



MRI Study of Perianal Fistula and its utility in Management

Kamalesh Majumdar

Associate Professor in Radio-Diagnosis. KPC Medical College and Hospital. Jadavpur, Kolkata 700 107. West Bengal. India. For correspondence email is qamalesh@gmail.com

Received: 12-05-2017 / Revised Accepted: 21-06-2017 / Published: 28-07-2017

ABSTRACT

MRI study of perineum clearly depicts the anatomy in all orthogonal sections and thus reliably shows the spread of perianal fistula tract. It is superior to any other modality of pre operative study. Surgical treatment is not easy if there is diffuse inflammation and consequent fibrosis in the perineum. In these cases prior MR scanning with and without intra venous contrast, becomes useful and also in cases where initial intervention fail to detect the presence of fistula. MR imaging also demonstrates apparently occult inter-sphincteric space sepsis with no cutaneous opening. MR imaging is quite good in the prediction of prognosis of the patient and the outcome from the disease process. MRI with St James's University Hospital classification, shows that grades 1 and 2 have satisfactory outcome requiring no further surgery, whereas grades 3 to 5 have unsatisfactory outcome requiring more surgery latter on. By using this system of classicication, radiologist can alert the referring clinician to the presence of complex disease process.

Keywords: Perineal fistula, Perianal abscess, MRI perineum, Ischio-rectal abscess, Entero-perineal inflammation. Classification of perineal abscess. Levato ani, Pevic floor muscle

Address for Correspondence: Dr. Kamalesh Majumdar, Associate Professor in Radio-Diagnosis. KPC Medical College and Hospital. Jadavpur, Kolkata 700 107, India: Email: qamalesh@gmail.com

How to Cite this Article: Kamalesh Majumdar. MRI Study of Perianal Fistula and its utility in Management. Int J Res Health Sci 2017; 5(3): 38-43.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, which allows adapt, share and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms. 

INTRODUCTION

Magnetic resonance imaging (MRI) can clearly depicts the surgical and physiological anatomy of the perianal region all orthogonal and 3D reconstruction planes with excellent septal resolution. Surgical approach to be taken and its outcome & prognosis depend on the relation of the fistula with pelvic floor muscle (levator ani group) and the ischio-rectal fossae. Anal fistula has been classified into five grades depending upon MRI features.

If the ischio-anal and ischio-rectal fossae are not involved, disease is confined by the sphincter planes (simple intersphincteric fistulisation, grade 1 or 2, situation is rather simple and the outcome following simple surgical intervention is good. But involvement of the ischio-anal or ischio-rectal fossa by a fistulous track or abscess formation indicates complex disease process related to trans-sphincteric or supra-sphincteric disease (grade 3 or 4). Accordingly more complex surgery is to be required. Anal continence may be destroyed and colostomy may require to allow healing.

In supra-sphincteric fistula, the track traverses the levator plate. It trans-levator fistula (grade 5) is present, source of pelvic sepsis should be searched for. In developing country like India perianal fistulisation is not uncommon condition. It is a nagging disease of the gastrointestinal tract that causes substantial morbidity. According to accepted over all incidence, perianal fistula occurs in approximately 1 of 10,000 persons and four times more common in male subjects.

Historical Back Ground

Reference of diseases, like formation of anal fistula are noted in Hippocrates's literates. However only during the 19th centuries, it received special attention in medical world. The 'Benevolent Dispensary for the Relief of the Poor Afflicted with Fistula, Piles, and Other Diseases of the Rectum and Lower Intestine' was established by Frederick Salmon during 1835 in London.

Dr Salmon St Mark's Hospital operated on renowned personalities like Charles Dickens, Goodsall and may more. Dr Parks attached with the same hospital, classified the fistulas in relation to anal anatomy and is widely used in surgical practice even today.

Relation of the cutaneous opening to the expected site of the rectal opening has been advocated by Goodsall (1). According to this rule a transverse anal line is drawn. In case of cutaneous openings anterior to that transverse anal line, fistula tract

usually radially goes to anal canal. And in case of cutaneous opening posterior to the line, fistula enters the anal canal in the midline posteriorly.

