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Research Article

PRE-OPERATIVE EVALUATION OF FISTULA IN ANO BY MR-FISTULOGRAPHY

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| | |
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| CT | Computed Tomography |
| EAS | External Anal Sphincter |
| EAS | EndoanalUltrasound |
| FLASH | Spoiled Fast Low-angle Shot |
| IAS | Internal Anal Sphincter |
| MRI | Magnetic Resonance Imaging |
| SD (Sd) | Standard Deviation |
| STIR | Short Tau Inversion Recovery |
| T1 WI | T1 weighted imaging |
| TSE | Turbospinecho |

ABSTRACT

MRI has become the method of choice for evaluating perianal fistulae due to its ability to display the anatomy of the sphincter muscles orthogonally, with good contrast resolution. In this study we give an outline of classification of perianal fistulae and present a pictorial assay of sphincter anatomy and the MRI findings in perianal fistulae. In the present study on evaluation of the MRI findings we found that - In 40 cases 32 patients had single tract (80%), 8 cases had multiple tracts (20%). 38 cases (95%) had single external opening, rest of 2 cases (5%) multiple external opening 26 cases (65%) had single internal opening, 14 cases had multiple internal opening. 7 (17.8%) cases shows ramification. 26 cases (65%) intersphincteric fistulae seen. 12 cases (30%) transsphincteric fistulae seen. 2 cases (5%) extrasphincteric fistulae seen. In present study 8 cases were presented with swelling. The mean age on present study was 34 (Sd+) 2.3 years. The youngest case was 21 years and elder was 61 years. The most cases were in 26-45 years.

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INTRODUCTION

Perianal fistulization is an uncommon but important condition of the gastrointestinal tract that causes substantial morbidity. Perianal fistulae occur in approximately 10 of 100000 persons with two fold to fourfold male predominance.

A fistulae-in-ano an abnormal hollow tract or cavity that is lined with granulation tissue and that connects a primary opening inside the anal canal to a secondary opening in perianal skin. Its common surgical problem with which patient present to clinician.

Although anal fistulae were known to Hippocrates and have been described throughout the centuries, they began to receive special attention in the 19th century.

Goodsall, who described the course of fistulous tracts from the skin to the anus and Park's, whose classification of fistulae in relation to anal anatomy is widely used in surgical practice.¹

As such, the vast majority of these infections are acute and significant majority is a contributory to chronic, low-grade infections.²

Infection and anal gland drainage obstruction may lead to an acute perianal abscess. Some abscesses may resolve spontaneously via internal drainage into the anal canal, whereas others may require surgical incision and drainage 3-5 Abscesses that are inadequately or incompletely drained will persist and may ultimately seek additional drainage pathways through the intersphincteric space or across the sphincter complex and, in the process, create fistulous tracts.³⁻⁵

Most of these anal fistulae are easy to diagnose with a good source of light, a proctoscope and digital rectal examination. Despite this establishing a complete cure of these anal fistulae is very problematic for these two reasons. First cause being the affection of the disease with respect to the site. Secondly, the significant percentage of these diseases persists or resumes when the correct type of surgery is not adopted or when

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postoperative care is insufficient, or intra-operative if the extensions are lost or unnoticed.^{2,3}

Also anal fistula needs to be differentiated from the following processes, which do not communicate with the anal canal like the hidradenitis suppurativa, infected inclusion cysts, pilonidal disease, Bartholin gland abscess in females.⁵⁻⁷

The state of the spectrum requires the importance of finding the most common cause and therefore⁹⁻¹¹ a better understanding of the targeted and specialized management of the condition. In today's scenario where time is money and litigation is a recalling rule. Better handling of a fistula would be through the images to see the possible pathways and the branching followed by definitive surgery.

MR Fistula is the best imaging mode when it comes to soft tissue, especially the perianal region because it can help identify the presence of abscesses and extensions that would otherwise be lost during surgery and thus prevent recurrences.¹²⁻¹⁵

In view of the above said we did a study "Pre-Operative Evaluation of Fistula In Ano By Magnetic Resonance Fistulography" with the aim to correlate the MRI findings with clinical examination and classify them.

