Research Article

Magnetic resonance imaging of perianal fistula

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Abstract

Introduction: Perianal fistula is a cause of morbidity that is prolonged and recurrent if surgical excision is incomplete. Good preoperative assessment of the fistula is the only solution to ensure best post operative outcome. MRI is the gold standard imaging of choice for perianal fistula and therefore this study aims to prove the usefulness of different MR sequences in delineating the primary tract and complications of a perianal fistula and classifying the same. **Materials and Methods:** Retrospective analysis of MRI of 20 patients with perianal fistula who underwent surgery as the primary treatment modality were included.MRI was analyzed with the reader blinded to the surgical findings which was considered as the gold standard. **Results and Conclusion:** Our study showed that the MRI classification showed excellent agreement with the surgical finding. Post contrast T1W sequence is the most useful and accurate sequence to delineate the internal opening, its distance from the anal verge as well as secondary tracts. Horse shoe component is best seen on T1W post contrast as well as Precontrast T1W images. Abscess is well seen on all sequences.
Keywords: perianal fistula.

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INTRODUCTION

From Hippocrates time The perianal fistula was a cause of distress and significant morbidity.[1] Anatomical location makes infection and recurrence problematic and therefore necessitates complete surgical excision of the fistula tract for better surgical outcome AND prognosis[2] Progressive advancement in the description and detailed preoperative evaluation of the perianal fistula has been documented since the 19th century. Computed tomography does not provide good soft tissue contrast however recent studies state that thin section fistulography with Intravenous contrast has improved tract viualization[3] Transperenial ultrasound with Doppler[4] as well as endoanal ultrasound has shown excellent delineation of the internal opening and fistula tract. Although Ultrasound has achieved sensitivity and specificity close to that of MRI, painindex is high and Field of view is limited, thus MRI sometimes becomes mandatory to complete the preoperative study and rule out pelvic disease.[5] Hence today MRI with it s multiplanar reformation capability remains the gold standard Imaging technique of choice for perianal fistula with 81 – 86 % concordance with surgical findings.[6,7] According to Buchanan *et al*.[8] recurrence reduced by 75 % when guided by preoperative MRI. It has has proved to be superior or equal to examination under anaesthesia[8] MR imaging examinations using body coils are well tolerated and do not require patient preparation. Endoanal coils had great promise in improving tract visualization with greater spatial resolution,[9] however poorly tolerated by symptomatic patients, and inadequate supralevator pelvic coverage results in body surface coils being the method of choice[10]. The objective of this study is to describe MRI findings in perianal fistula, classify them according to St. James University Hospital Classification and to evaluate the usefulness of different MR sequences in doing the same.

MATERIALS AND METHODS

A retrospective study of 20patients operated for perianal fistula with MR examinations performed in our Institute under department protocol between January 14 and June 2015 are included in this study. With the reader blinded to the surgical findings, T1W, T2W, Fat suppressed sequences and post contrast sequences were reviewed for visibility of surgically important parameters. These

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included, primary and secondary tracts, internal opening and its distance from the anal verge and Presence of horse shoe component or abcess complicating the fistula. Using these parameters the fistula was graded according to the St. James University classification. Accuracy of different sequences of MR in description of the fistula was evaluated against surgical findings which was considered to be the gold standard. Patients who underwent conservative management or whose MRI studies were done more than 3 weeks prior to surgery were excluded from the study. Patients with previous surgery or intervention in the perianal region were excluded from this study.

MRI

Examinations were performed on a 1.5 T PHILIPS ACHIEVA SUPERCON MRI scanner. Using a phased array coil, images were acquired with the patient in supine position. HASTE axial and sagittal localizers were performed. FOV included the distal rectum and subcutaneous tissue including the supralevator space. Thin slices coronal and axial images were obtained.

