

MRI IN THE PRE-OPERATIVE EVALUATION OF PERIANAL FISTULA

Imaad ur Rehman¹, Samina Akhtar², Atif Rana³, Uzair Latif⁴,
Hassan Saleem⁵, Mohammad Yousuf Chaudhary⁶

¹⁻⁶ Department of Radiology, Shifa International Hospital(SIH), Islamabad.

Address for correspondence:

Dr. Imaad ur Rehman

Assistant Professor, Department of Radiology, Shifa International Hospital(SIH), Islamabad - Pakistan.

E-mail: imaadur@gmail.com

Date Received:

January 01, 2014

Date Revised:

June 25, 2014

Date Accepted:

June 28, 2014

ABSTRACT

Objective: To assess the diagnostic accuracy of Magnetic Resonance Imaging (MRI) in the pre operative evaluation of perianal fistulae.

Methodology: Between Decemebr 2010 and January 2013, thirty patients with clinical suspicion of peri-anal fistulae had MRI scans done for evaluation of extent of disease. Out of these 11 patients underwent surgery in our hospital and were included in the study. All patients had body-coil MR Imaging examinations including the following sequences for anatomic and pathologic information: T2 sagittal, T1, T2 and STIR axial oblique, T2 and STIR coronal oblique and post contrast T1 FAT SAT sagittal, axial oblique and coronal oblique planes. Scans were interpreted by a senior radiologist with more than 5 year experience in body MR imaging. Surgical findings were accepted as the gold standard and were recorded independently by the surgeon. MRI findings were compared with surgical findings using Park's classification.

Results: The MRI findings were in accordance with surgical findings in 10 out of 11 patients regarding type and extent of fistula in ano. In one patient peroperatively diagnosed and treated fistula did not show on MRI. Statistical parameters showed that MRI has a sensitivity of 90%, specificity of 100% and diagnostic accuracy of 90% in determining type and extent of peri-anal fistula.

Conclusion: MRI is an accurate and non invasive imaging modality for determining type and extent of peri-anal fistula and helps in pre operative management and surgical planning by giving correct assessment of extent of disease.

Key Words: Magnetic Resonance Imaging (MRI), Perianal fistula, Pre-operative assesment.

This article may be cited as: Rehman I, 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.

INTRODUCTION

Although MR has gained worldwide acceptance as the predominant imaging modality in management of perianal fistulae¹, in Pakistan it is still not the mainstay of pre-operative assessment because of high cost and non-availability of MRI in many areas. In Pakistan, fistulography still continues to be the most commonly used investigation for detecting the course of fistulous tracts, assessment of secondary tracts, abscess formation and exact location of internal opening because of wide availability and cost effectiveness.² Fistulography, EAUS (endoanal ultrasound) and computed Tomography (CT), however, have their limitations in assessing perianal fistulae^{3,4}.

MRI has been found to be the investigation of choice and has been shown to be superior to digital explora-

tion, fistulography, EAUS and CT scan in assessing perianal fistulas^{5,6}. It is noninvasive and can be performed on an outpatient basis without anesthesia. The multiplanar imaging capability makes imaging of deeper pathologic anatomic relations possible with superior soft tissue resolution.

Although much work has been done in the West regarding assessment of diagnostic accuracy of MRI in management of perianal fistulae⁸⁻¹⁰, very few studies have been published in this regard in Pakistan². The aim of this study is to evaluate the role of MRI in our local settings.

METHODOLOGY

Thirty patients were referred to the Radiology department of our hospital, from December 2010 till January 2013. All these patients were males with age rang-

Figure 1: Transsphincteric fistula traversing the sphincter complex at 6 o'clock position with the track on the right side in T2 weighted Images