METHODOLOGY

Source of data

This prospective study had been carried out with main source of data for the study were patients from following teaching hospitals attached to Bapuji Education Association J.J.M. Medical College, Davangere.

1. Bapuji Hospital
2. Chigateri General Hospital, Davangere.

Method of collection of data

Study period: 2 years.

Sample size: Proposed to evaluate 40 cases.

The study period was 2 years (August 2016 to August 2018). This study evaluated 40 patients with clinical diagnosis of perianal fistulae.

Inclusion criteria

- All clinically suspected cases of fistulae-in-ano.
- Patients of all age groups.

Exclusion criteria

- Contraindication for MR including incompatible implants.
- Patients with claustrophobia.

MRI Technique

- Imaging system Philips Achieva 1.5 Tesla will be used for imaging.

Protocol

- Coil - surface coil
- T1 & T2 WI in multiple planes with and without fat saturation
- STIR

- Contrast enhanced imaging will be performed, only if indicated.
- Obtained data analysed and tabulated.
- All patients underwent surgery as a primary treatment modality and intraoperative details of the fistula were recorded.
- MRI findings were compared with intraoperative records, which were considered as gold standard in treatment.
- Different sequences and their combination were analyzed for best determination of the fistula.

Objectives of the study

- To determine the type of fistula
- To delineate extent of fistulae with ramification and abscess
- To identify the internal opening

Interpretation and Conclusion

MRI imaging of perianal fistulae relies on the inherent high soft tissue contrast resolution and the multiplanar display of anatomy by this modality.

MRI is especially useful in patients with fistulae associated with Crohn's disease and those with recurrent fistulae as there entities are associated with branching fistulous tracts mixed extrusions are the commonest cause of recurrence.

T2W images (TSE & fat saturated) provide good contrast between the hyperintense fluid in the tract and the hypointense fibrous wall of the fistulae while providing good delineation of the layer of anal sphincters. In our experience axial T2W fat-suppressed images were the most useful for locating fistulous tracts.

Gadolinium enhanced T1W images are useful to differentiate a fluid filled tract from an area of inflammation. The tract wall enhances where as control portion is hypointense.

The exact location of the primary tract 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.

Coronal images depicts the levator plane, thereby allowing differentiation of supralevator from infralevator infection. A combination of an axial and longitudinal series (coronal, sagittal) will provide all the necessary details.

RESULTS

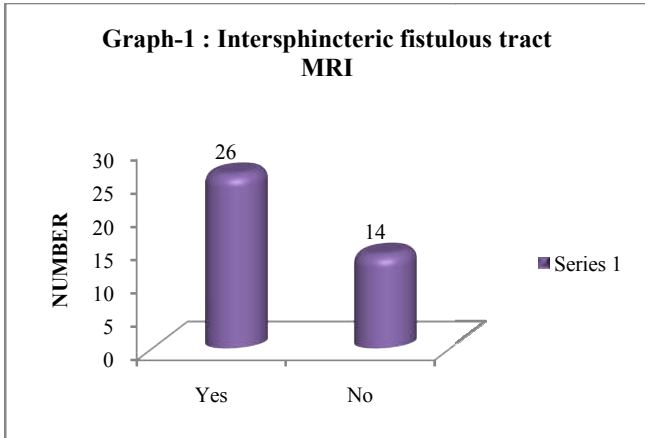
Total 40 patients evaluated in this study. The presence/absence of external sphincter involvement and the location of the internal opening.

- Out of 40 fistulae 26 (65%) were intersphincteric, 12 (30%) were transsphincteric, two (5%) was extrasphincteric, No suprasphincteric fistula was encountered in the study.
- 25 fistulae (71%) were simple where as 11 (29%) showed complications like abscess formation, branching course, and inflammatory tissue.

