

“Mr Imaging Evaluation of Perianal Fistulas”

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Abstract:

A fistula is defined as an abnormal connection between two structures or organs or between an organ and the surface of the body. In the case of perianal fistula, it is a connection between the anal canal and the skin of the perineum. It predominantly affects young males, with a male-to-female ratio of 2:1. The most common presenting symptom is discharge, but local pain due to inflammation is also common.

Although imaging techniques played a limited role in evaluation of perianal fistulas in the past, it is now increasingly recognized that imaging techniques, especially magnetic resonance (MR) imaging play a crucial role.

MR imaging allows identification of infected tracks and abscesses that would otherwise remain undetected. MR imaging can provide detailed anatomic descriptions of the relationship between the fistula and the anal sphincter complex, thereby allowing surgeons to choose the best surgical treatment, significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence.

It is a hospital based cross sectional and observational study was carried out over a period of 6 months from November 2020 to April 2021 in patients with suspected perianal fistulas / abscess in the Department of Radiodiagnosis at Santhiram medical college and general hospital, Nandyal, Andhra Pradesh. Patients who met the inclusion / exclusion criteria were included in the study.

Of the 30 patients in our study, eight were having a perianal sinus, rest of them have multiple fistulae, abscess and few have recurrence after fistula surgery.

Key Words: Perianal fistula, Abscess drainage, Magnetic Resonance (MR) imaging

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I. Introduction :

A fistula is defined as an abnormal connection between two structures or organs or between an organ and the surface of the body. They are thought to be a result of anal gland obstruction, with secondary abscess formation and external rupture of the abscess [3]. In the case of perianal fistula, it is a connection between the anal canal and the skin of the perineum. It predominantly affects young males, with a male-to-female ratio of 2:1. The most common presenting symptom is discharge, but local pain due to inflammation is also common[1].

They have traditionally been imaged by conventional fistulograms; the procedure involves cannulation of the external opening and injection of a water-soluble contrast into the fistula. It has two main disadvantages: The primary tract and its extensions do not fill with contrast if they are plugged with pus or debris and the sphincter muscle anatomy [6]is not imaged and hence the relation between the tract, the internal/external sphincter, and the levator ani muscle is not revealed.

Transrectal ultrasound better depicts fistulae and their relation to the anal sphincter muscles. The operator dependence, limited field of view and absence of a coronal plane of imaging are its disadvantages.

CT fistulography is limited by the fact that attenuation values of the fistula tract, the areas of fibrosis, and sphincter muscles are similar to each other. Multidetector row CT fistulography with its isotropic voxels is expected to improve the results from this modality.

Although imaging techniques played a limited role in evaluation of perianal fistulas in the past, it is now increasingly recognized that imaging techniques, especially magnetic resonance (MR) imaging play a crucial role.

MR imaging allows identification of infected tracks and abscesses that would otherwise remain undetected. MR imaging can provide detailed anatomic descriptions of the relationship between the fistula and the anal sphincter complex [5], thereby allowing surgeons to choose the best surgical treatment, significantly reducing recurrence [2]of the disease or possible secondary effects of surgery, such as fecal incontinence[4].

II. Aims And Objectives :

To describe the main MR imaging features and classification of perianal fistulas.

To discuss the MR imaging features of complications of perianal fistulas.

III. Materials And Methods :

It is a hospital based cross sectional and observational study carried out over a period of 6 months from May 2020 to October 2021 in patients with suspected perianal fistulas / abscess in the Department of Radiodiagnosis at Santhiram medical college and general hospital, Nandyal, Andhra Pradesh. Patients.

INCLUSION CRITERIA:

1. Patient willing to participate in the study and willing to give written and informed consent.
2. Patients with suspected perianal fistulas/abscess.
3. Patients with no contraindications to IV Gadolinium & MRI.
4. Patients with age between 14-70.

EXCLUSION CRITERIA:

1. Patients not willing to participate in the study and not willing to give written and informed consent.
2. Patients with contraindications to IV Gadolinium & MRI.
3. Patients who are under age 14 .

EQUIPMENT:

Patients undergone MR imaging examination under a 1.5 T **SIEMENS MAGNETOM_ESSENZA, syngo version- syngo VH ASL P** machine TIM+DOT System.