If a flexible probe is introduced along the track from the cutaneous opening, the enteric opening of the fistula can be determined during simultaneous proctoscopy examination. Management of fistula depends on the course of the track between cutaneous and luminal openings so that the appropriate surgical option can be used.

Previously contrast fistulogram x ray was the only imaging tool available for the preoperative assessment of perianal fistulas. After the availability of magnetic resonance (MR) imaging demonstration of perianal anatomy has become more accurate. Anatomy of the perianal area, causes of perianal fistula, surgical management and previous methods for preoperative assessment are being discussed here. Then the usefulness of MR imaging protocols for this is studied. St James's University Hospital classification (2) system has been described in correlation with MR imaging-based grading system and its long term surgical prognosis.

Perineal Anatomy

Surgical anatomy (1) is best described in the form of a virtual clock. Patient lies in the lithotomy position. Therefore, 12 o'clock is in mid anterior perineum, 6 o'clock is in the natal cleft, 3 o'clock refers to the left lateral aspect and 9 o'clock, to the right lateral side of the anal canal.

These clock wise descriptions matches well with the axial MR images and it is useful for surgical team if the radiologist describes the MR findings to the virtual clock position. Internal sphincter - it is involuntary in nature and is composed of smooth muscle as an extension of the circular smooth muscle layer of the rectum. Major part of resting anal tone is produced by this sphincter. If it becomes incompetent, as by surgical resection, anal continence may be produced. External sphincter - it is voluntary in nature and is composed of striated muscle fibers. Superiorly it is continued with the puborectalis and levator ani muscles. Though it takes part to minimal resting anal tone, its strong voluntary contraction can stop defecation. Resection of this sphincter more likely to cause anal incontinence.

Causes of Fistula

Most common is idiopathic fistulas - a chronic phase of intramuscular anal gland sepsis. Other causes are pelvic infection, tuberculosis, trauma during childbirth, Crohn disease, pelvic malignancy, radiation therapy etc.

From anal glands in the mid-anal canal the infection may run down the inter-sphincteric plane to the skin and about 80% of fistulas behave in this way. Often in about 15% cases infection may pass through both the anal sphincters to enter the ischiorectal fossa.

Along the course of fistulous tracks, abscess cavity may be developed. Abscesses associated with intersphincteric fistulas are loculated within the intersphincteric space. But trans-sphincteric fistulas are limited within ischiorectal fossa.

In uncommon supra-sphincteric fistula, infection runs upward above the sphincter complex to enter the ischiorectal fossa. Abscess arising within the pelvis may track down to the skin through the ischiorectal fossa.

Surgical Management

It depends on the nature of the primary & secondary fistulous tracks and with associated abscess of any. For simple inter-sphincteric fistulas fistulectomy is usually done, in which the internal sphincter is divided to expose the track. In patients with perianal abscess, incision and drainage of the abscess is done initially. In more complex disease scenario, management is a challenge even for the most experienced colorectal surgeon. Maintenance of fecal continence after operation is most the important factor for long term compliance and satisfaction for the patient. Surgeons have to plan the strategies to preserve the integrity of the external sphincter.

Preoperative assessment of perianal fistulas

Performing imaging study for perianal fistulas are required to,

- 1) Determine the relation of fistulous track to the sphincter complex. Does sphincter tract traverse both external and internal sphincters (trans-sphincteric) and only one sphincter (intersphincteric)?
- 2) Identify presence of any secondary fistulous tracks and the position of abscess cavity, if any.

If these aspects are not identified preoperatively, blind operative intervention may lead to relapse and therapeutic failure. Small secondary track or its branches may be found within the intersphincteric plane, ischiorectal fossa or in the supra-levator space. "Horseshoe" shape track may pass circumferentially and cross the midline.

Clinical examination is always superior and cannot be suppressed by any imaging technique what so ever. Before the use of MR imaging studies, in the assessment the classification of perianal fistula, the surgical approach was determined from clinical

findings got from a combination of digital rectal examination, procto-sigmoidoscopy and surgical exploration with anesthesia with or without probing.

