



MAGNETIC RESONANCE IMAGING (MRI) – AS A NONINVASIVE TOOL FOR EVALUATION OF PERIANAL FISTULA IN A RURAL BASED TERTIARY HOSPITAL OF WEST GUJARAT (INDIA).

Radiology

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ABSTRACT

Background: Evaluation of various perianal fistula to assess the extension and anatomic relationships to the anal sphincters by using noninvasive Magnetic resonance imaging (MRI) in a tertiary care hospital in west Gujarat of India.

KEYWORDS

MR fistulography, perianal fistula, GI Tract fistula, perianal abscess, Perianal Glands, Fistula in ano.

Introduction:

Perianal fistula is very painful condition and in management medical treatment has little role and usually required surgery. For the success of surgical procedure & to reduce recurrence knowledge of detail tract of fistula, its branches and associated finding like abscess formation is essential. Usually pre surgical evaluation done by inspection, palpation, probing, injecting dye –conventional /CT fistulography and endoanal ultrasonography (EAUS) & MRI.

Among this investigation MRI is noninvasive, painless and most sensitive due to high-spatial-resolution images and multi planar imaging capacity it provide detail anatomy and evaluation of perianal fistula with detection of extension as well associated abnormality. This make MRI the preferable imaging modality for detection and assessment of perianal fistula.^[8]

The aim of our study was to analyze age, sex, anatomical distribution and evaluation of perianal fistula with help of optimal combination of MRI sequences with or without contrast, in shortest possible time and provide detail information for successful surgical procedure.

Anatomy of Anal Canal (figure 1, figure 3)

Anal canal extend from levator ani muscle to anal verge caudally, measures approximately 3" to 4" cm long. The *anal verge* refers to the distal end of the anal canal, a transitional zone between the epithelium of the anal canal and the perianal skin. It should not be confused with the pectinate line between the upper and lower zones within the anal canal.

It is surrounded by internal (Involuntary) and external (voluntary) sphincter. Both sphincter separated by inter sphincter space which contain loose fat-contain areolar tissue. The internal sphincter is the inferior extension of the inner circular smooth muscle of the rectum and is primarily responsible for resting involuntary anal continence^[1].

Further superficial to external sphincter there is contiguous pyramidal space containing fat – known as caudally – ischioanal fossa and cranially ishiorectal fossa.

Anal canal is traditionally divided into two segments, upper and lower, separated by the pectinate line (also known as the dentate line)

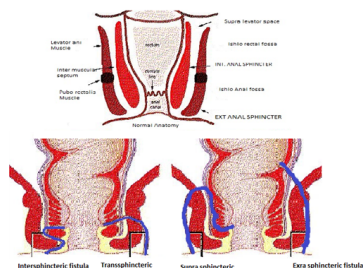


Figure 1: Anatomy of anal canal (upper) & classification of perianal fistula (lower)

Etiology & pathogenesis of peri anal fistula

Perianal fistula is an abnormal connection from anal canal to superficial skin. It usually primary (90%) or secondary due to Iatrogenic (post-operative-hemorrhoidectomy) , Inflammatory bowel disease (crohn's disease ,Ulcerative colitis etc) ,infection (fungal, viral ,bacterial) & malignancy.^[3,4]

Pathogenesis – typically there are circumferentially located 9-10 anal crypto glands present at the level of the dentate line in the anal canal. Obstruction of this gland lead to stasis and formation of localized abscess. These further penetrate and form tract lead to anal canal (internal opening) and skin (external opening) which may involve anal sphincter.

Classification of fistula:

Commonly perianal fistula classified according to many factors like size ,shape ,course, level/position, communication ,involvement of sphincter and associated abnormality etc.

Parks classification : classified according sphincter involvement (figure 1 lower)^[7]

- 1) Intersphincteric
- 2) Transsphincteric
- 3) supra sphincteric
- 4) extrasphincteric

St James University hospital classification: tracks were assessed with regard to anatomical level, length, extension, communication – external and internal opening and abscess formation.

Grade 1: Simple, linear intersphincteric (figure 3A)

Grade 2: Intersphincteric with abscess or secondary ramification (figure 3B)

Grade 3: Trans sphincteric (figure 4)

Grade 4: Trans sphincteric with abscess or secondary ramification. (figure 5)

Grade 5: supra levator (figure 6)

Other classification may include:

- Complete, blind external and blind internal according to hole /opening.
- Low anal, high anal, ano-rectal, Subcutaneous and sub mucosal - grouped according to the relationship of the main tract to the anal musculature.
- Simple and complex according to tract course and branches.

