predictive value was 16.66%. On cross-tabulation of MRI with surgical findings in abscess cases, 107 patients were found to be true positive, and 2 were false positive. Ten patients were false negative and 2 were true negative. (Table-3).

Table-1: Age distribution (n=121)

Age	Frequency	Percentage
20–30 Years	12	10.0%
31–40 Years	38	31.0%
41–50 Years	42	35.0%
51–65 Years	29	24.0%
Total	121	100%
Mean±SD (Years)	43±12.77	

Table-2: MRI vs Surgical findings of fistula (n=121)

MRI findings	Surgical findings		
	Present	Absent	Total
Present	112 (TP)	1 (FP)	113 (93%)
Absent	5 (FN)	3 (TN)	8 (7%)
Total	117 (97%)	4 (3%)	121

Table-3: MRI vs surgical findings of abscess (n=121)

MRI findings	Surgical findings		
	Present	Absent	Total
Present	107 (TP)	2 (FP)	109 (90%)
Absent	10 (FN)	2 (TN)	12 (10%)
Total	117 (97%)	4 (3%)	121

DISCUSSION

Perianal fistula and/or abscess has been diagnosed clinically in surgical OPDs traditionally but incidence of recurrence has led to the need of accurate preoperative diagnosis for planning of surgical procedure. MRI findings in peri-anal fistula were assessed in various studies previously and appeared to be quite accurate. In a study conducted by Rehman *et al*¹⁴, the MRI findings were in accordance with surgical findings in 10 out of 11 patients regarding type and extent of *fistula-in-ano*. Statistical parameters showed that MRI has diagnostic accuracy of 90%, a sensitivity of 90%, and specificity of 100% and in determining type and extent of peri-anal fistula.¹⁴ Similar findings were observed in another study conducted by Singh *et al*¹³ in which a total of 50 patients were observed, per-operative findings confirmed perianal fistulae in 45 out of 50 patients. The sensitivity and specificity of MRI in correctly detecting and grading the primary tract was found to be 95.56% and 80% respectively; and for abscess, it was 87.50% and 95.24% respectively. High sensitivity was also observed in identification of secondary tract (93.75%),

correct localization of internal opening (95.83%) and detecting the horse-shoeing (87.50%).¹³

MRI was not able to identify clearly the internal sphincter and anal mucosa, therefore the site of the internal opening was inferred by the proximity of the tract within the intersphincteric space.¹⁵ According to Halligan *et al*¹⁶, area of maximal intersphincteric sepsis is the probable site of internal opening. An internal opening was considered as correctly identified when it was at the correct level in the anal canal and was within the correct quadrant. Among total 48 internal openings found on surgery, MRI correctly identified 46 cases. In one case, internal opening was wrongly identified and case was actually a sinus tract.¹⁶

CONCLUSION

MRI is quite an accurate, non-invasive imaging technique for identifying the type and extent of peri-anal fistula and perianal abscess. It helps in pre-operative assessment and surgical planning for management.

REFERENCE

1. Zubaidi AM. Anal fistula. Past and present. Saudi Med J 2014;35(9):937-44.
2. Slauf P, Antoš F, Marx J. [Acute periproctal abscesses]. Rozhl Chir 2014;93(4):226-31. [Article in Czech]
3. Ramanujam PS, Prasad ML, Abcarian H, Tan AB. Perianal abscesses and fistulae. A study of 1023 patients. Dis Colon Rectum 1984;27(9):593-7.
4. Vasilevsky CA, Gordon PH. The incidence of recurrent abscesses or fistula-in-ano following anorectal suppuration. Dis Colon Rectum 1984;27(2):126-30.
5. Lee EH, Yang HR, Kim JY. Comparison of transperianal ultrasound with colonoscopy and magnetic resonance imaging in perianal Crohn's disease. J Pediatr Gastroenterol Nutr 2018;66(4):614-9.
6. Sofic A, Beslic S, Sehovic N, Caluk J, Sofic D. MRI in evaluation of perianal fistulae. Radiol Oncol 2010;44(4):220-7.
7. Algazzar HY, Eldib DK, Bahram MA, Zaher NA. Preoperative MRI of perianal fistula evaluation and its impact on surgical outcome. Egypt J Radiol Nucl Med 2019;50:71.
8. Agha ME, Eid M, Mansy H, Matarawy K, Wally M. Preoperative MRI of perianal fistula: Is it really indispensable? Can it be deceptive? Alexandria J Med 2013;49(2):133-44.
9. Karanikas I, Koutserimpas C, Siaperas P, Skarpas A, Karoubalis J, Velimezis G. Transrectal ultrasonography of perianal fistulas: a single center experience from a surgeon's point of view. G Chir 2018;39(4):258-60.
10. Adityan R, Immanuel JP. The role of diagnostic medical imaging techniques in the evaluation of peri-anal fistula: A review. Int J Radiol Imaging Technol 2021;7(2):1510084.
11. Siddiqui MR, Ashrafian H, Tozer P, Daulatzai N, Burling D, Hart A, *et al*. A diagnostic accuracy meta-analysis of endoanal ultrasound and MRI for perianal fistula assessment. Dis Colon Rectum 2012;55:576-85.
12. Li X, Qiang JW, He C, Ji XS, Zhang B. Magnetic resonance imaging study of perianal abscess. Zhonghua Wei Chang Wai Ke Za Zhi 2011;14:868-70.
13. Singh K, Singh N, Thukral C, Singh KP, Bhalla V. Magnetic resonance imaging (MRI) evaluation of perianal fistulae with surgical correlation. J Clin Diagn Res 2014;8(6):RC01-4.
14. Imaad ur Rehman, Akhtar S, Rana A, Latif U, Saleem H, Chaudhary MY. MRI in the pre-operative evaluation of perianal fistula. J Postgrad Med Inst 2014;28(3) 264-9.
15. Barker PG, Lunniss PJ, Armstrong P, Reznick RH, Cottam K, Phillips RK. Magnetic resonance imaging of fistula-in-ano: technique, interpretation and accuracy. Clin Radiol 1994;49:7-13.
16. Halligan S, Stoker J. Imaging of fistula in ano. Radiology 2006;239(1):18-33.

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