Fistulography: It is the most frequently used procedure from the old time to identify the presence and course of the fistula (3). But it has its inherent shortcomings. Levator ani muscle and the anal sphincters are not directly visualised. Sometimes, full length of the fistulous track does not fill with contrast material.

Due to lack of precise anatomic landmarks position of the inner opening is only to be assumed not confirmed. Difference between the position of abscess high in the ischiorectal fossa and one low in the supralevator pararectal space cannot be made.

Trans-rectal sonography (4): with expert had gives lot of required information but still inferior to expert clinical examination. Sphincters intersphincteric tissue plane are usually well visualised with sonography. However due to poor tissue penetration secondary tracts may not be visualised or under visualised. Fibrosis and active inflammation can give similar sonographic findings. In bulky subjects external sphincter can be difficult to visualise.

Computed tomography: done after administering trans rectal and IV contrast media (5). Multiplanar and 3D reconstruction is to be done. But due to poor septal resolution pelvic floor muscles, sphincter complex and even the fistula tract can not be properly identified. Though leakage of contrast outside the tract or presence of air bubble inside the fistula tract can be identified. Therefore, CT scan is not much useful for preoperative make up.

MRI imaging: is taking the position of investigation of choice in the diagnosis of perianal fistulas. Because MR image guidance matches well with surgical findings. It is definitely superior to any other modality. Several MR imaging techniques have been proposed. Imaging in coronal, sagittal and axial planes depicts fistulous tracks in relation to the sphincters, ischiorectal fossa and levator muscle. Ano-vaginal extension of the disease is also properly demonstrated by MR (6).

Scanning by using body coil or trans rectal dedicated coil requires no prior preparation. Application of pelvic surface coils further improve image quality. Use of trans rectal coil provides excellent anatomic detail of the anal sphincters but it fails to provide the overview required for surgical management.

Though use of rectal coil is painful specially in patient with inflammation over all patient compliance is very good.

MR Imaging of Perianal Fistulas

Sagittal, coronal and axial MR sequences clearly display the perineal anatomy. Ischio-rectal fossae and levator ani sling are well seen. But internal and external sphincters could not be separately resolved for which use of intra cavity coil is needed.

MR Techniques

Plain T1 weighted image: Fistula track, abscess and inflammation in the perineum appear as low signal intensity areas and may be difficult to separately differentiated from normal structures like the sphincters and pelvic floor muscles.

On T2 and STIR weighted image: In this sequence fistula track, abscess and inflammation in the perineum appear as high signal intensity lesions in contrast with the low signal intensity of the sphincters, muscles and fat. This is more so with STIR sequence. Fat suppressed T2-weighted sequence is also very informative. Though of good septal resolution STIR images some times over diagnose an inactive tract and often fail to identify serpigineous secondary tract, due different sensitivity and specificity.

GRE sequence with intravenous contrast enhanced MR imaging plus with T2 Fatsat images are the best option to assess perianal fistulas and their sequels. With this technique, active fistula tract, secondary branches and abscesses if any are clearly demonstrated. Wall of the tracks and abscess margins are markedly enhanced. Retained collection and pus remains unenhanced leading to ring like lesion formation that is typical of abscess anywhere in the body. This technique is well tolerated by most of the patients specially with acutely inflamed perianal regions.

Plain T1 weighted imaging used for postoperative assessment. A weeks after the operation hemorrhage will appear hyper intense and the residual track, if any, are hypointense. Thus differentiation becomes easy. Use of IV contrast to identify residual disease or abscess formation within postoperative tissue is helpful. Though post contrast images are visually attractive to surgical colleagues, it may not be essential for all cases.

MR Grading of Perianal Fistula (2)

MR imaging-based, St James's University Hospital classification, describes five grades and related to Parks surgical classification to anatomy as seen in MR imaging in both axial and coronal planes

This classification deals with the demonstration of the primary & secondary fistulous tracks and also the associated abscesses. This is easy to use because it uses anatomic landmarks familiar to radiologists. This system corroborates with surgical proof and has been shown to correlate well with initial surgical assessment with long-term outcome.

