RESEARCH ARTICLE

"PRE-OPERATIVE MAGNETIC RESONANCE FISTULOGRAPHY AND ITS CORRELATION WITH POST OPERATIVE FINDINGS IN CASE OF FISTULA IN- ANO AT A TERTIARY CARE HOSPITAL IN NORTH KERALA"

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Manuscript Info

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Abstract

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Introduction: Perianal fistula is a common clinical problem with considerable morbidity. Accurate preoperative assessment of the perianal fistulous tract determines the success of the surgery. Magnetic resonance imaging fistulography is a non-invasive, safe, and accurate imaging modality. The success of surgery and the likelihood of recurrence are now determined to a great extent by radiographic imaging (including fistulography, computed tomography, endoanal ultrasound imaging, and magnetic resonance imaging) of the complete fistulous tract, ramifications, and related collections. Difficulties in assessing tracts may lead to unsuccessful "blind" attempts at tract delineation during surgery. These attempts may result in the failure of surgery with high recurrence rate.

Objectives: Main aim of the study is to classify perianal fistulae according to SJUHS classification, and to correlate MR Fistulography evaluation with per operative finding.

Methodology: MR fistulography was done in 40 patients over a period of 12 months (June 2021 and November 2022). The sensitivity of MR fistulography is calculated by taking intra operative findings as the gold standard, to be 92%, with permissible error = 10%,

Results: In the present study, during a period of 12 months, 40 patients were evaluated with MR fistulography. It was found to be highly sensitive in identifying the internal opening of fistula and secondary tracts, abscess formation. Most common was grade 1 in 22 patients, the remaining were equally distributed in grades II, III, and IV. Commonest internal opening was at 4- 6 O' clock position. MRI findings were concordant with surgical findings in 37 patients.

Conclusions: When compared to operative observations, MR fistulography has become the imaging technique of choice for preoperative evaluation of perianal fistulas. It offers a highly accurate, quick, non-invasive way to perform fistula assessment prior to surgery and is highly sensitive in the detection of the primary tract, internal opening, secondary tract, abscess, and horseshoe extension.

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Introduction:-

Fistulae-in-ano is defined as an abnormal hollow tract or cavity lined with granulation tissue that connects a primary internal opening in the anal canal to a secondary opening in the perianal skin. It is a common surgical problem with considerable morbidity, societal stigma and traumatizing mental experience to patients. The successful outcome of surgery depends to a great extent on the accurate preoperative identification of the perianal fistulous tract. Perianal fistulas affect 10 out of every 10,000 individuals [1,] Predominantly affecting adult males in the third and fifth decades. [2, 3.]

Fistula-in-ano frequently develops following anorectal abscess. One-third of individuals who have anorectal abscesses incised and drained go on to develop fistulas [4.] Most common cause of fistula is nonspecific infection of anal glands [5,] however a number of other causes are also identified, which include tuberculosis, Crohn's disease, ulcerative colitis, pelvic infections, radiations, carcinomas, and traumas to the anorectal region [6,7.]

The success of surgery and the likelihood of recurrence are now determined by radiographic imaging (including fistulography, computed tomography, endoanal ultrasound imaging, and magnetic resonance imaging) of the complete fistulous tract, ramifications, and related collections. As a result, a thorough pre-operative evaluation of the fistulous tract plays a crucial part in deciding the outcome of surgery. Difficulties in assessing such tracts may lead to unsuccessful "blind" attempts at tract delineation during surgery. A "blind" surgery without a proper route map of the fistulous tract favors the development of pathological granulation tissue, and a persistent inflammatory foci. The "gold standard" for preoperative evaluation should be MRI [8,] However, many surgeons employ endoanal ultrasonography (TRUS) in the preoperative evaluation of anal fistulas. Hydrogen peroxide-enhanced endoanal ultrasonography may be equivalent to MRI, despite some contradictory findings [9.]

The M R fistulography outscores all other investigations for the assessment of perianal fistula, as it is safe, accurate and non-invasive modality with high spatial resolution without any risk of ionizing radiation. The added advantage of MR in delineating the perianal anatomy helps in the assessment of the fistulous tracts and their associated ramifications and abscesses if any.. In our study, we have assessed the diagnostic accuracy of MRI in comparison with intraoperative findings which is considered as the gold standard.

Material and Methods:-

A cross sectional study was conducted among 40 patients referred from surgical out-patient department, KMCT medical college hospital, Kozhikode, Kerala, over a period of 12 months between June 2021 and November 2022. They were evaluated with MR fistulography in Department of Radiology.