Intersphincteric Fistulous Tract MRI

Table 1 Intersphincteric fistulous tract MRI

| Intersphincteric fistulous tract MRI | Frequency | Percentage |
|--------------------------------------|-----------|------------|
| Yes | 26 | 65% |
| No | 14 | 35% |
| Total | 40 | 100% |

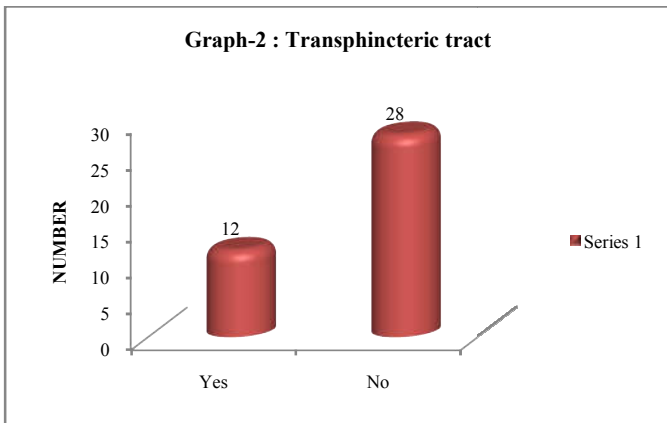


In the present study on evaluation of the MRI findings we found that in 26 cases Intersphincteric fistulous was seen.

Transphincteric Tract MRI

Table 2 Transphincteric tract

| Transphincteric tract | Frequency | Percentage |
|-----------------------|-----------|------------|
| Yes | 12 | 30% |
| No | 28 | 70% |
| Total | 40 | 100% |

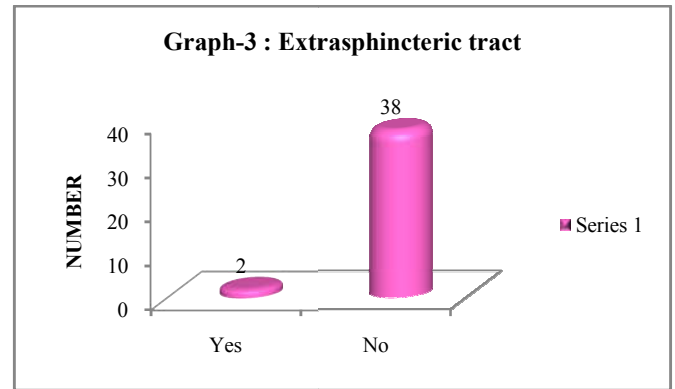


In the present study on evaluation of the MRI findings we found Transphincteric tract in 12 cases, 30%

Extasphincteric tract

Table 3 Extasphincteric tract

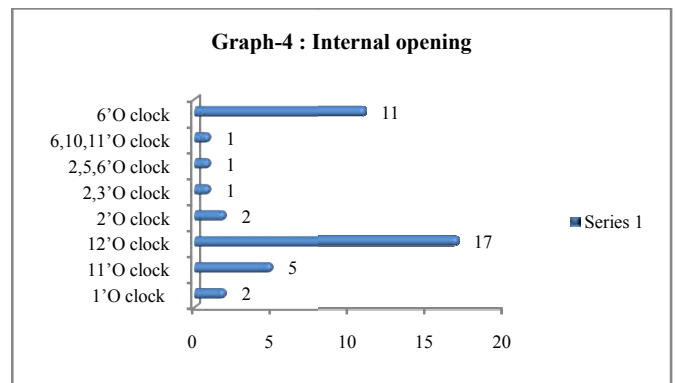
| Suprasphincteric tract | Frequency | Percentage |
|------------------------|-----------|------------|
| Yes | 2 | 5% |
| No | 38 | 95% |
| Total | 40 | 100% |



Internal Opening MRI

Table 5 Internal opening

| Internal opening | Frequency | Percentage |
|------------------|-----------|------------|
| 1'O clock | 2 | 5% |
| 11'O clock | 5 | 12.5% |
| 12'O clock | 17 | 42.5% |
| 2'O clock | 2 | 5% |
| 2,3'O clock | 1 | 2.5% |
| 2,5,6'O clock | 1 | 2.5% |
| 6,10,11'O clock | 1 | 2.5% |
| 6'O clock | 11 | 27.5% |
| Total | 40 | 100% |