Grade 1- Inter-sphincteric fistula. This is the most common type. The fistula track runs from the skin of the perineum to the anal canal. The ischio-rectal and ischio-anal fossae are normal. No branching of the track will be there within the sphincter complex. The contrast enhanced track is seen in the plane between the sphincters and is entirely limited by the external sphincter. Fistula tracks arising posterior to anal line enter the anal canal in the midline posteriorly.

Grade 2 – Inter-sphincteric fistula with secondary track. This type of fistula is also bounded by the external sphincter. Secondary fistulous tracks may be of the horseshoe type, crossing the midline or they may give rise to branches within the intersphincteric plane. There may be inter sphincteric abscess formation also. Pus and edema & inflammation has high signal intensity on T2 weighted images. So differentiation between then is difficult. But presence of air bubble indicates abscess formation. On contrast-enhanced images, the pus in the central cavity has low signal intensity and is surrounded by a brightly enhancing rim. Horseshoe fistula tract which extends to the opposite side, is best seen in the axial plane.

Grade 3 - Trans-sphincteric fistula. Here the fistula tract perforates through both external and internal sphincters and then runs down to the perineal skin through the ischio-rectal and ischioanal fossae. Fat planes of the ischio-rectal and ischioanal fossae are disrupted by the fistula and give rise to secondary edema and hyperemia

In coronal MRI image, the point of entry to the middle third of the anal canal, corresponding to the dentate line is well seen. In surgical management, the tract must be dissected from both the sphincters. Therefore there is a high possibility of making an iatrogenic fecal incontinence.

Grade 4 - Trans-sphincteric fistula with abscess or secondary track. A trans-sphincteric fistula can be complicated by development of inflammation in the ischio-rectal or ischioanal fossa. So an abscess may develop along the fistula tract or as a structure distorting or completely occupying the ischio-rectal fossa. Multi axial IV contrast-enhanced MR images can clearly demonstrate trans-sphincteric perineal abscess. As in other parts of body, this abscess has a central area of hypointensity of pus.

Grade 5 - Supralelevator and Translevator fistula. Here the perianal fistula extends above the attachment of the levator ani muscle. Supra-sphincteric fistulas runs upward in the intersphincteric plane over the level of the levator ani. Extra-sphincteric fistula is actually an extension of primary pelvic disease downward through the levator muscle (9). Coronal IV contrast-enhanced MR image can clearly demonstrate the perforation of levator plate. Often the trans-levator fistulas takes up horseshoe configuration to the opposite side.

DISCUSSION

During last 4 years, in this KPC Medical College, we have followed more than 70 cases with MR scanning before the surgical intervention. Initially, patients were operated without MR being done. And prospective study showed excellent anatomic and diagnostic correlation(10) with MR imaging .

Surgical treatment may not be easy if there is diffuse inflammation and consequent fibrosis in the

perineum. In these cases prior MR scanning becomes useful and also in cases where initial intervention fail the detect the fistula. MR imaging also demonstrate apparently occult inter-sphincteric space sepsis with no cutaneous opening. Our experience shows that MR imaging is quite good in the prediction of patient outcome. MR imaging with St James's University Hospital classification, shows that grades 1 and 2 have satisfactory outcome requiring no further surgery, whereas grades 3 to 5 have unsatisfactory outcome requiring more surgery latter on.

Conclusions

MR imaging is very helpful in the preoperative assessment of fistulas. We use the St James's University Hospital classification. This classification uses simple anatomically identifiable land marks on axial and coronal MR images. By using this system, we as radiologist can alert the referring clinician to the presence of complex disease process.

