

MRI IN THE EVALUATION OF PERIANAL FISTULAS

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HOW TO CITE THIS ARTICLE:

Gururaj Sharma, Manjit Mohan. "MRI in the Evaluation of Perianal Fistulas". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 19, May 11, 2015; Page: 2863-2871.

ABSTRACT: Perianal fistulae though uncommon, can be quite distressing to the patient. Correct surgical management requires accurate pre-operative assessment and grading of this condition. MRI is now considered the modality of choice in the pre-operative assessment of perianal fistulae. We did a retrospective analysis of patients who underwent MR imaging for perianal fistulae in our institution, and compared it with the surgical findings. The purpose of the study was to evaluate the accuracy of MRI in the pre-operative grading of perianal fistulae. A total of 32 patients were included in this study. Of these, 12(37%) had type 1 intersphincteric, 8(25%) had type 2 intersphincteric, 6(18%) had type 3 transsphincteric, 4(12%) had type 4 transsphincteric, and 2(6%) showed supra-levator extension. MRI was able to correctly grade the fistulous tract in 30 of these 32 patients, giving an accuracy of 94%. MRI was found to be extremely useful in the pre-operative assessment of perianal fistulae. It helps in correctly classifying the fistulae and to detect hidden or deep seated tracts or abscesses which would have been otherwise missed. Thus, it is useful in selecting the most appropriate surgical procedure, thereby reducing the chances of recurrence and to avoid complications such as fecal incontinence from occurring.

KEYWORDS: Perianal fistula, MRI, Intersphincteric, Transsphincteric, Supralevator.

INTRODUCTION: Perianal fistula is an uncommon but important condition which can have substantial morbidity. It has a reported incidence of 0.01% and commonly afflicts young adults with a twofold to fourfold male preponderance.⁽¹⁾

Treatment of this condition includes surgical exploration and removal of the fistulous tract.⁽²⁾ However, in 25 to 30% of cases, the condition has a tendency to recur.^(2, 3) This is most often because surgical exploration can easily miss secondary tracts and abscesses, resulting in recurrent infection requiring re-exploration.

Surgeons have traditionally used digital rectal examination and examination under anesthesia to detect the fistulous tract and their internal opening. However, this method fails to identify complex fistulas and their branches, leading to wrong classification and incomplete treatment.^(3, 4)

Until recently, imaging had very little role to play in the preoperative evaluation of perianal fistulas. Contrast fistulography, endoanal sonography and CT scan have all been tried, but with disappointing results.^(3,5) The advent of MRI with its excellent soft tissue contrast and multiplanar capabilities makes it an ideal choice in the pre-operative assessment of perianal fistulas. It is non-invasive and well tolerated by patients and can be quickly and easily performed. It is able to delineate the sphincter anatomy sufficiently and to detect the fistulous tracts and its ramifications as well as any abscesses.^(5, 6)

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The aim of this study was to evaluate the accuracy of preoperative MR imaging for the detection and classification of perianal fistulas and to determine the additional clinical benefit of MR imaging to the operating surgeon.

MATERIALS AND METHODS: We retrospectively studied 32 patients referred for MR imaging with clinical suspicion of perianal sepsis between March 2012 and December 2014 and who were detected to have perianal fistula on MRI.

MR Imaging was done with a 1.5T Magnetom Avanto MRI unit (Siemens Medical Systems, Erlangen, Germany) using a phased array 18 channel body coil. There was no special patient preparation. The MRI protocol for visualization of the perianal fistulas included a spin echo T1 weighted sequence, spin echo T2 weighted fat saturated sequence and a Short TI Inversion Recovery (STIR) sequence. Images were obtained in the axial, coronal and sagittal planes. Where there was suspicion of abscess formation, fat suppressed T1 weighted pre and post-contrast images (Gd DTPA, magnevist in a dosage of 1.5mmol / kg body wt.) were also obtained.

All cases were analyzed for presence and location of internal opening, location of primary tract (intersphincteric or transsphincteric), presence or absence of side branches or abscesses, and supra-levator extensions if any.

MRI ANATOMY OF PELVIC FLOOR (Figure 1):

Awareness of the normal anatomy of the pelvic floor and anal canal is the key to proper MRI interpretation and classification of perianal fistulas.^(4, 7)

The external anal sphincter (a striated muscle) is clearly visualized on MRI. It is hypointense on T1W, T2W, and fat-suppressed T2W images, and is bordered laterally by the fat in the ischioanal fossa (Figure 1 a, b). The internal sphincter (a smooth muscle) is hypointense on T1W and T2W TSE images and is relatively hyperintense on fat-suppressed T2W images. It shows enhancement on post-gadolinium T1W images. The coronal images depict the levator ani muscle (Figure 1a), the identification of which is important to distinguish supralelevator from infralevator infections.