The following sequences were performed:

1. T2 weighted imaging (T2 WI) ,
2. T1 weighted imaging (T1 WI) ,
3. Coronal short τ wave inversion recovery (STIR) sequence of region of interest,
4. T1 fat saturation (FS) .

IV. Results :

Of the 30 patients in our study, eight (26%) were identified as having a perianal sinus only, with no fistula extending into the anal canal.

The remaining 22 cases were evaluated for the site of the primary tract and its ramifications, the presence/absence of external sphincter involvement, and the location of the internal openings.

Two patients had a primary or recurrent perianal fistula . One of the case had multiple fistulae and all had abscess formation .

Of the remaining 19 patients , 11 patients had a primary fistula and, of these, five had previously undergone perianal abscess drainage.

Three patients had undergone previous fistula surgery and had presented with a recurrence.

V. Discussion :

Normal MRI anatomy of the anal sphincter :

The external anal sphincter (a striated muscle) is clearly visualized on MRI. It is hypo intense on T1W, T2W, and fat-suppressed T2W images, and is bordered laterally by the fat in the ischioanal fossa .

The internal sphincter (a smooth muscle) is hypo intense on T1W and T2W TSE images and is relatively hyper intense on fat-suppressed T2W images . It shows enhancement on post-gadolinium T1W images.

The coronal images depict the levator ani muscle (levator plane), the identification of which is important to distinguish supra levator from infra levator infections.

The puborectalis ring is seen as a thickening of the superior fibers of the external sphincter [5].The puborectalis further merges with the levator plate superiorly[8].

Classification of Perianal Fistulas :

Depending on the location and course of the primary tract [9], perianal fistulae have been classified into four types.

1. Intersphincteric type : The infection starts from an anal gland and develops in the inter sphincteric plane, lying between the internal and external sphincters, without penetrating the external sphincter. It eventually ruptures onto the skin, creating the fistula.

2. Transsphincteric type : This occurs when the intersphincteric infection penetrates the external sphincter to reach the ischioanal fossa and, eventually, the perianal skin.

3. Suprasphincteric type : These fistulae extend superiorly in the intersphincteric plane to reach above the levator plane and penetrate inferiorly through the ischioanal fossa.

4. Extrasphincteric type : These result from extension of primary pelvic disease (e.g., Crohn's disease, diverticulitis) down through the levator plate.

An MR imaging–based classification was proposed that relates the Parks surgical classification to anatomic MR imaging findings in the axial and coronal planes. This classification was proposed on the basis of imaging findings and does not represent an official surgical reference [10]. In fact, the main role of radiologists in evaluation of perianal fistulas is to be descriptive and accurate in their reports, as details will be essential in future decisions about medical or surgical treatment.

This classification is simple to apply because it uses anatomic landmarks in the axial plane familiar to radiologists. Furthermore, the classification considers the primary fistulous track as well as secondary extensions and abscesses in evaluating and classifying fistulas.

The classification grades fistulas into five groups:

Grade 1, Simple linear intersphincteric fistula

Grade 2, Intersphincteric with abscess or secondary track

Grade 3, Transsphincteric fistula

Grade 4, Transsphincteric fistula with abscess or secondary track in ischioanal or ischioanal fossa

Grade 5, Supralelevator and translevator fistula .

Grade 1: Simple Linear Intersphincteric Fistula.— In this type, track extends from the anal canal through the intersphincteric space to reach the skin of the perineum or natal cleft. No extensions or abscesses are found in the intersphincteric space or ischioanal and ischioanal fossae. The fistulous track is always observed in the intersphincteric space and is entirely confined by the external sphincter .

Grade 2: Intersphincteric Fistula with an Abscess or Secondary Track.—In a grade 2 fistula, the primary track and a secondary track or abscess occur in the intersphincteric space. They are always confined by the external sphincter, which is never crossed . Extensions and abscesses may be of the horseshoe type, crossing the midline, or may branch in the ipsilateral intersphincteric plane.