Inclusion criteria

1. Patients with clinical suspicion of fistulae-in-ano.
2. Patients of age group between 18-60 years.
3. All patients who give valid consent for the study.

Exclusion criteria

1. Contraindication for MR including incompatible implants.
2. Patients with claustrophobia.
3. Patients not willing to participate in the study.
4. Patients who underwent surgery for fistula in ano before

Study Procedure:

40 patients who satisfy inclusion and exclusion criteria were enrolled in the study. Brief history of clinical symptom, a previous allergic reaction if any to contrast media or any of the ingredients in the past is elicited. No specific pre-procedure preparation was required except for sedation in a few patients who are not able to cooperate. Patients were instructed to remove all metallic belongings before the examination. The study is performed with a 1.5 T MRI scanner (SIGNA – GE Healthcare, U.S, Chicago) with a 16-channel body coil.

The following were assessed:

Type of fistula, position of internal opening, position of external opening, presence of accessory tracts& abscesses, grading of fistula by St. James's University Hospital MRI Classification and the accuracy of MRI findings was correlated with intra operative findings.

Results:-

The study was conducted by collecting data from 40 patients, who were diagnosed with fistula in ano and referred for MRI fistulogram to the department of Radiodiagnosis, KMCT medical college. Parameters like internal opening, external openings, secondary tracts, abscesses and SJUHS grading were analyzed and each was compared with intra operative findings. The diagnostic accuracy of each parameter was assessed.

1) **Age distribution.**

Table 1 and the bar diagram (in figure no:1) depict the incidenceof fistula in ano in different age groups. The majority (62.5%)of fistula in ano are seen in the age group of 30-50 years.Only few fistulas are seen in children and in patients more than 50 years.

Table 1:- Age distribution.

	AGE(IN YRS)	NO OF PATIENTS	PERCENTAGE
1	<30	7	17.5
2	31-40	12	30
3	41-50	13	32.5
4	51-60	8	30
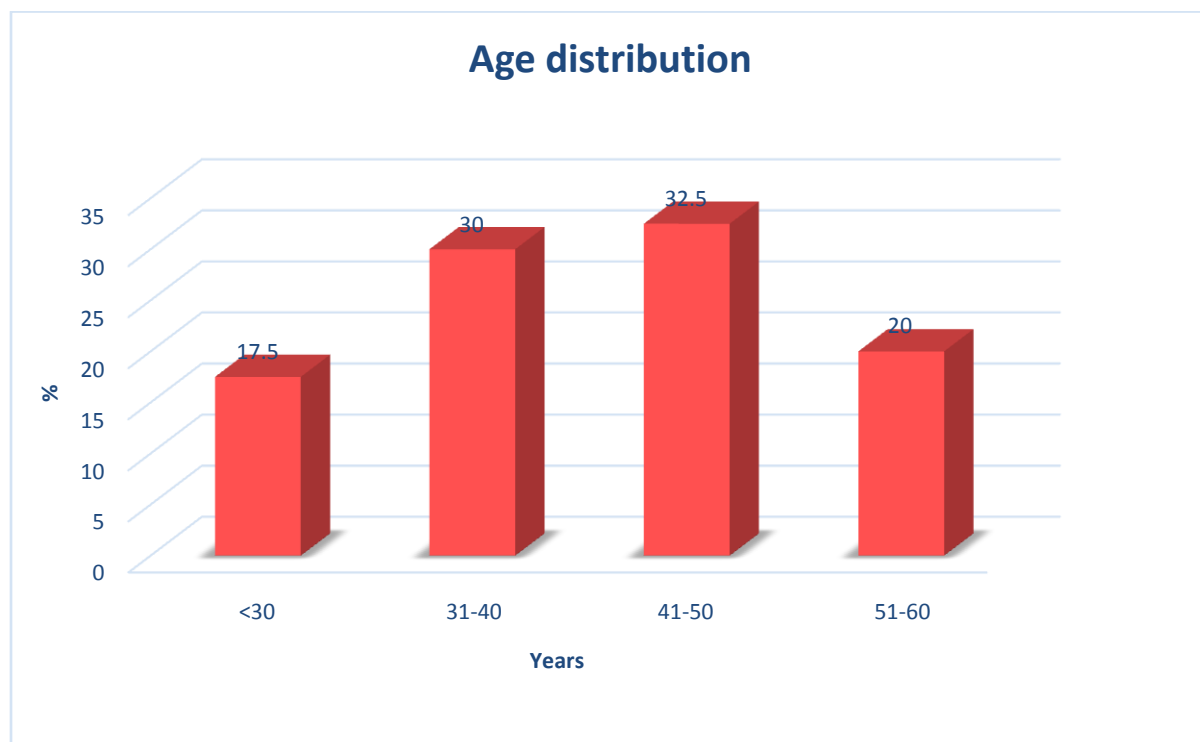
Figure no 1:-

2) Gender distribution of fistula in ano.