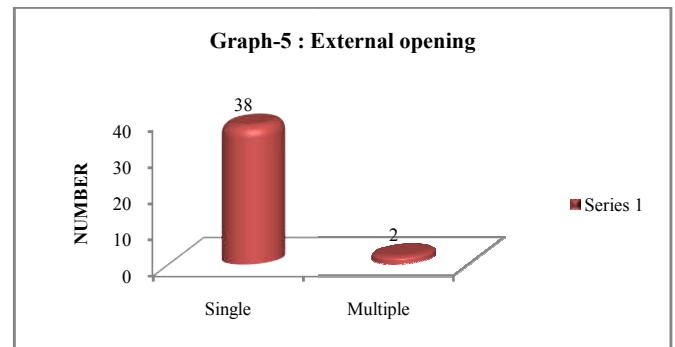


In the present study on evaluation of the MRI findings the above table and graph show the level of internal openings.

External Opening MRI

Table 6 External opening

| External opening | Frequency | Percentage |
|------------------|-----------|------------|
| Single | 38 | 95% |
| Multiple | 2 | 5% |
| Total | 40 | 100% |



In the present study on evaluation of the MRI findings we found that in 38 cases a single opening was seen. In 2 cases

multiple openings (two openings) were seen representation was seen, on the same side.

Comparison of gender distribution

Present study 40 patients (32 males and 8 female).

Comparison of age

Present study 26-45 years 34 (Sd+) 2.3 years.

Type of fistula:

- 26 cases (65%) - Intersphincteric
- 12 cases (30%) - Transsphincteric
- 2 cases (5%) - extrasphincteric

ST. James’s university hospital classification type -MRI

In the present study on evaluation of the MRI findings we found that in 19 cases a single opening Belonged to Type I and 13 Cases to Type III St. James's university hospital classification type

Table 7 ST. James’s university hospital classification type

| St. Jame’s University | Frequency | Percentage |
|-----------------------|-----------|------------|
| I | 19 | 47.5% |
| II | 3 | 7.5% |
| III | 13 | 32.5% |
| IV | 4 | 10% |
| V | 1 | 2.5% |
| Total | 40 | 100 |

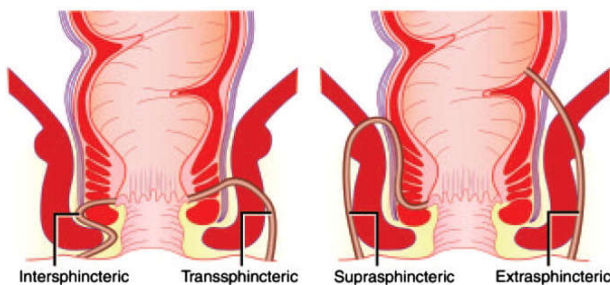
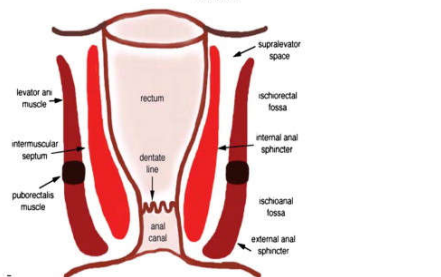
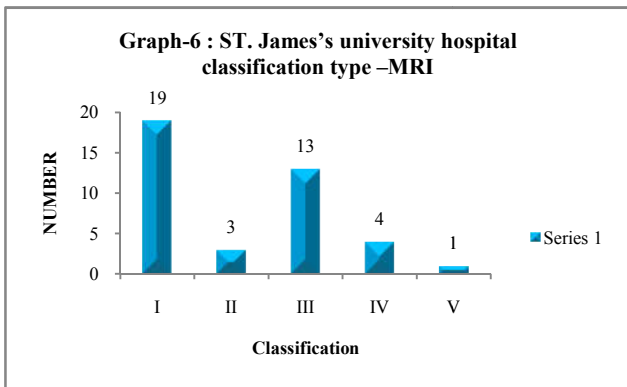
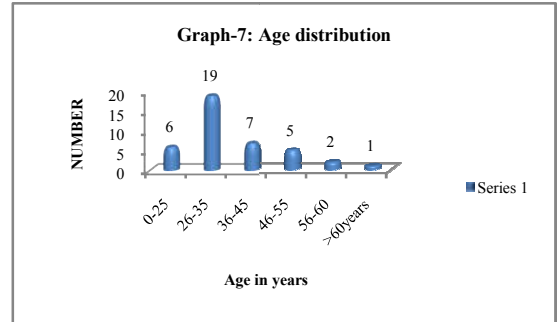