Grade 3: Transsphincteric Fistula.—A grade 3 fistula pierces both layers of the sphincter complex and takes a downward course through the ischioanal and ischioanal fossae before reaching the perineal skin. It may provoke inflammatory changes in the fat of the ischioanal and ischioanal fossae, although it is not complicated by secondary tracks or abscesses in these areas. A transsphincteric fistula is distinguished by location of the enteric entry point in the middle third of the anal canal, at the level of the dentate line, which is best evaluated in the coronal plane.

Grade 4: Transsphincteric Fistula with an Abscess or Secondary Track in the Ischioanal or Ischioanal Fossa.—In this , the track crosses the external sphincter to reach the ischioanal and ischioanal fossae, where it is complicated by an abscess or extension .

Grade 5: Supralelevator and Translevator Disease.—In rare cases, perianal fistulous disease extends above the insertion point of the levator ani muscle. In translevator disease, the fistulous track extends directly from its

origin in the pelvis to the perineal skin through the ischioanal and ischioanal fossae, with no involvement of the anal canal.

MR imaging has a critical role in helping determine the proper treatment of perianal fistulas because treatment strategies must be individualized according to the type of perianal fistula and the degree of involvement of surrounding pelvic structures.

At MR imaging, identification and localization of the entire cryptoglandular fistula, including the external opening, the primary track, secondary tracks, abscesses, and the internal opening, are essential for fistula classification and treatment. Inadequate assessment of the fistula may result in a simple fistula developing into a complex fistula, and failure to recognize secondary extensions can result in recurrent sepsis and an unnecessarily protracted clinical course.

To preserve continence, accurate presurgical definition of the relationship of the fistulous track to the anal sphincters is of great importance before performance of any sphincter-interrupting procedure. The information obtained with MR imaging appears to be a more powerful predictor of postoperative outcome than the information gained from surgical exploration[7].

MR imaging-guided surgery of anal fistulas is feasible. Preoperative and intraoperative MR imaging techniques can be used to identify extension of the fistula track and septic foci and ensure the adequacy of the surgical procedure. Use of MR imaging can thus prevent incomplete procedures and the necessity for second surgeries. MR imaging may become particularly useful in surgery of recurrent or complex anal fistulas and may lead to fewer recurrences[2].

MRI imaging of perianal fistulae relies on the inherent high soft tissue contrast resolution and the multiplanar display of anatomy by this modality. Lunniss *et al.* reported a concordance rate of 86-88% between MRI and surgical findings.[8]

T2W images (TSE and fat-suppressed) provide good contrast between the hyperintense fluid in the tract and the hypointense fibrous wall of the fistula, while providing good delineation of the layers of the anal sphincter .

Gadolinium-enhanced T1W images are useful to differentiate a fluid-filled tract from an area of inflammation. The tract wall enhances, whereas the central portion is hypointense. Abscesses are also very well depicted on post-gadolinium images.

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.

Buchanan *et al.*[5] in their study showed that MR increases the accuracy of diagnosis by 10% in comparison to EAUS. There was a threefold decrease in recurrence rate after surgical interventions based on appropriate diagnostics with the use of MR only.

As mentioned earlier, coronal images depict the levator plane, thereby allowing differentiation of supralelevator from infralevator infection. A combination of an axial and a longitudinal series (coronal, sagittal, or radial) will provide all the necessary details [10].

VI. Conclusion :

MR imaging has emerged as the imaging technique of choice for preoperative evaluation of perianal fistulas, providing a highly accurate, rapid, and noninvasive means of performing presurgical assessment. MR imaging provides precise definition of the fistulous track, along with its relationship to pelvic structures, and allows identification of secondary fistulas or abscesses. Accordingly, MR imaging provides accurate information for appropriate surgical treatment, decreasing the incidence of recurrence and allowing side effects such as fecal incontinence to be avoided.

To conclude evaluation of an enhanced T1W image, in conjunction with a fat-suppressed T2W image, provides most of the details necessary for accurate evaluation of perianal fistulae.

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FIGURES :



IMAGE 1 : MRI, coronal T2-weighted STIR image. Right-sided intersphincteric fistula. Linear trans-sphincteric fistulous tract with its internal opening into anal canal at 6'o' clock position and external opening into perianal region on left side.



IMAGE 2 : MRI, Sagittal T2-weighted STIR image. Linear trans-sphincteric fistulous tract with its internal opening into anal canal at 6'o' clock position and external opening into perianal region on left side.