The sequence of the parameters was as follows:

1. T1-weighted (T1W) axial and coronal spin echo (TR/TE, 680–700/14 ms; field of view [FOV], 20–23 cm; matrix size, 512×245; acquisition, 1; slice thickness, 4 mm; gap, 0.4 mm)
2. T2-weighted (T2W) turbo spin echo axial and coronal (TR/TE, 4000/130 ms; FOV, 23 cm; matrix size, 512×512; slice thick- ness, 4 mm; gap, 0.4 mm)
3. Short tau inversion recovery (STIR) axial and coronal (TR/TE, 4000/30 ms; TI, 150; FOV, 16 cm; matrix size, 256×512; slice thickness, 5 mm; gap, 0.6 mm); and
4. T1W gradient echo (fast low-angle shot, FLASH) native and contrast- enhanced axial and coronal images with fat suppression (TR/TE, 160/4 ms; FOV, 23 cm; flip angle 80°; matrix, 256×512; slice thickness, 5 mm; gap, 0.5 mm); the standard dose of 0.1 mmol/kg of gadopentetatedimeglumine was injected.

Analysis of the MR Examinations included classifying the type of fistula according to St. James University Hospital Classification into one of five grades, identifying the location of the internal opening and detection of secondary tracts, abscess or supralevator extensions. The internal opening was decided on by direct visualization of the primary tract entering the anal mucosa or the radial site showing maximal inflammation in the intersphinctericplane which was described on a clock face.

Statistical Analysis

Statistical Package for Social Sciences, version 17.0 was used for all statistical analyses. Measures of central tendency for demographic data and Interclass correlation coefficient and kappa statistics was applied. Statistical significance was inferred if a P value of less than 0.05 was obtained.

RESULTS

Of the 20 patients studies, 80% were male (n=16) and 4 were female (n=4). The mean age of presentation was 45 years +/-11.4 years, ranging from 27 to 64 years of age. When different sequences were evaluated independently to determine the class of fistula, Postcontrast fat saturated T1W sequence proved to have excellent agreement(r=0.914) with the surgical class which was considered as gold standard. All sequences however showed a statistically significant agreement ($p<0.0001$) For identification of the internal opening, Precontrast T1W sequence as well as STIR did not show a significant agreement, however Interclass correlation coefficient was highest for the post contrast T1 W fat saturated sequence (r=0.994) indicative of excellent agreement. In our study, 30% (n=6) of cases had a secondary tract and 20% (n=4) had a horseshoe component which was detected during surgery. Only the post contrast T1W sequence with fat saturation showed good agreement with surgical secondary tract (kappa value = 0.625). This sequence along with Pre contrast T1W sequence showed good agreement with the presence of horse shoe component. (kappa agreement = 0.688, and 0.615 respectively) All sequences performed correlated significantly with presence of abscess complicating the fistula ($p<0.0001$: kappa agreement = 0.828)) With respect to the distance of internal opening from the anal verge, when the former is identified on MRI, Post contrast T1W image with fat saturation is the most reliable sequence.(kappa of 0.954 with fat suppression). Precontrast T1 W images are unable to identify internal opening in 10 percent of patients thus distance from anal verge could not be determined in these cases.

Table 1: St. James University Classification of Perianal Fistula: MRI Grading

Grade	Name	
1	Simple Linear Intersphincteric Fistula	Track from skin to anal canal in the intersphincteric plane with no ramifications
2	Intersphincteric Fistula with Abscess or Secondary Track	Ramifications,horseshoe component or abscess all in the Intersphincteric plane

3	Trans-sphincteric Fistula	Track must pierce both internal and external sphincters
4	Trans-sphincteric Fistula with Abscess or Secondary Track within the Ischiorectal Fossa	Ramifications and abscess in addition to grade 3 findings
5	Supralevator and Translevator Disease	Extrasphinteric fistulae may reflect pelvic disease which needs to be evaluated and treated.