Table 2 and pie diagram (in fig no: 2) shows distribution of fistula in ano based on gender.There is male preponderance in fistula in ano(82.5%). Only 17.5% of females are affected in our study.

Table 2:- Gender distribution of fistula in ano.

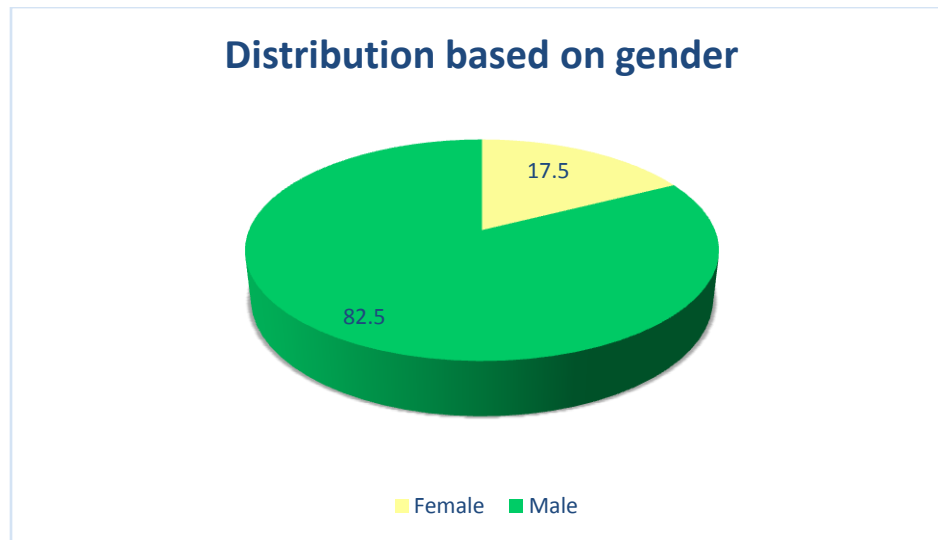| GENDER	NUMBER OF PATIENTS	%
Female	7	17.5
Male	33	82.5
Total	40	100.0

Figure 2:-

3) Identification of secondary tracts.

Table 3 and the bar charts in Fig.3 show the identification of anorectal fistulas in MRI and intraoperatively. Secondary tracts were found in the MRI in 10 cases, but secondary tracts were found in 12 cases during surgery. Sensitivity of MRI for identifying secondary tract is 81%.

Table 3:- Identification of secondary tracts.

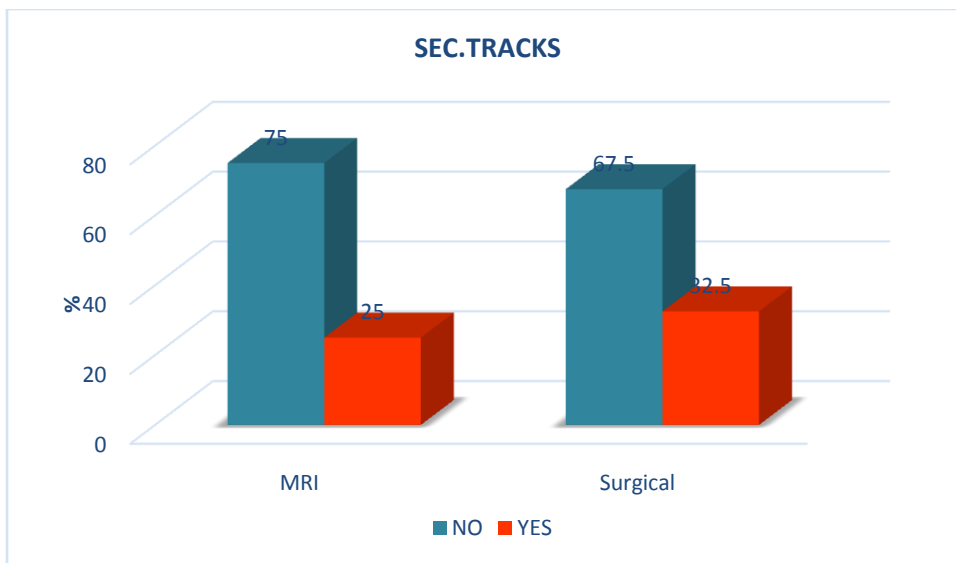|	MRI	Surgical	Chi square value	P value	MRI –SURGERY CONCORDANCE
ABSENT	30	27	0.55	0.31	
PRESENT	10	13			Sensitivity – 81% Specificity-100%