Figure Parks Classification of Perianal Fistulae

Demographic DATA

Table 8 Age distribution

| Age | Frequency | Percentage |
|----------|-----------|------------|
| 0-25 | 6 | 15% |
| 26-35 | 19 | 47% |
| 36-45 | 7 | 18% |
| 46-55 | 5 | 13% |
| 56-60 | 2 | 5% |
| >60years | 1 | 2% |
| Total | 40 | 100% |

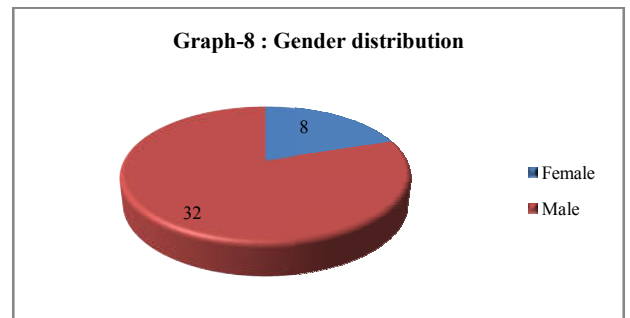


The mean age on the present study was 34(SD+) 2.3 years. The youngest case was 21 years and an elder was 61 years of age most cases were in the age group 26-45 years.

Gender

Table 9 Gender distribution

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Female | 8 | 20% |
| Male | 32 | 80% |
| Total | 40 | 100% |

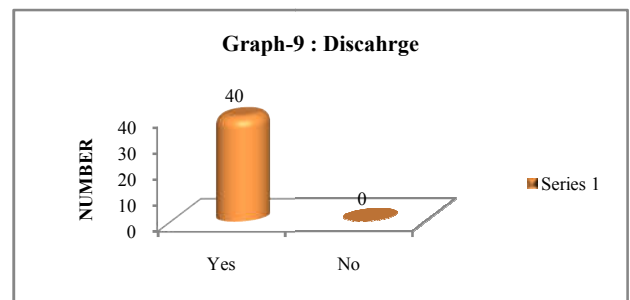


In the present study we found that 32 cases 92% were males as compared to 8 cases 8% females were affected with fistula. In the present study all 40 cases were presented with discharge.

Discharge

Table 10 Discharge

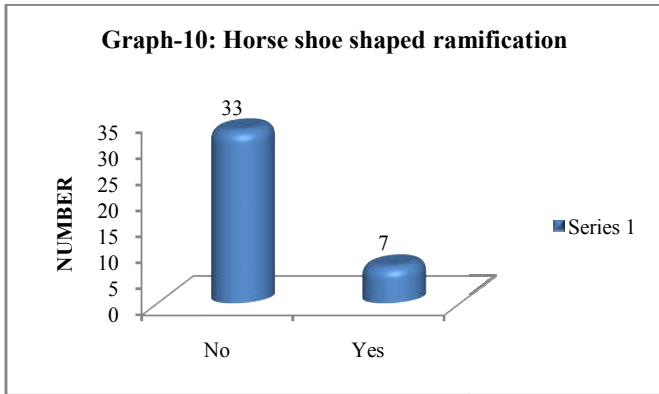
| Discharge | Frequency | Percentage |
|-----------|-----------|------------|
| Yes | 40 | 100% |
| No | - | - |
| Total | 40 | 100% |



Horse shoe shaped ramification MRI

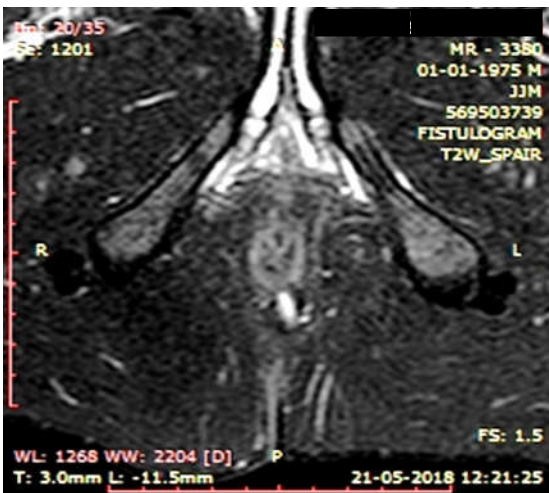
Table 11 Horse shoe shaped ramification MRI

| Horse shoe shaped ramification | Frequency | Percentage |
|--------------------------------|-----------|------------|
| No | 33 | 82.2% |
| Yes | 7 | 17.8% |
| Total | 40 | 100% |