Material/methods:

This retrospective hospital based study was conducted during period of one year from April 2019 to June 2020 in the department of Radio diagnosis of our institute. A total of 27 consecutive patients was referred to radiology department, had under gone MRI examination for evaluation of peri anal fistula.

All clinically diagnosed patient with perianal fistulous disease referred to MRI department are included in our study. No exclusion criteria.

MR Technique with protocol:

(NB: This article is intended to outline some general principles of protocol design. The specifics will vary depending on MRI hardware and software, radiologist's and referrer's preferences, institutional protocols, patient factors (e.g. allergy) and time constraints.)

We use following protocol for this purpose would include:

- Fine 3 mm slices
- Localizer
- T2 axial and coronal (delineation of anatomy)
- T2 Fat sat or STIR (to look for fluid in fistula or abscess)
- Axial and coronal T1 Fat sat with gadolinium-based intravenous contrast material if required.
- T1 axial, transverse & T1 TSE-coronal.
- Some authors also recommend:
- short-inversion-time inversion recovery (STIR)
- gradient-echo T1-weighted with or without gadolinium-based intravenous contrast material
- spin-echo T1-weighted
- spin-echo T2-weighted with saline instillation (MR Fistulography)

A novel method is the use of volume MRI sequences. Three dimensional (3D) T2 weighted turbo spin echo (TSE) can provide data for post processing reformation of images in to desired plane (axial, coronal and sagittal) Thus may replaces 2 D sequences. The benefits are reduced imaging times and isotropic data allowing multi-planar reformatting while maintaining comparable contrast resolution.

Results:

In our study we find perianal fistula predominantly involve male than female with Male to female ratio of 25:2

Age group distribution third and 5th decade.(table 1)

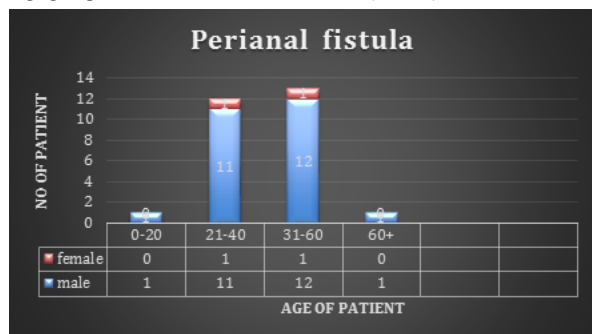


Table 1 showing age distribution and sex ratio

According to parks classification we found Trans sphincteric and Inter sphincteric fistula was common with 50 % & 38 % prevalence among the study group .while extra sphincter 11 % and High levator /Grade V fistula was least common (4%).

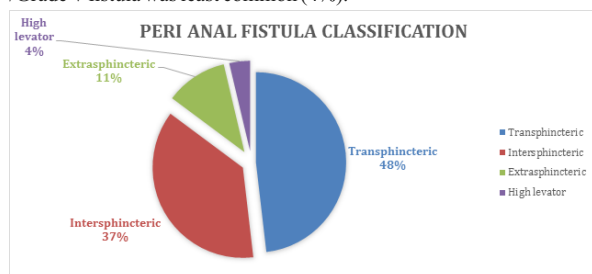


Table 2 : prevalence of perianal fistula in our study group.

MRI showed a high sensitivity of 93.7% and positive predictive value (PPV) of 97.6% when correlated with surgical findings.

Surgical correlation was done in 19 patients who opted for surgical treatment. Rest of the 8 patients (32%) preferred alternative medicine for treatment or chose to postpone their surgery.

Discussion:

In our study MRI showed a high sensitivity of 93.7% in different

grading from simple to complex perianal fistula according to grade 1-5 and positive predictive value (PPV) of 97.6% when correlated with surgical findings (100%).

In line with these findings, Singh et al.^[5] reported high sensitivity of MRI in identification of secondary tract, correct localization of internal opening, and correct detection of horse-shoeing with rates of 93.75%, 95.83%, and 87.5%, respectively. Also, Chauhan et al.^[6] reported that MRI showed a high sensitivity rate of 93.7% and positive predictive value (PPV) of 96.7% when correlated with surgical findings. Recently, Karanikas et al.^[10] reported a success rate of 77.4% to demonstrate the presence of a fistula in their series.