CLASSIFICATION OF PERIANAL FISTULAS: Classification of perianal fistulas is based on the St. James University Hospital grading, which is an MR based classification system⁽⁸⁾ (Table I).

Grade	Description	Example
0	Normal appearance	Fig. 1
1	Simple, linear intersphincteric fistula	Fig. 2
2	Intersphincteric fistula with intersphincteric abscess or secondary fistulous tract	Fig. 3
3	Trans-sphincteric fistula	Fig. 4
4	Trans-sphincteric fistula with abscess or secondary tract within ischioanal / ischiorectal fossa	Fig. 5
5	Supralelevator and translevator disease	Fig. 6

Table 1: St James's University Hospital MR Imaging Classification of Perianal Fistulas

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RESULTS: There were 24(75%) male and 8(25%) female patients in our study with an age range of 18 to 64 years. Two patients had undergone previous drainage of perianal abscesses, while 4 of the patients had previous surgery for perianal fistula. We did not encounter any patient with Crohns disease in our study.

Out of a total of 32 fistulae, 12(37%) were type I intersphincteric, 8(25%) were type II intersphincteric, four (12%) were type III transsphincteric, 6(18%) were type IV transphincteric, and 2(6%) showed supra-levator extension (type V) (Table 2).

Type of fistula	MRI	Surgery
Type 1	12	12
Type 2	8	8
Type 3	4	6
Type 4	6	4
Type 5	2	2

Table 2: Showing MRI grading of fistulas with surgical correlation

There was overall good correlation between the MRI and surgical findings in 30 of the 32 patients, giving accuracy rate of 94%. In two of the cases of Type 4 branching fistulae, the secondary track detected on MRI turned out to be old healed fibrous tracts on surgery with no active inflammation, representing false positive finding on MRI. The primary tracts were however correctly identified on MRI. Both the patients had presented with recurrent fistulae

DISCUSSION: The advent of MRI with its exquisite soft tissue contrast and multiplanar capabilities makes it an ideal choice in the pre-operative assessment of perianal fistulas.^(5,9) It is useful in identifying the infected tract and undetected abscesses. A detailed assessment of the anatomic relationship between the fistula and the anal sphincter complex allows surgeons to choose the best surgical procedure.

Lunniss et al⁽¹⁰⁾ were the first to utilize MRI in the preoperative assessment of perianal fistulas and reported a concordance rate of 86-88% between MRI and surgical findings. Subsequent studies using high field 1.5T MR systems have suggested that MRI is more sensitive than even surgical exploration of the tract with reported accuracies of up to 97%.^(4,11,12) Currently, MR imaging is considered the most accurate preoperative technique for classification of fistula-in-ano and for evaluating the primary track and any extensions.^(3, 11)

MR imaging of perianal fistulae relies on the inherent high soft tissue contrast resolution and the multiplanar display of anatomy by this modality.^(4,13) We found that T2W images with fat suppression is most useful for identifying the fistulous tract due to the excellent contrast between the hyperintense fluid within the tract and the hypointense fibrous wall. Gadolinium enhanced T1W images are useful to detect areas of active inflammation and abscesses since the tract wall enhances whereas the central fluid component does not. STIR (Short TI inversion recovery) and DWI (Diffusion Weighted Imaging) are additional sequences that complement T2W sequence and are especially useful where the use of contrast is considered risky or contraindicated.^(5,14)

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The exact location of the primary tract (ischioanal or intersphincteric) is most easily visualized on axial images; the presence of disruption of the external anal sphincter differentiates a transsphincteric fistula from an intersphincteric one. The internal opening of the fistula is also best seen in this plane. Coronal images depict the levator plane, thereby allowing differentiation of supralelevator from infralelevator infection.

Thus, from our study we found that in all positive cases of perianal fistula, use of combination of MR sequences and imaging planes provided most of the details necessary for an accurate evaluation of perianal fistulas.