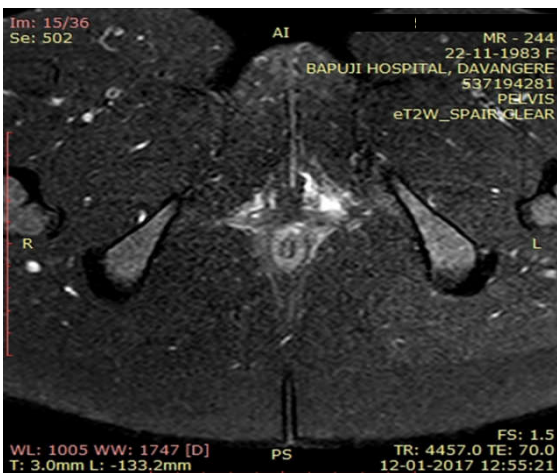


In the present study on evaluation of the MRI findings we found that in 7 cases Horse shoe shaped ramification was seen.

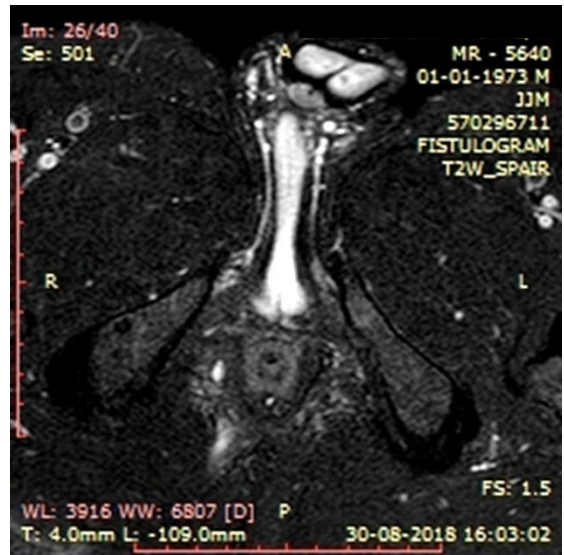
Case Illustration Photographs



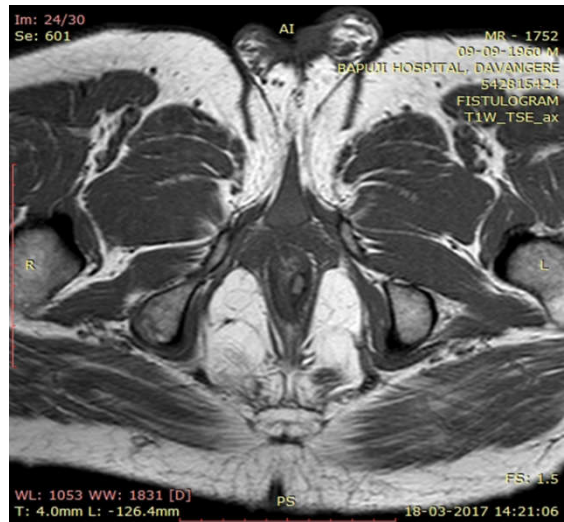
Axial T2 WI showing intersphincteric fistula