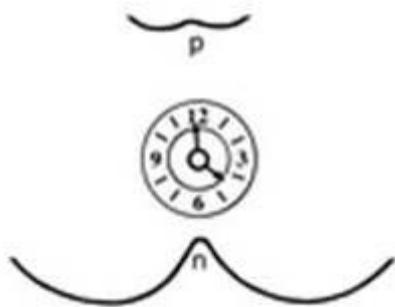
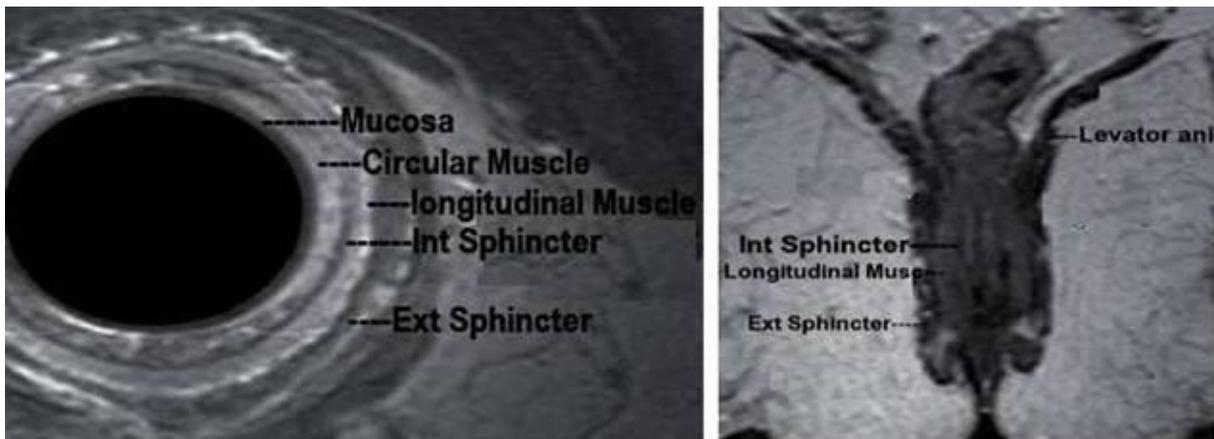
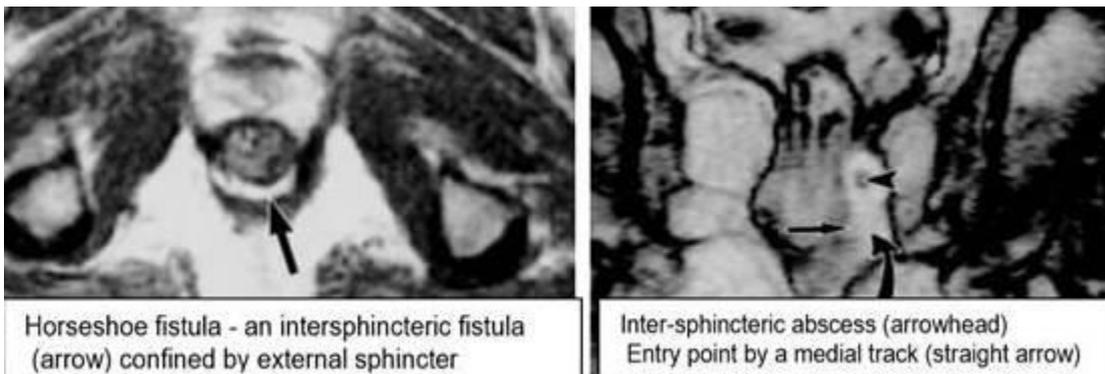
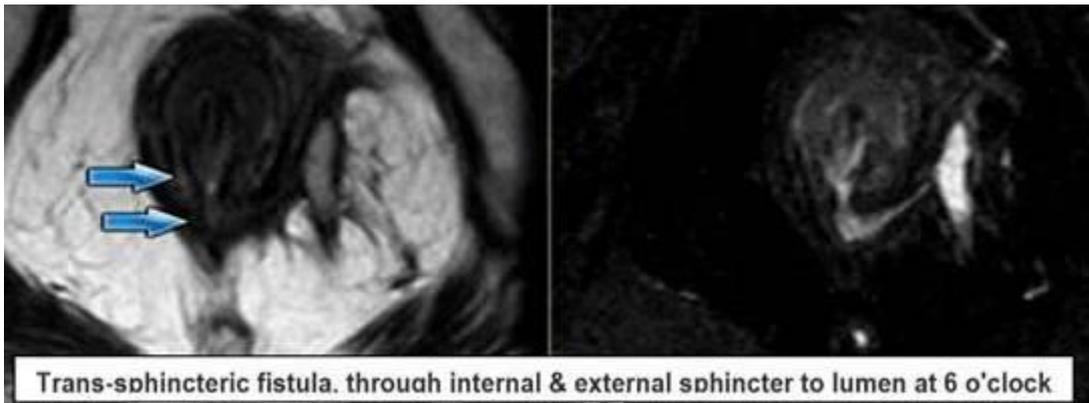
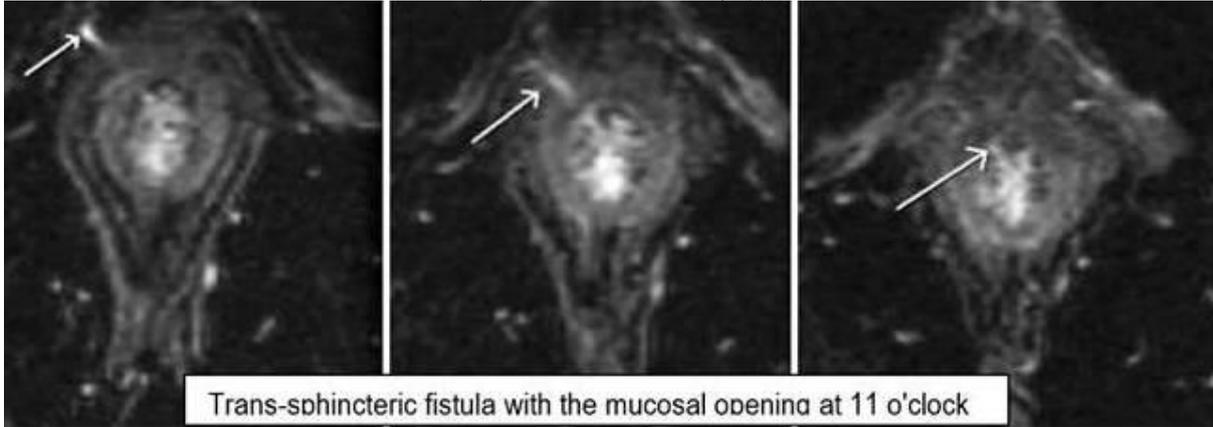


