

## 3T MR imaging evaluation of perianal fistulas: an initial experience in Nepal

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### Abstract

**Introduction:** Fistula-in-ano is an abnormal perianal tract that connects anal canal to the perianal skin. Improper visualization of primary fistulous tract and the associated abscesses or secondary tracts are the causes of recurrence. Earlier imaging modalities like conventional fistulography, endosonography and CT scan have had limited role. Even without endorectal coils, 3T MRI has multi-planar imaging capability and excellent soft tissue differentiation to show perianal anatomy, primary and secondary tracts with associated abscesses in relation to sphincter complex. It provides excellent road map to surgeons for preoperative evaluation. The objective of the study was to evaluate the role of 3T MR in imaging of perianal fistulas.

**Methods:** A retrospective study was done among 32 patients who were referred for MR fistulogram for suspected perianal fistula at Jeebanta Advanced Kathmandu Imaging, Durbar Marg, Kathmandu, Nepal. All images and findings were obtained and recorded with the help of Philips Ingenia 3T digital broadband MR scanner. Imaging was performed in oblique coronal and oblique axial plane. MR images were studied and grading system was applied according to the St James's University Hospital Classification. The data were entered in a performa and was analyzed using IBM SPSS V21.

**Results:** Male to female ratio was 7:1. According to St. James's University Hospital MR Imaging classification of perianal fistulas, most of the patients (25%) had Grade 4 followed by (12.5% each) Grade 0, Grade 1 and Grade 2 and (6.3% each) Grade 3 and Grade 5 fistulas. Mean age was 37.28 years (Std. deviation 11.9). Common internal opening in axial image was found at 5 o'clock positions (31.3%). Mean length of the fistulous tract was 3.9 cm (Std. deviation 2.3).

**Conclusion:** Perianal fistulas are more common in males and Grade 4 fistulas are the commonest. MRI is well-tolerated, painless and noninvasive technique and has multiplanar capabilities with excellent tissue differentiation of pelvic muscle along with sphincter complex.

**Keywords:** Abscess; fistula; MRI; secondary tract.

### Introduction

Fistula-in-ano is an abnormal perianal tract lined with epithelialized surface that connects anal canal to the perianal skin.<sup>1</sup> Fistula-in-ano is not a very common disease of the gastrointestinal tract. The prevalence rate is approximately 0.01% and more common in men than in women. Male female ratio is 2:1.<sup>2</sup>

On and off perianal discharge, itching, discomfort, fever and local pain are the common symptoms.<sup>3,4</sup> Even though being an uncommon disease, Fistula-in-ano was first described in Hippocrates. In 1835, Frederick Salmon treated 131 patients for fistula St Mark's hospital in London.<sup>5</sup> In 1900, David Henry Goodsall described the course of fistulous tract

and developed Goodsall's rule for fistulous tract. <sup>6</sup> "Parks' initial classification of perianal fistula was presented in 1976. It was based on surgical anatomy.<sup>7</sup> Morris modified the Parks classification system in 2000. This on the basis of radiologic anatomy on pelvic MRI, which is known as the St. James university Hospital Classification.<sup>5</sup>

Obstruction by trauma or fecal material to the outlet duct of the mucous anal gland leads to stasis, infection and first stage of perianal abscess. Pus then follows the least resistance path between the internal and external anal sphincter and through the external anal sphincter into the skin or ischioanal fossa or both. Multiple secondary tracts is also developed.<sup>8</sup>

Postoperative recurrence rate of perianal fistula is very high. This is not due to surgical hands. The main cause is due to poor or lack of demonstration of anatomical details, primary fistulous tract and it's multiple branches with abscess.<sup>5,9</sup> Three Tesla Magnetic Resonance imaging has excellent multiplanner imaging capability and provides excellent anatomical details (especially sphincter anatomy) in relation with primary, secondary tracts with abscess and can be performed without endorectal coils.<sup>10,11</sup>

The objective of the study was to evaluate 3T MR imaging of perianal fistula. High tesla MRI is very important in the evaluation of perianal fistulas including simple vs. complex fistulas along with secondary tracts and abscess in relation with anal sphincter complex. It will provide excellent road map for surgeon for preoperative evaluation for management.<sup>12</sup>

## Methods

A retrospective study was done among 32 patients who were referred for MR fistulogram for clinically suspected perianal fistula with perianal discharge at Jeebanta Advanced Kathmandu Imaging Pvt. Ltd., Durbar Marg, Kathmandu, Nepal from 11<sup>th</sup> January, 2015 to 9<sup>th</sup> March, 2016.