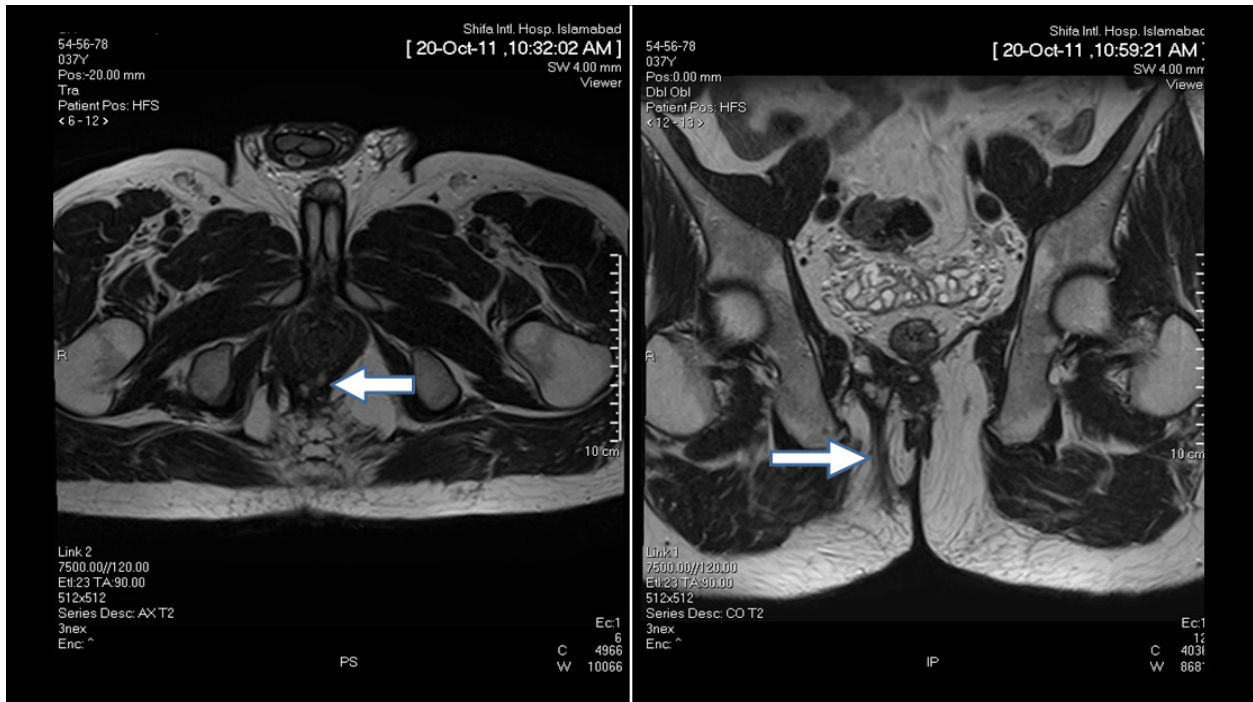
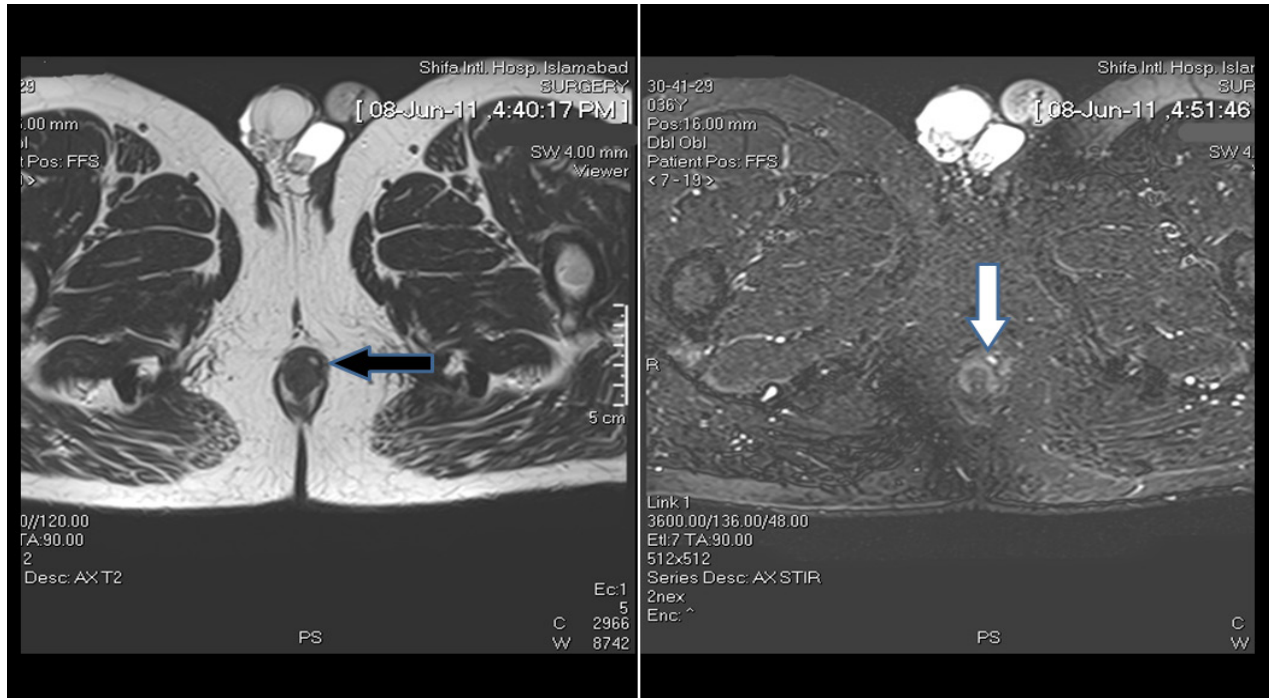