Figure 1 Diagram of with the patients in the lithotomy position.





REFERENCES

- 1) Goodsall DH, Miles WE. Diseases of the anus and rectum. England: Longmans, Green, 1900
- 2) Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. Br J Surg 1976; 63:1-12.
- 3) Weisman RI, Orsay CP, Pearl RK, et al. The role of fistulography in fistula-in-ano: report of 5 cases. Dis Colon Rectum 1991; 34:181-184.
- 4) Choen S, Burnett S, Bartram CI, Nicholls RJ. Comparison between anal endosonography and digital examination in the evaluation of anal fistulae. Br J Surg 1991; 78:445-447.
- 5) Guillaumin E, Jeffrey RB, Shea WJ, et al. Perirectal inflammatory disease: CT findings. Radiology 1986; 161:153-157.
- 6) Barker PG, Lunniss PJ, Armstrong P, Reznek RH, Cottam K, Phillips RK. Magnetic resonance imaging of fistula-in-ano: technique, interpretation, and accuracy. Clin Radiol 1994; 49:7-13.
- 7) Spencer JA, Ward J, Beckingham JJ, Adams C, Ambrose NS. Dynamic contrast-enhanced MR imaging of perianal fistulas. AJR Am J Roentgenol 1996; 167:735-741.
- 8) Haggatt PJ, Moore NM, Shearman JD, Travis SPL, Jewell DP, Mortensen NJ. Pelvic and perianal complications of Crohn's disease: assessment using magnetic resonance imaging. Gut 1995; 36:407-410.
- 9) Hussain SM, Stoker J, Schouten WR, Hop WCJ, Lameris JS. Fistula-in-ano: endoanal sonography versus endoanal MR imaging in classification. Radiology 1996; 200:475-481.
- 10) Halligan S, Bartram CI. MR imaging of fistula-in-ano: are endoanal coils the gold standard? AJR Am J Roentgenol 1998; 171:407-412.