Figure 3:-

4) **Identification of abscesses.**

Table 4 and the pie chart in Fig 4 show the identification of abscess associated with anorectal fistulas in MRI and intraoperatively. Abscesswas found in both MRI and intraoperativelyin8cases. Sensitivity of MRI for identifying abscess is 100%.

Table 4:- Abscesses.

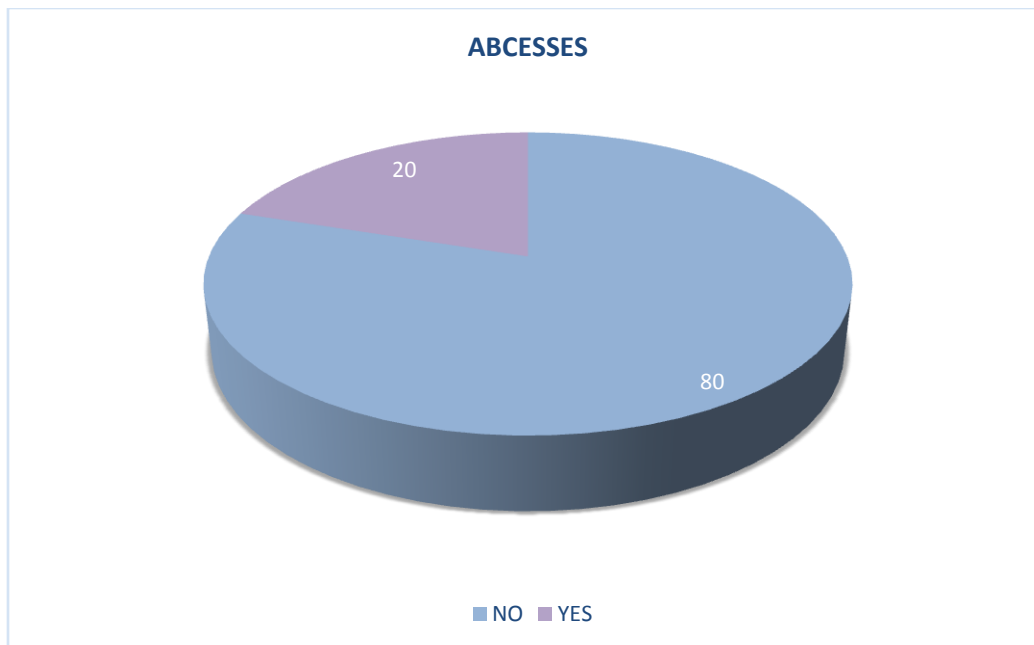| ABCESS	Number of patients	%	Concordance based on surgery
ABSENT	32	80.0	
PRESENT	8	20.0	Sensitivity -100% Specificity-100%

Figure 4:-

5) Identification and distribution of external opening-MRI.

Table 5 and the bar chart in Fig. 5 show the distribution of external opening according to clock position in MRI.

Table 5:- External opening clock position –MRI.