We were able to correctly grade the perianal fistulas in 30 of our 32 cases. We routinely use the St. James University Hospital classification to grade the fistulas. This MR based classification system uses simple anatomic landmarks easily identifiable on axial and coronal MR images.⁽⁸⁾ Classification, or grading is important because treatment options differ for the different types of perianal fistulas.^(5, 8) Simple submucosal, intersphincteric or low fistulas can be treated with fistulotomy and removal of the fistulous tract without compromising the continence. More complex fistulas may require complex surgical procedures with likely disruption of continence or may require colostomy to allow healing.^(5, 12)

MRI can sometimes give fallaciously high signal intensity in healed fibrous tracts, especially with STIR sequence.^(11, 12) This can be misdiagnosed as an actively inflamed fistula as in 2 our cases. Careful attention to other pulse sequences, especially T2W sequence and dynamic contrast enhanced MR sequence might help in avoiding this pitfall.⁽¹¹⁾

Patients definitely benefit from preoperative MRI evaluation which provides a detailed roadmap of the fistulae and its branches.⁽¹⁵⁾ MRI is especially useful in patients with fistulae associated with Crohn's disease and those with recurrent fistulae,⁽¹⁶⁾ as these entities are associated with branching fistulous tracts. Missed extensions are the commonest cause of recurrence.

Over the past few years, MRI has emerged as the best modality in the detection and precise classification of perianal fistulas. Its ability to detect hidden disease has helped the surgeon immensely in the proper planning of therapy and thus directly affecting favorable patient outcome.

CONCLUSION: Our study supports that MR imaging provides precise definition of the fistulous track, along with its relationship to pelvic structures, and allows identification of secondary fistulas or abscesses. MR imaging provides accurate information for appropriate surgical treatment, and thereby reducing the incidence of recurrence and also avoid side effects such as fecal incontinence from occurring.

We found that MRI is well tolerated, non-invasive, pain less and requires relatively little time to perform, which has made it the modality of choice in evaluating perianal fistulas. Radiologists should be familiar with the anatomic and pathologic findings of perianal fistulas and its classification.

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Figure 1: T2Wtd axial (A) and coronal (B) images showing internal (1) and external (2) sphincters, ischioanal and ischiorectal fossae (3), and levator ani (4).

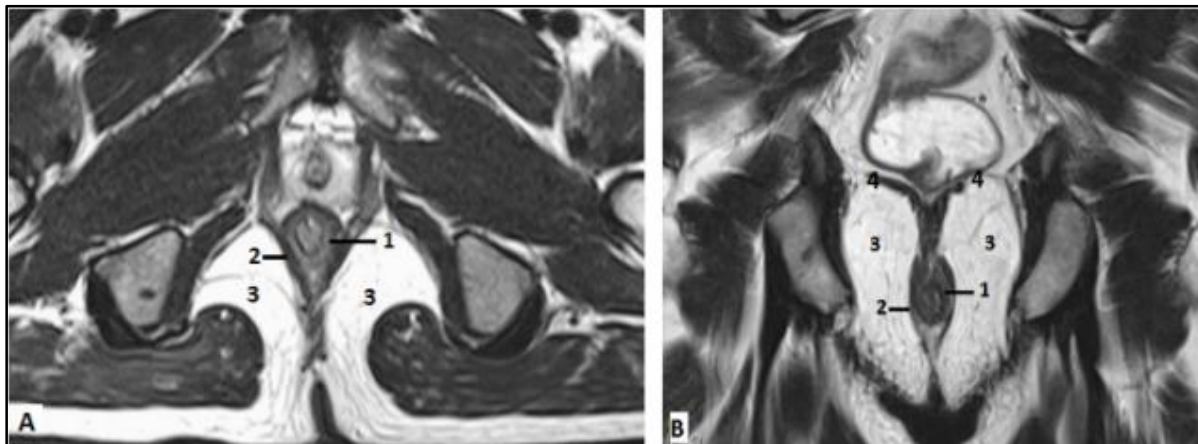


Figure 1

Figure 2: Simple intersphincteric fistula (Type I). Coronal (A) and axial (B) STIR images showing simple, intersphincteric fistula-in-ano (arrows).