The MRI protocol for all of the sequences was standard. All images were obtained with a Philips Ingenia 3T digital broadband MR scanner. Patient was placed in supine position with head first body coil was placed over the pelvis region placing center at the level of symphysis pubis. T1 3D GRE sequences in 3 planes were taken as localizer. For all sequences, distal rectum and subcutaneous tissue was included in imaging volume. Imaging plane was also included suprlevator space to ensure no extension.

Imaging was performed in oblique coronal and oblique axial planes. The plane for oblique coronal plane was

parallel to anal canal and plane for oblique axial plane was perpendicular to oblique coronal.

### Following sequences were taken as standard sequences.

1. T1W oblique axial TR/TE 450/8ms, field of view (FOV) 18-20 cm, slice 3mm with 0.9 mm gap and matrix 348x298.
2. T2W oblique axial TR/TE 2400/90ms, field of view (FOV) 18-20 cm, slice 3mm with 0.9 mm gap and matrix 328x267
3. T2W SPAIR in oblique axial and oblique coronal TR/TE 3400/65ms, field of view (FOV) 18-20 cm slice 3mm with 0.9 mm gap and matrix 276x254
4. 3DT2W SPAIR in sagittal plane TR/TE /8ms 1500/145, field of view (FOV) 20 cm, continuous slice of 1mm with isometric voxel having matrix of 200x198. These 3D data were sent to Philips intellispace portal and further analyzed in different planes (MPR/ MIP) to see the extension of fistula to other area and to project the lesion better.

### Image Analysis

MR images were interpreted by a single radiologist with more than 13 years of experience in abdominal imaging with experience in perianal fistula imaging. MR imaging was described and grading was done according to the St James's University Hospital classification.

According to this grading system, normal findings is grade 0 (Figure 1), simple linear intersphincteric fistula is grade 1 (Figure 2), intersphincteric fistula with intersphincteric abscess or secondary tract is grade 2 (Figure 3), transphincteric fistula is grade 3 (Figure 4), transsphincteric fistula with abscess or secondary tract within the ischioanal or ischiorectal fossa is grade 4 (Figure 5) and tract extending to suprlevator region of translevator region is grade 5 (Figure 6).