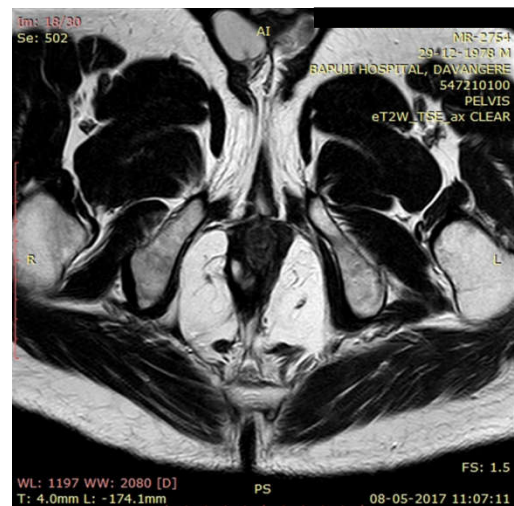
Axial T2 spair showing extrasphincteric tract



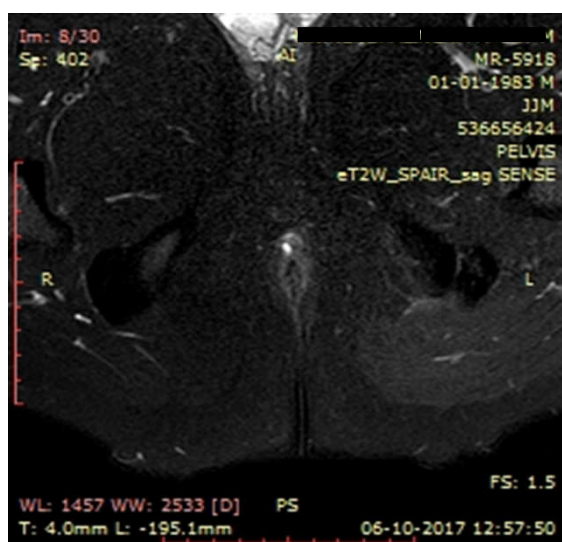
Axial T2 spair showing blind ending sinus



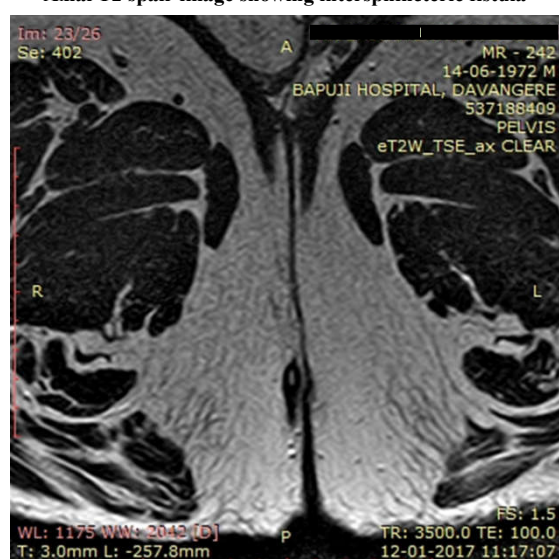
Axial T2WI showing internal opening



Axial T2WI showing transphincteric fistula with horse shoe ramification



Axial T2 spair image showing intersphincteric fistula



Axial T2 WI showing external opening

Rishi Philip Mathew⁶², 28 (93%) were males and 2 (7%) were females.

Table 12 Comparison of gender distribution

| Study | Gender distribution |
|--|--|
| Marina Garcés-Albir, <i>et al</i> | 14 patients (11 men and 3 women) |
| Sthela Maria Murad-Regadaset <i>al</i> | Seventy-four (49%) patients (M: 41, F: 33) |
| Present study | 40 patients (32 men and 8 women) |

Comparison of Age Distribution

The mean age on our study was 43(sd+) 2.3 years. The youngest case was 24 years and eldest was 82 years of age .most cases were in the age group 26-45 years.

Table 13 Comparison of age distribution

| Study | Age distribution |
|---|-------------------------------------|
| DariuszWaniczeket <i>al</i> ⁶⁶ | mean age of 47 years (range 21-77), |
| Present study | 26-45 years, 34(sd+) 2.3 years |

Type of Fistula

In our study intersphincteric fistulas (24 cases , 60 %)were the most common variety as opposed to the study by Marina Garcés-Albir, *et al*⁵⁵low trans-sphincteric fistulas were the most frequent type found (33, 47.1%) followed by hightranssphincteric (24, 34.3%) andintersphincteric fistulas (13, 18.6%).