In support of the efficacy of MRI for perianal fistula evaluation, Lee et al.^[9] used MRI as a comparative gold standard and found trans perianal US corresponded with MRI findings with sensitivity and PPV of 76.3% and 84.2% for fistula detection and 56.3% and 90.0% for diagnosis of abscess cavity, while colonoscopy corresponded with MRI findings with sensitivity and PPV of 67.8% and 89.9%, respectively, for fistula detection and 43.8% and 48.8% for abscess detection.

Conclusion:

We concluded that MRI is a very sensitive, painless and noninvasive modality of choice for the evaluation of perianal fistula. T2 W Fat suppression techniques increase visualization of small fistula and complication like ramification and abscess formation or adjacent involvement.

In our study group, the disease predominantly affected third and fifth decade male. Trans sphincteric fistula were most common .Ramification and abscess were seen in approx. half of patient with internal opening in to anal canal. Approx.70 % of patient under gone surgical treatment while rest selected alternative allopathic /homeopathic treatment.

Ramifications and abscesses were commonly seen, affecting nearly half of the patients and majority of the patients had active fistulous tracks with posteriorly located enteric opening. Overall, Trans sphincteric fistulae were most common.

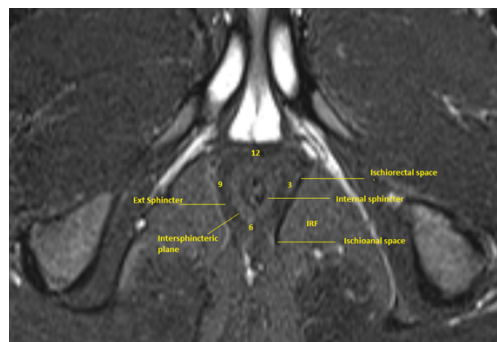
Figures

Figure 2 : MRI anatomy 12 anterior perineum, 6 natal cleft, 3 left lateral aspect 9 right lateral aspect



Figure 3- Intersphincteric grade 1(A) & grade 2(B) fistula

Axial T2 fat-saturated (A, B) show the fistulous track (arrow) medial to external anal sphincter figure 3A and with abscess formation on left paramedian location in figure 3B.

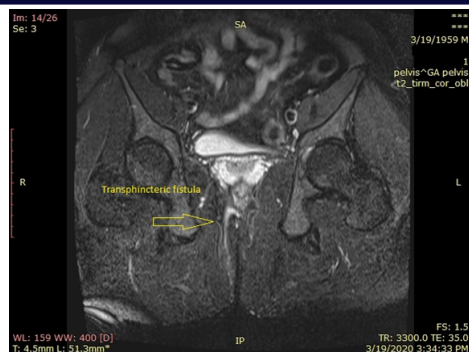


Figure 4 - Simple transsphincteric grade 3 fistula.

Coronal T2 fat-saturated shows the fistulous track (arrowheads) lateral to the external anal sphincter in left paramedian location with internal opening at 12 o'clock position.

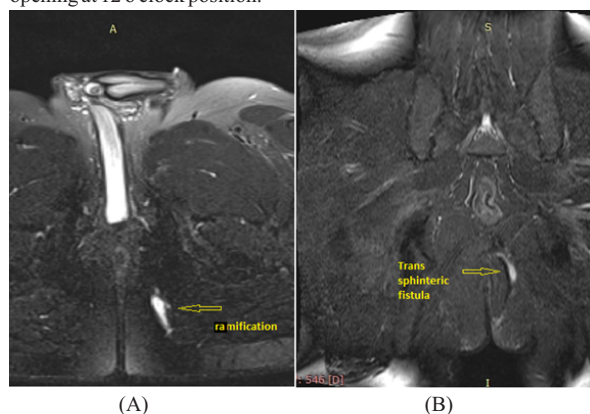


Figure 5 - Complex transsphincteric grade 4 fistula with ramification.

Axial T2 fat-saturated (A, B) Arrow show ramification (Figure A) in the trans-sphincteric fistulous track (Figure B).

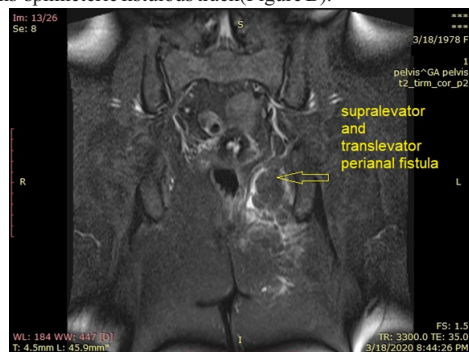


Figure 6 - Supralelevator grade 5 fistula.

Coronal T2 fat-saturated show the fistulous track (arrow) reaching above the levator ani muscle on left side with surrounding inflammatory changes.

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