Figure 1. Normal Findings

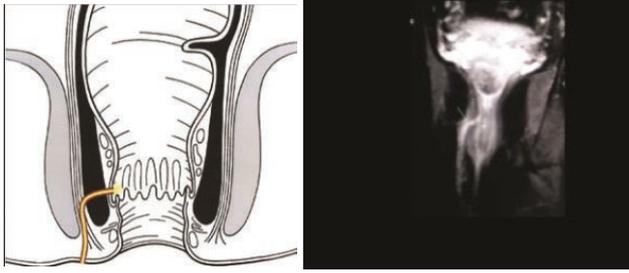


Figure 2. Grade 1

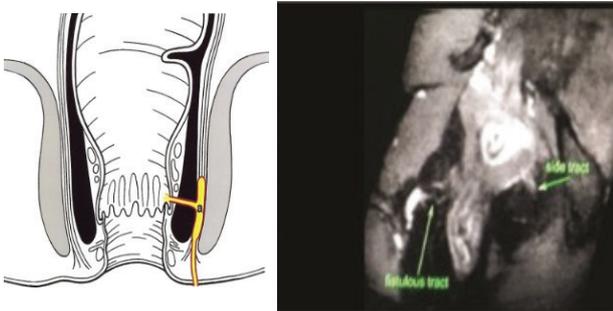


Figure 3. Grade 2

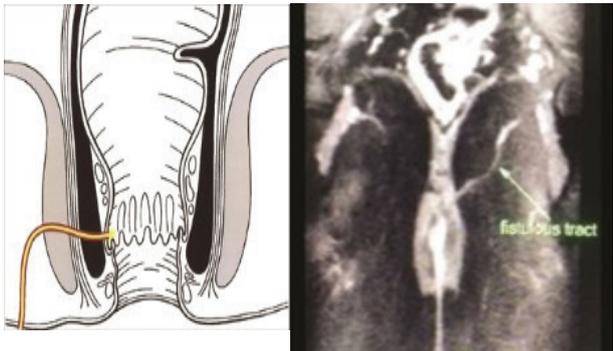


Figure 4. Grade 3

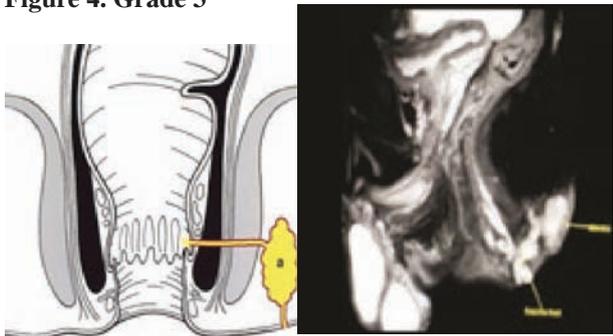


Figure 5. Grade 4

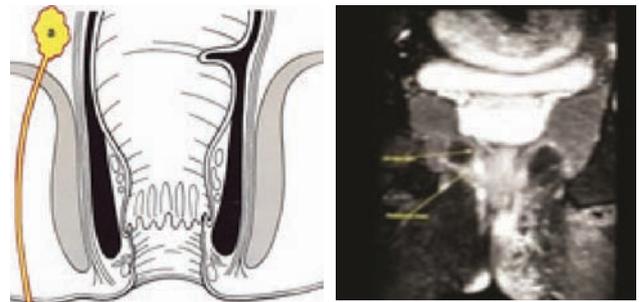


Figure 6. Grade 5

The fistulous internal opening was described as clockwise fashion. 12 o'clock position is anterior and 6 o'clock position is posterior. Length of the track was measured from internal opening to skin surface, and number of secondary tract and tract direction was also mentioned. Fistulous tract associated with presence or absence of abscess in the ischioanal, ischiorectal or supralelevator spaces were carefully evaluated.

The data was entered in a predesigned performa. Data analysis was done by commercially available software package (using IBM SPSS V21). Numeric variables were presented as mean and standard deviation and categorical variables were presented as number and percentage.

### Results

Out of 32 patients, 4 (12.5%) were normal while 28(87.5%) were abnormal MRI findings. Amongst the abnormal findings, 8 (25%) of the patients had intersphincteric fistulas followed by 10 (31.3%) transsphincteric fistulas, 6 (18.8%) sinus tract, 2 (6.3%) supralelevator/translevator and pilonidal sinus (Figure 7).

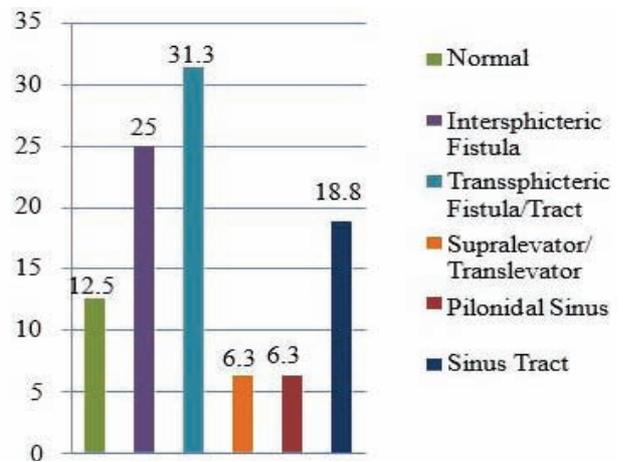


Figure 7. MRI Findings

Associated Ischianal/ Ischiorectal abscess and secondary tracts were found in 5(15.6%) and 17(53.1%) patients respectively.

Abnormality was seen maximum in male patients 28(87.5%) rather than female patients 4 (12.5%) and male female ratio was 7:1. Minimal age was 18 years and maximum age was 63 years. Mean age was 37.28 (std deviation 11.9). External fistulous opening at anal region were found right side 13(40.6%), left side 14(43.8%) and inferiorly 3(9.4%) associated with multiple opening in 5(15.6%), single opening in 25(78.1%) and no external opening seen in 2(6.3%) patients.

Common internal opening (sphincteric) in axial MR image was found in 5 0'clock position in 10(31.3%) patients while least common 1(3.1%) of the patients had 1, 4, 11 0'clock position.

Maximum length of the tract was found 9cm while minimum length was 1cm. Mean tract length was 3.9 (std. Deviation 2.3) and anterosuperior direction of the tract was found in maximum patients 9(28.1%).