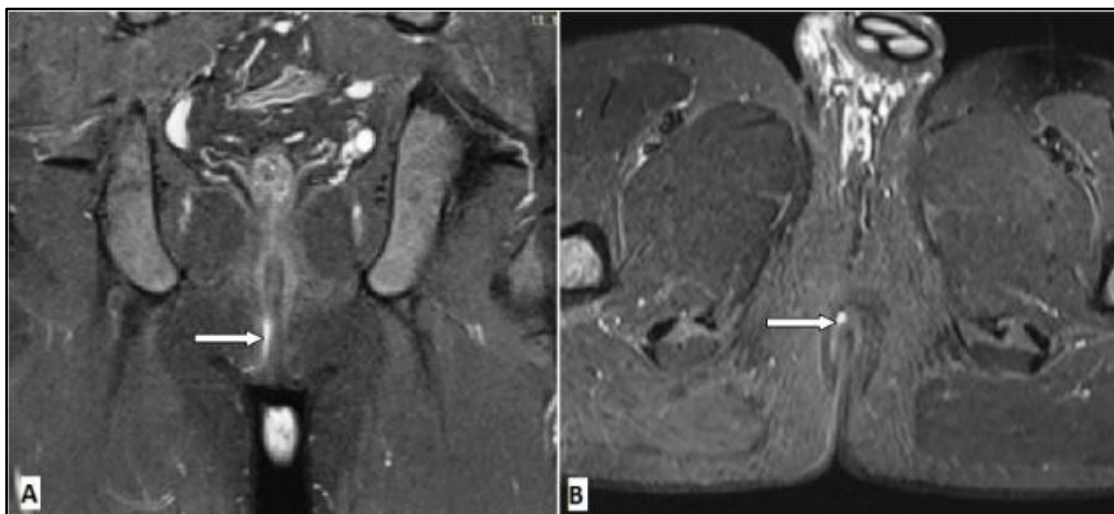


Figure 2

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Figure 3: Intersphincteric fistula-in-ano with abscess (Type II). Axial (A) and coronal (B) STIR images showing intersphincteric tract (long white arrow, A) with an intersphincteric abscess (short arrows, A & B).

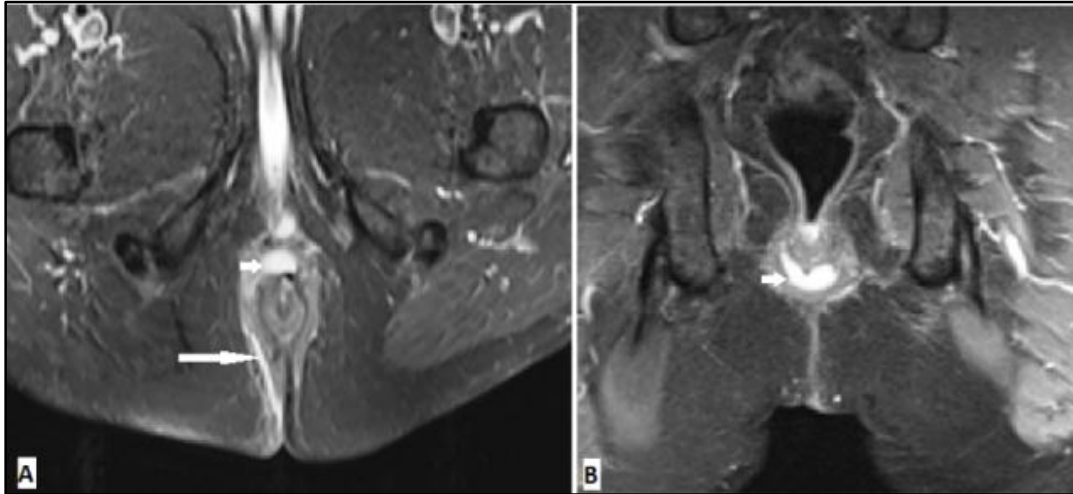


Figure 3

Figure 4: Transsphincteric fistula-in-ano (Type III). Coronal (A) and axial (B) STIR images showing a fistulous tract (white arrows) which has crossed the external sphincter and lying in the left ischioanal fossa.

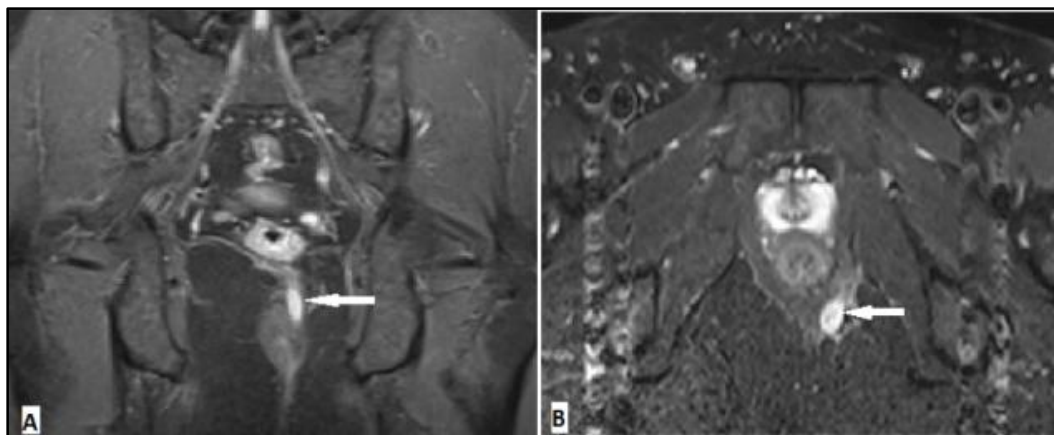


Figure 4

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Figure 5: Type IV transsphincteric fistula-in-ano. Coronal (A) and axial (B) images showing multiple branching fistulous tracts in the ischioanal fossa (white arrows, A & B).