Figure 2: Intersphincteric fistula. Bright signal is seen at 1 o'clock position on both T2 and STIR axial sequences



ing from 24 to 51 year. Diagnosis of perianal fistula was made after clinical examination, probing of fistula and rectoscopic examination by their surgeons. These patients were then referred to the Radiology department for MRI. 16 channel body coil with surface coil was used. All patients had body-coil MR Imaging examinations including the following sequences for anatomic and pathologic information: T2 sagittal, T1, T2 and STIR axial oblique, T2 and STIR coronal oblique and post contrast T1 FAT SAT sagittal, axial oblique and coronal oblique planes. Scans were interpreted by a senior radiologist with more than 5 year experience in body MR imaging.

Out of these 30 patients, 11 patients underwent surgery and were included in the study. Time interval between MRI and surgery ranged between one week to two months. Surgical findings were accepted as the gold standard and were recorded independently by the surgeon.

MRI findings were compared with surgical findings using Park's classification⁷:

Inter-sphincteric: Via internal sphincter to the inter-sphincteric space and then to the perineum

Trans-sphincteric: Low via internal and external sphincters into the ischiorectal fossa and then to the perineum

Supra-sphincteric: Via intersphincteric space superiorly to above puborectalis muscle into ischiorectal fossa and then to perineum

Extra-sphincteric: From perianal skin through levator ani muscles to the rectal wall completely outside sphincter mechanism

RESULTS

The MRI findings were in accordance with surgical findings in 10 out of 11 patients (True positives) regarding type and extent of fistula in ano. In one patient

Table 1: Comparison of MR findings with surgical findings

Patient Number	Age/Gender	MRI Findings	Per-operative Findings
1	48 year / Male	Intersphincteric	Intersphincteric
2	37 year / Male	Not identified Abscess in ischiorectal fossa	Intersphincteric Abscess in ischiorectal fossa
3	42 year / Male	Intersphincteric	Intersphincteric
4	38 year / Male	Intersphincteric	Intersphincteric
5	37 year / Male	Intersphincteric	Intersphincteric
6	24 year / Male	Extrasphincteric sinus track to base of penis	Extrasphincteric sinus track to base of penis
7	38 year / Male	Transsphincteric	Transsphincteric
8	51 year / Male	Intersphincteric	Intersphincteric
9	33 year / Male	Transsphincteric	Transsphincteric
10	38 year / Male	Transsphincteric	Transsphincteric
11	28 year / Male	Intersphincteric	Intersphincteric

Table 2: Table (2x2) showing comparison of MR findings with surgical findings taken as gold standard

	Surgery positive for fistula	Surgery negative for fistula
MR positive for fistula	9 (TP)	0 (FP)
MR negative for fistula	1 (FN)	1 (TN)

Table 3: Comparison of Sensitivity and specificity of our study with international literature

	Beckingham et al ¹⁵	Regina et al ¹⁶	Our study
Sensitivity	97%	100%	90%
Specificity	100%	86%	100%

(patient no.2) peroperatively diagnosed and treated fistula did not show on MRI (False Negative). In one patient (patient no.6) only extrasphincteric sinus tract was seen reaching base of penis without involving sphincter complex or rectum on MRI and this was confirmed surgically as well (True Negative). Ischioanal abscess was correctly diagnosed in one patient. Forty % patients had simple fistulas and 60% patients had complex fistulas. One fistula was associated with abscess(16%), two with multiple ramifications (33%), one with horseshoe ramification (17%) and one was associated with multiple external openings (17%). Six patients had intersphincteric fistulas and 3 had transsphincteric fistulas. There was no suprasphincteric fistula encountered in our study. Results of our study are summarized in Table 1.