In our study, St. Jame's University Hospital MR Imaging classification of perianal fistulas identified Grade 4 (Transsphincteric fistula with secondary tract/abscess) in most of the patients 8 (25%), Grade 0 (normal), Grade 1 (simple linear intersphincteric fistulas) and Grade 2 (intersphincteric fistula with secondary tract/abscess) in 4(12.5%) patients and Grade 3 (transsphincteric fistula) and Grade 5 (supralelevator and translevator) in 2(6.3%) patients (Table 1).

**Table 1. St. Jame's University Hospital MR Imaging Classification of Perianal Fistulas**

Grade	Frequency	Percent
Grade 0 (normal findings)	4	12.5
Grade 1 (simple linear intersphincteric fistula)	4	12.5
Grade 2 (intersphincteric fistula with intersphincteric abscess or secondary fistulous tract)	4	12.5
Grade 3 (Trans-sphincteric fistula)	2	6.3

Grade 4 (Trans-sphincteric fistula with abscess or secondary tract within the ischioanal or ischiorectal fossa)	8	25
Grade 5 (supralelevator and translevator disease)	2	6.3
Sinus tract +	8	25
Pilonidal sinus		
<b>Total</b>	<b>32</b>	<b>100</b>

Data was evaluated regarding clinical complaints which showed 14(43.8%) perianal discharge followed by 11(34.4%) recurrent fistula past H/O operation and 1(3.1%) perianal bleed, past H/O fissure operation and H/O discharge and 2(6.3%) pilonidal sinus with discharge.

### Discussion

Because of its excellent capability of demonstration of soft tissue contrast and multiplanner capabilities, MRI is the best choice of the pre operative evaluation of perianal fistulas.<sup>12, 13</sup>

Lunniss et al first utilize the MRI for preoperative evaluation of fistula. They correlated MR and surgical findings and found 86-88% concordance rate.<sup>14</sup> Subsequent studies with high tesla MRI suggested that MRI is more sensitive. Dynamic contrast enhanced magnetic resonance imaging (DCEMRI) was more accurate to identify complex fistula than surgical exploration and had a sensitivity of 97%.<sup>15</sup>

T2W SPAIR images (fat-suppressed) shows high signal intensity fluid in the tract and low signal intensity fibrous wall of the fistula which provides the good contrast and delineate the layers of the anal sphincter.<sup>16, 17</sup>

In our experience, axial T2W SPAIR and 3DT2W SPAIR (fat - suppressed images) was the most useful for locating the fistulous tract, its internal opening, secondary tracts and collection.

Gadolinium enhanced T1W images and subtraction contrast MR fistulography are useful to detect abscess and active inflammation. STIR (short inversion recovery) and DWI (Diffusion weighted Imaging) are additional sequences to whom contrast is contraindicated.<sup>12, 18</sup>

STIR sequence sometimes gives fallacious high signal intensity in healed fibrous tract. T2W and dynamic contrast

enhanced MR sequence should be carefully evaluated which will help to avoid this fallacy.<sup>15</sup> Axial images provide the exact location of the primary tract, internal opening and differentiate intersphincteric from a transsphincteric fistula; the presence of involvement external anal sphincter. Coronal images differentiate extension of supralelevator from infralevator tract. In our study we found all positive cases of perianal fistula using combination of different MR sequences and imaging planes, which provided necessary details.

In our study we found St. James University Hospital classification grading of fistulas applicable in 24 of 32 cases. This MR based classification system provides simple anatomic details, which can be seen in axial and coronal images. Classification or grading is important because it provides the treatment option, simple fistulotomy to complex surgical procedures.<sup>6</sup>

Preoperative MRI evaluation provides detail about primary, secondary tracts, abscess and high and low fistula and associated Crohn's disease which will benefit the patient. Recurrent fistula is headache to surgeons and is a cause of anxiety to patients, and is associated with branching fistulous tract.<sup>13</sup> Incomplete diagnosis and missed extensions are the commonest cause of recurrence. In our study recurrence fistulae rate was 11(34.4%). All cases had not undergone preoperative MR examination.

In last few years, MRI has emerged as the best modality of choice in the detection and classification of perianal fistula. It has ability to detect complex fistula in simple way which helps the surgeon decide therapy with positive patient outcome.

## Conclusion

Perianal fistulas are more common in males and according to the St. James's University Hospital MR Imaging classification; Grade 4 fistulas are the commonest. MRI is a well-tolerated, painless and noninvasive technique and has multiplanner capabilities with excellent tissue differentiation of pelvic muscle along with sphincter complex. MR imaging provides the excellent information about the fistulas, secondary tracts and abscess in relation to pelvis structures.

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