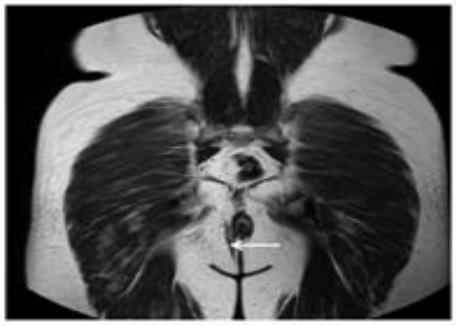

Figure 1(a): T2 W coronal section

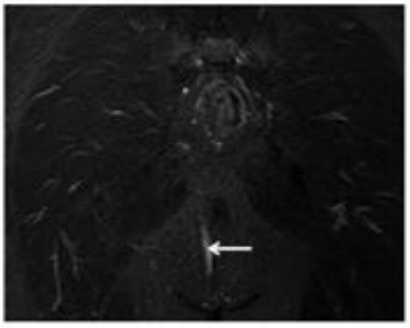

Figure 1 (b): STIR axial section

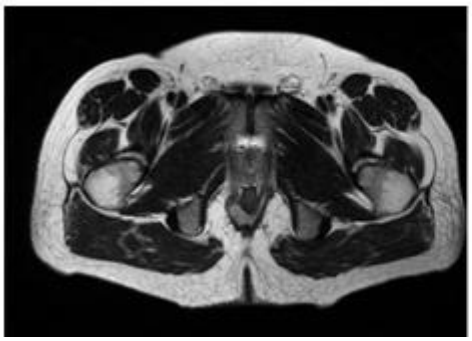

Figure 1 (c): T2 W axial section

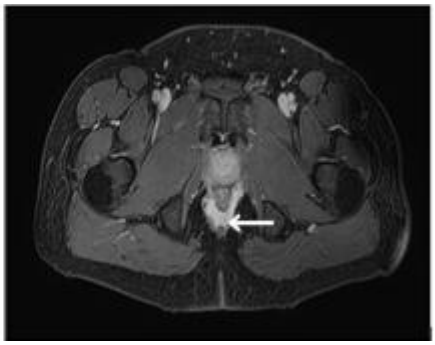

Figure 1 (d): Post contrast THRIVE, axial section

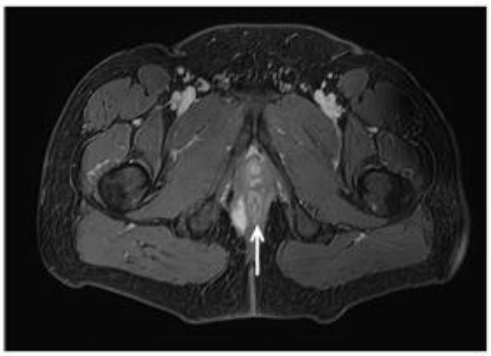

Figure 1 (e): Post contrast T1 W axial section with fat suppression

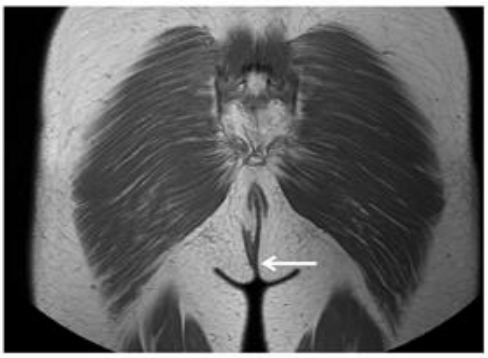

Figure 1 (f): T1W Coronal section

45 years old male patient with (a) and (b) showing a T2 and STIR hyperintensetransphincericfistula tract. (c) and (d) show a T2 W hyperintense, enhancing horse shoe component of the fistula in the intersphincteric plane. (e) Post contrast axial section shows the position of the internal opening at 6 o clock position. (f) T1W Coronal section shows the external opening of the fistula of the right side of the gluteal cleft.