We had 9 true positives (TP), 1 false negative (FN) and 1 true negative (TN) in our study. There were no false positive (FP) cases in our study (Table 2). Our diagnostic accuracy was 90%, sensitivity was 90% and specificity was 100% (Table 3).

DISCUSSION

Due to its ability to display the anatomy of the sphincter muscles with good contrast resolution, three-dimensional imaging capability and higher soft tissue resolution, MRI has superseded fistulography, computed tomography (CT) scan and endoanal ultrasonography and has the greatest concordance with clinical and surgical findings.⁸⁻¹² MRI allows the classification of fistulous tracts and the identification of underlying infection. It helps in surgical planning and has resulted in reduction of incidence of recurrent disease. MRI is especially useful in patients with recurrent or complex fistulae.^{13,14}

The results of our study indicate that MRI is highly accurate for determining the type and extent of perianal fistulae. Sensitivity of 90% and specificity of 100% seen in our study is comparable to international literature as shown in Table 3.

In our experience, identifying the right combination of sequences significantly increases the accuracy of the study. We used T2 sagittal, T2, T1 and STIR axial oblique, T2 and STIR coronal oblique, post contrast T1 FAT SAT sagittal, axial oblique and coronal oblique planes. We found T2 axial, T1 post contrast fat saturated axial and coronal sequences to be the most helpful sequences in characterizing the disease process.

T2 axial sequence was the most useful sequence in locating the fistulous tract. It also identified presence or absence of disruption of external anal sphincter which is pivotal in differentiating between an inter and trans sphincteric fistula. Gadolinium enhanced T1 fat saturated images are especially useful to differentiate a fluid filled tract from an area of inflammation and also for better characterization of abscesses. Coronal sequences are useful in detecting supralelevator extent of disease as levator plate is best seen on coronal sequences. Although few studies have described STIR as a very useful and accurate sequence to delineate fistulous tract¹⁷, in our experience, STIR sequences, although highly sensitive, should be interpreted with caution as they sometimes tend to exaggerate the findings and are best interpreted in combination with T2 and Gadolinium enhanced T1WI sequences.

When performing MRI, care should be taken to image the entire perineum because fistulous tracts, in particular, suprasphincteric and extrasphincteric tracts, may extend for several centimetres. MRI is particularly useful in showing the relationship of fistulous track to

the levator ani muscle and ischioanal/ischiorectal fossa. In our study one extrasphincteric sinus tract was seen that was extending to base of penis (case number 6) and because of wide field selected, it was imaged in its entire extent.

In case number 2, inter-sphincteric fistula found on surgery was missed on MRI. It may have been because of presence of abscess in perianal region with surrounding inflammatory changes, however, it is known that chronic fistulas are difficult to see on MR because of low contrast uptake due to presence of fibrous tissue. Another improvement in MR imaging evaluation of perianal fistulas is dynamic MRI which evaluates the fistulous tract in arterial, venous and delayed phases and is reported to be superior to single phase post contrast sequence.^{15,18} Recently, we have added dynamic MR sequence in our protocol and it will take another year or two to assess whether it has any additional benefit over single phase post contrast MR for perianal fistula.

Another innovation mentioned in the literature is MRI done with an endo-anal coil. It has been shown to be better in assessing sphincter damage and atrophy but suffers from field of view and cost limitations. Also it is more painful especially in patients with acute fistulas and tolerability by the patient remains a major issue.¹⁹

Small sample size is a limitation of our study, therefore, results cannot be generalized. Nevertheless, as a preliminary study, our results strongly indicate that pre operative MRI provides an accurate road map for the surgeons and helps them to plan their surgery beforehand.

CONCLUSION

MRI accurately provides the necessary anatomic and pathologic data required to guide pre operative management and surgical planning for perianal fistulas.