Marina Garcés-Albir, *et al*⁵⁵in their study showed that the intraoperative findings were consistent with radiological descriptions of 13 MRI fistulographies. Only in one case, according to surgery findings, it was a transsphincteric fistula with an abscess in the ischioanal fossa, with an orifice in the posterior crypt; the radiologist described it as a transsphincteric, internal blind fistula.

Maier *et al.*⁴⁸ showed a statistically higher efficiency in the detection of perianal fistulas andabscesses in 39 patients with the use of magnetic resonance (84% sensitivity) as compared to endosonography (60% sensitivity). False-positive results were present in 6 patients (15%) examined with MR and in 10 (26%) examined with endosonography

Beets-Tan *et al.*⁴⁹ assessed the usefulness of the method by comparing the results of MRI in patients before surgery with intraoperative findings. They proved that its sensitivity and specificity for fistulous canal detection amounted to 100% and 86%, respectively. For a horseshoe fistula this was 100% and 100%, and for internal openings - 96% and 90%.

MR imaging findings were correlated with the intraoperative surgical finding IN a study by Jajooet *al.*⁵⁷ MR imaging shows 7 fistulous patients with side branching and 16 with abscess cavity which was 100% intraoperatively correlated. Fifty-six patients out of 60 completely correlated with MRI for primary track which was clinically significant. MRI had 96% sensitivity and 100% specificity for primary tract and internal opening an7 100% sensitivity and specificity for abscess and multiple tracks.

Regina G. H. Beets-Tan *et al.*⁶⁸ The sensitivity and specificity for detecting fistula tracks were 100% and 86%, respectively; abscesses, 96% and 97%, respectively; horseshoe fistulas, 100% and 100%, respectively; and internal openings, 96% and 90%, respectively.

DISCUSSION

As multiple medical and surgical treatment options exist, imaging plays a critical role in accurately characterizing perianal fistulas to individualize management strategy. Differences in the classification scheme have been shown to have an impact on prediction of prognosis. Imaging options include fistulography, computed tomography (CT), anal endosonography, and MRI.

MRI classification of perianal fistulae has been significantly associated with clinical outcome, with MRI grades differing significantly between satisfactory and unsatisfactory outcomes. MRI evaluation of perianal fistula has also revealed additional diagnostic information in the preoperative setting, especially for complicated disease

MRI evaluation and classification of perianal fistulae can be standardized with a high degree of diagnostic accuracy therefore reducing interobserver variability.

Comparison of Gender Distribution

In our study we found that 92 % were males as compared to 8 % females were affected with fistula.

Rishi Philip Mathew⁶² MRI had a sensitivity and specificity of 96.15% and 75% respectively. JA Spencer *et al.*⁶⁷ in their study found MR imaging had a sensitivity of 97%, a specificity of 67%, a positive predictive value of 88%, and a negative predictive value of 89%.

DISCUSSION

In the present study on evaluation of the MRI findings we found that

- In 40 cases 32 patients had single tract (80%), 8 cases had multiple tracts (20%).
- 38 cases 95% had single external opening, rest of 2 cases (5%) multiple external opening.
- 26 cases (65%) had single internal opening, 14 cases had multiple internal opening.
- 33 (82.2%) cases shows ramification.
- 26 cases (65%) intersphincteric fistulae seen.
- 12 cases (30%) transsphincteric fistulae seen.
- 2 cases (5%) extrasphincteric fistulae seen
- In present study 8 cases were presented with swelling.
- The mean age on present study was 34 (Sd+) 2.3 years. The youngest case was 21 years and elder was 61 years. The most cases were in 26-45 years.

CONCLUSION

Perianal fistulae is a clinical entity with significant patient morbidity. While multiple surgical options exist, recurrence rates and the risk of fecal incontinence are important considerations in management strategy. MRI provides information about the fistulae with great anatomic detail with respect to secondary tracks and abscesses as well as the surrounding pelvic organs. The use of MRI for the identification and classification of perianal fistulae can provide essential information that has been shown to have both preoperative and prognostic value. Preoperative precise localization of the fistulous tract with its internal and external orifice is the main purpose of the diagnostics in perianal fistulas and, to a large extent, determines the effectiveness of surgery.

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