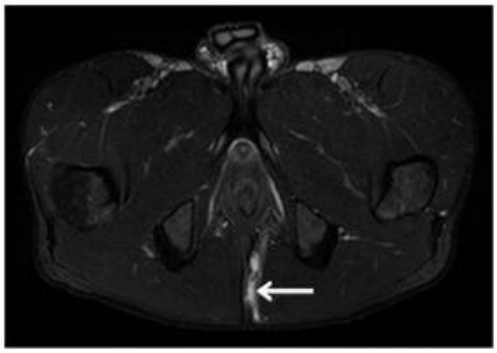

Figure 2 (a): T2 W axial section with fat suppression

Figure 2(b): Post contrast T1W axial section with fat suppression

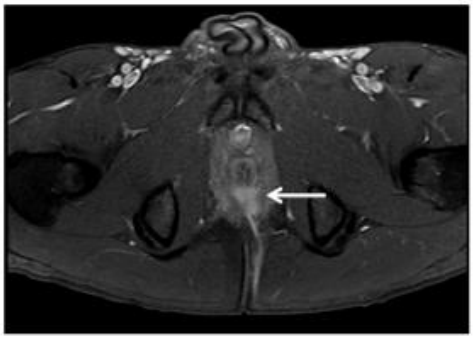

Figure (c): Post contrast T1W axial section with fat suppression

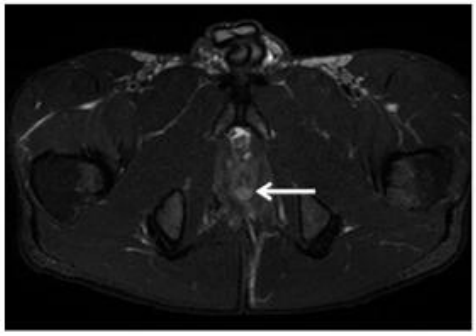

Figure 2 (d): T2W fat suppressed axial section

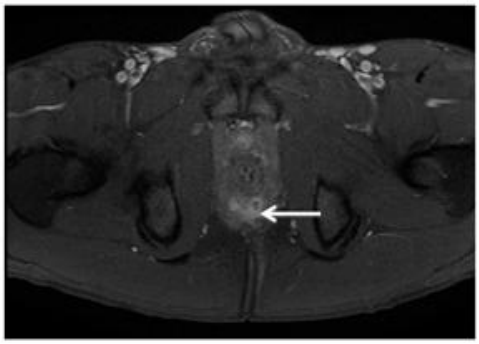

Figure 2 (e): Post contrast T1W fat suppressed axial section

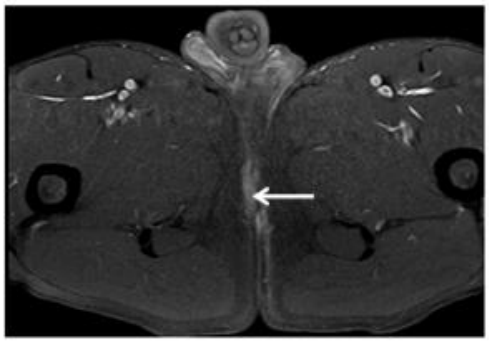

Figure 2 (f): Post contrast T1W fat suppressed axial section

Figure 2: 31 year old male patient, (a) and (b) showing T2 opening of the fistula. Post contrast T1W fat suppressed axial hyperintensetransphincteric fistula tract with enhancing walls. section (e) shows a peripherally enhancing abscess in the Post contrast and T2 Fat suppressed sequences showing intersphincteric plane and (e) showing an enhancing hyperintensity at the 6 o clock position suggesting the internal secondary tract which ended blindly.