REFERENCES

1. Criado JM, del Salto LG, Rivas PF, del Hoyo LF, Velasco LG, Vacas MI, et al. MR imaging evaluation of perianal fistulas: spectrum of imaging features. *Radiographics* 2012;32:175-94.
2. Waheed S, Mazhar R. Magnetic resonance imaging: a road map for perianal fistulae in comparison with contrast fistulography. *Ann King Edward Med Uni* 2004;10:225-8.
3. Tio TL, Muder CJ, Wijers OB, Sars PR, Tytgat GN. Endosonography of peri-anal and pericorectal fistula and/or abscess in Crohn's disease. *Gastrointest Endosc* 1990;36:331-6.
4. Schratte-Sehn AU, Lochs H, Vogelsang H, Schurawitzki H, Herold C, Schratte M. Endoscopic ultrasonography versus computed tomography in the differential diagnosis of perianorectal complications in Crohn's disease. *Endoscopy* 1993;25:582-6.
5. Lunniss PJ, Barker PG, Sultan AH, Armstrong P, Reznick RH, Bartram CI, et al. Magnetic resonance imaging of fistula-in-ano. *Dis Colon Rectum* 1994;37:708-18.
6. Laniado M, Makowiec F, Dammann F, Jehle EC, Claussen D, Starlinger M. Perianal complications of Crohn's disease: MR Imaging findings. *Eur Radiol* 1997;7:1035-42.
7. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. *Br J Surg* 1976;63:1-2.
8. Chapple KS, Spencer JA, Windsor AC, Wilson D, Ward J, Ambrose NS. Prognostic value of magnetic resonance imaging in the management of fistula-in-ano. *Dis Colon Rectum* 2000;43:511-6.
9. Schaefer O, Lohrmann C, Langer M. Assessment of anal fistulas with high-resolution subtraction MR-fistulography: comparison with surgical findings. *J Magn Reson Imaging* 2004;19:91-8.
10. Perini L, Marcon M, Bidoli L, Fabris G, Ferraro B, Cavallo A, et al. Magnetic resonance imaging in the assessment of perianal fistula. *Radiol Med (Torino)* 1995;89:637-42.
11. Spencer JA, Chapple K, Wilson D, Ward J, Windsor AC, Ambrose NS. Outcome after surgery for perianal fistula: predictive value of MR imaging. *AJR Am J Roentgenol* 1998;171:403-6.
12. Halligan S, Stoker J. Imaging of fistula in ano. *Radiology* 2006;239:18-33.
13. Berman L, Israel GM, McCarthy SM, Weinreb JC, Longo WE. Utility of magnetic resonance imaging in anorectal disease. *World J Gastroenterol* 2007;13:3153-8.
14. Buchanan GN, Halligan S, Williams AB, Cohen CR, Tarroni D, Phillips RK, et al. Magnetic resonance imaging for primary fistula-in-ano. *Br J Surg* 2003;90:877-81.
15. Beekingham IJ, Spencer JA, Ward J, Dyke GW, Adams C, Ambrose NS. Prospective evaluation of dynamic contrast enhanced magnetic resonance imaging in the evaluation of fistula in ano. *Br J Surg* 1996;83:1396-8.
16. Regina GH, Geerard LB, Arthur G, van der Hoop, Alfons GH, Roy FA, et al. Preoperative MRI of anal fistulas: does it really help the surgeon? *Radiology* 2001;218:5-84.
17. Halligan S, Healy JC, Bartram CI. Magnetic resonance imaging of fistula-in-ano: STIR or SPIR? *Br J Radiol* 1998;71:141-5.
18. Spencer JA, Ward J, Beekingham IJ, Adams C, Ambrose NS. Dynamic contrast-enhanced MR imaging of perianal

fistulas. *AJR Am J Roentgenol* 1996;167:735-41.

19. deSouza NM, Hall AS, Puni R, Gilderdale DJ, Young IR, Kmiot WA. High resolution MRI of the anal sphincter using a dedicated endoanal coil: comparison of MRI with surgical findings. *Dis Colon Rectum* 1996;39:926-3.

CONTRIBUTORS

IR planned the study, did data analysis and wrote the manuscript. SA, AR, UL, HS and MYC helped in data collection, study design and manuscript writing. All authors contributed significantly to the final manuscript.