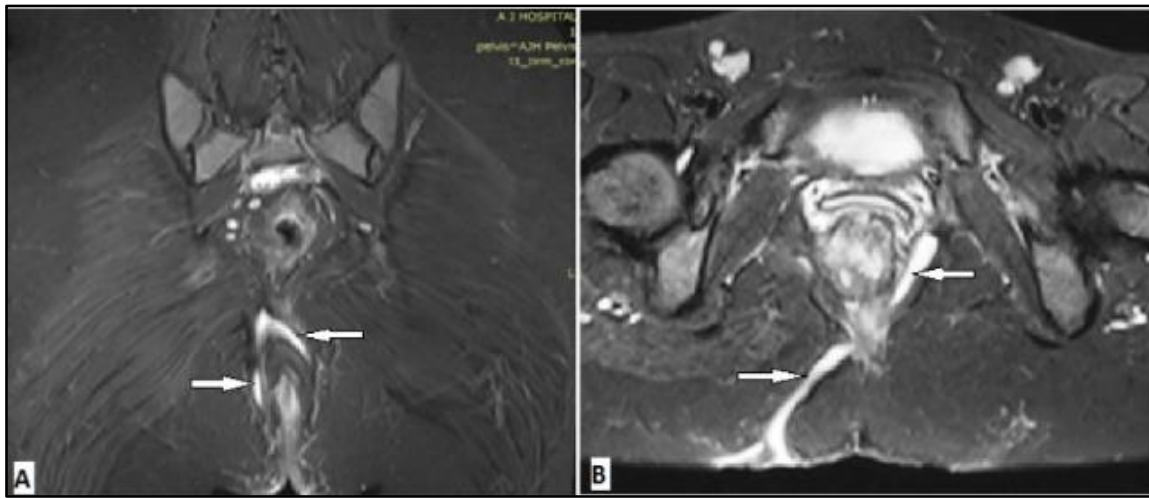


Figure 5

FIGURE 6: Type V fistula-in-ano with supralelevator extension. Coronal (A) and axial (B) images showing fistulous tract (long white arrows) which is extending above the levator sling (short arrows, A).

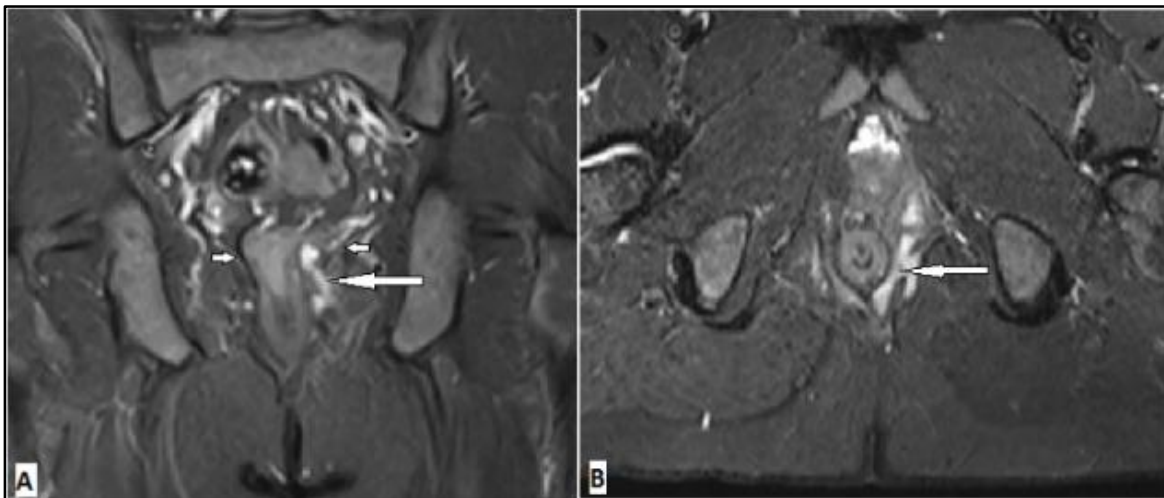


Figure 6

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Date of Submission: 01/05/2015.
Date of Peer Review: 02/05/2015.
Date of Acceptance: 05/05/2015.
Date of Publishing: 08/05/2015.