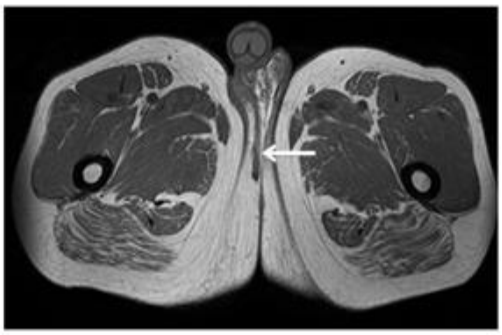

Figure 3 (a): T1 W axial section without fat suppression

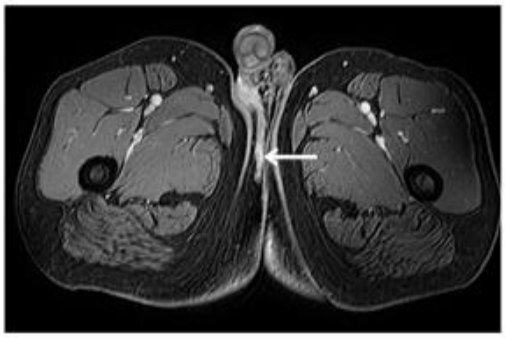

Figure 3 (b): Post contrast T1W axial section with fat suppression

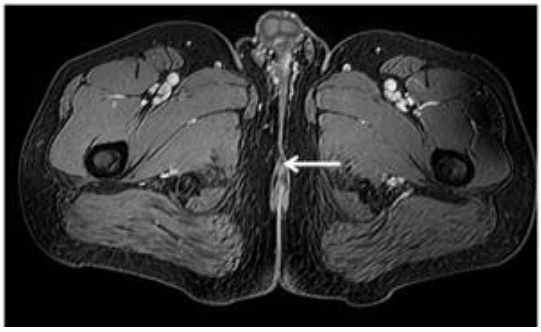

Figure 3 (c): Post contrast T1W axial section with fat suppression

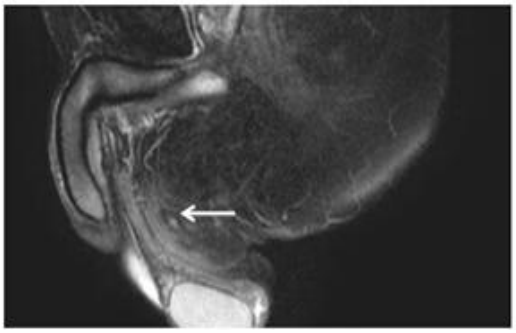

Figure 3 (d): T2W sagittal section with fat suppression

Figure 3 : 52 year old male patient (a) and (b) showing a T1 hypointense T2 hyperintense fistula tract in the perineum which enhances post contrast The internal opening is seen at 12 o clock position.. (c) The tract coursed anteriorly and inferiorly opening at the root of the scrotum as seen in (d).

DISCUSSION

The reported incidence of Perianal Fistula is only approximately 0.1% of individuals.[11] however the significant morbidity it causes has drawn a lot of attention to its detailed preoperative imaging. The crypto glandular hypothesis states that idiopathic fistulae are due to intramuscular anal gland sepsis. Other common etiologies include Crohn disease and tuberculosis in our country. Perianal trauma during childbirth, malignancy, post radiation therapy as well as infection are other known causes of fistula formation[2] Fistulotomy / fistulectomy or seton placement are some surgical treatment options for fistula in ano[11]. Of prime importance is eradication of the infection and preservation of anal continence[14]. Thus the MR study needs to clearly delineate the sphincteric anatomy and the tract relationship to the sphincter complex. Goodsall s rule predicted the internal opening of the fistula in the Anal canal with respect to the external cutaneous opening. Parks later classified the fistula in relation with the anal sphincters which is still widely used by surgeons today.[12] The St. James's University Hospital classification for MRI[1] (table 1) is the current MRI-based grading of perianal fistulas. This update was required to include all surgically relevant information that MR imaging can provide including the primary tract secondary tracts and associated abscesses. MRI using various sequences can clearly visualize the sphincter and fistulous tract anatomy.[15] Evaluation of individual sequences in MR imaging for detailed description of the perianal fistula is considered with experience from our institute. It is known that T1 W images delineate the anatomy well while T2W images can differentiate fibrous versus pus filled tracts.[15] STIR images provide information on inflammatory change. Post Contrast fat sat T1W images also delineate tract anatomy well and previous studies like Spencer *et al*[16] concluded that Post contrast T1W fat suppressed images with T2W images was adequate.[16] Our study showed that the MRI classification showed excellent agreement with the surgical finding. Post contrast T1W sequence is the most useful and accurate sequence to delineate the internal opening, its distance from the anal verge as well as secondary tracts. Horse shoe component is best seen on T1W post contrast as well as Precontrast T1W images. Abscess is well seen on all sequences. MR fistulography has been described suggesting injection of positive or negative contrast into the tract to improve its delineation[17], and MRI with rectal contrast has also been

documented[18]. However in countries like ours, cost and time required for these techniques is inadequate and thus this study shows that Post contrast T1W fat saturated image with a precontrast T1 and T2 based sequence would be a satisfactory protocol to provide adequate information of the perianal fistula required for good surgical planning. Limitations to this study include the small sample size, and long term follow up of patients was not performed.

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