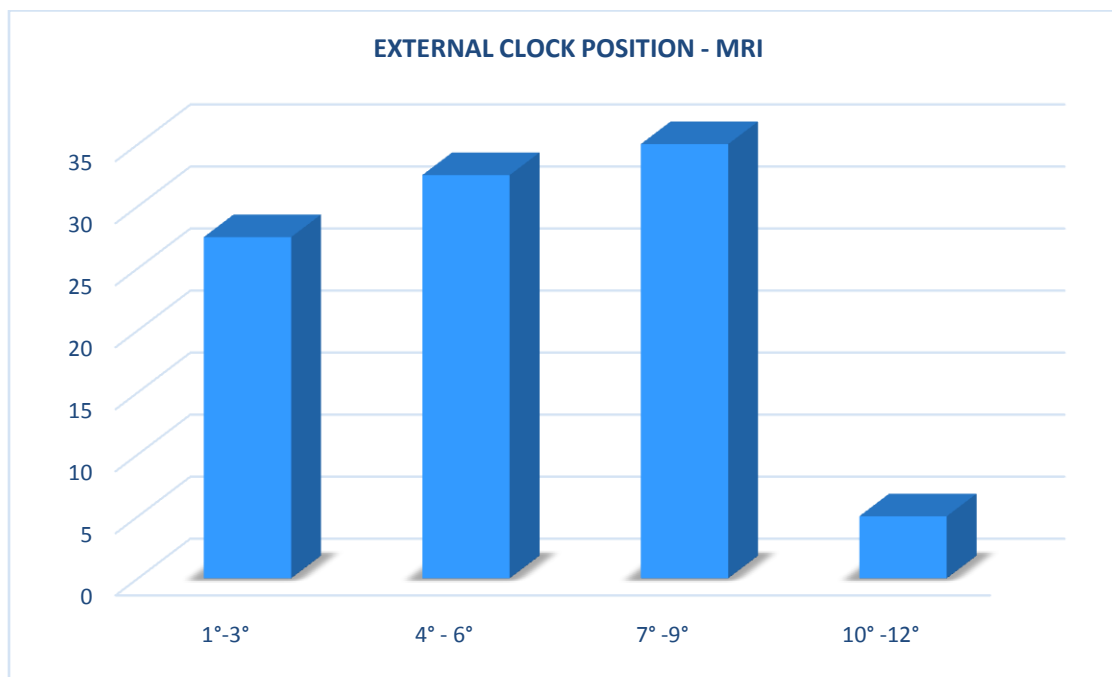| CLOCK POSITION	NUMBER OF PATIENTS	%
1°-3°	11	27.5
4° - 6°	13	32.5
7° -9°	14	35.0
10° -12°	2	5.0

Figure 5:-

6)Identification and distribution of external opening- surgical.
Table 6 and the bar chart in Fig. 6 show the distribution of external opening according to clock position during surgery. Majority of fistula have external opening between 7 and 9 o clock positions (35%).

Table 6:- External opening clock position –surgical.

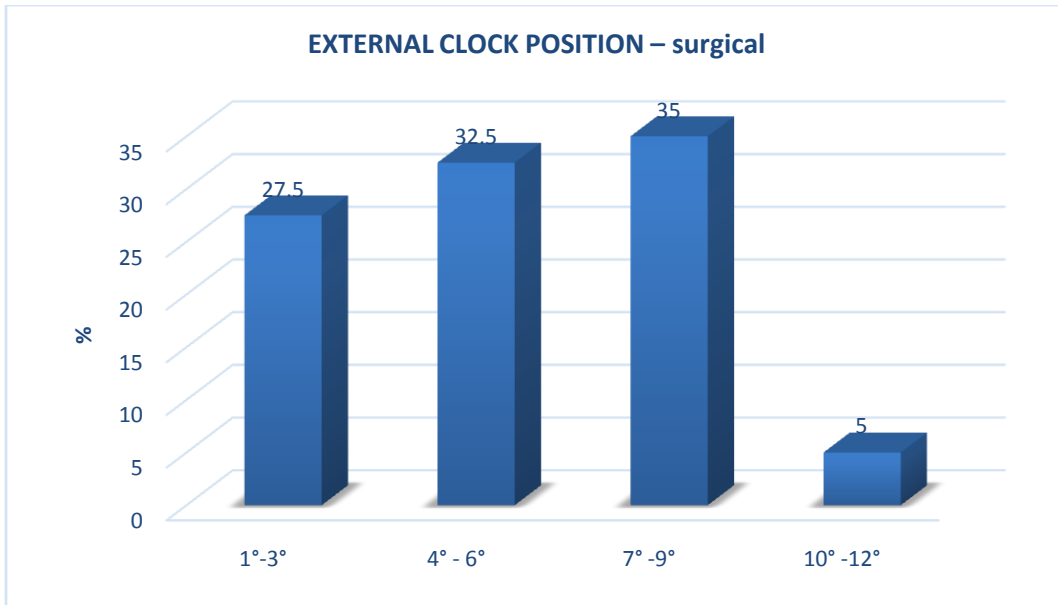| CLOCK POSITION	NUMBER OF PATIENTS	%
1°-3°	11	27.5
4° - 6°	13	32.5
7° -9°	14	35.0
10° -12°	2	5.0

Figure 6:-

7)Identification and distribution of internal opening-MRI.

Table 7 and the bar chart in Fig.7 show the distribution of internal opening according to clock position in MRI.Majority of fistula have internal opening between 4 and 6 o clock positions (57.5%). Least common site of internal opening is 7-9 o clock position (5%).

Table 7:- Internal opening clock position – MRI.

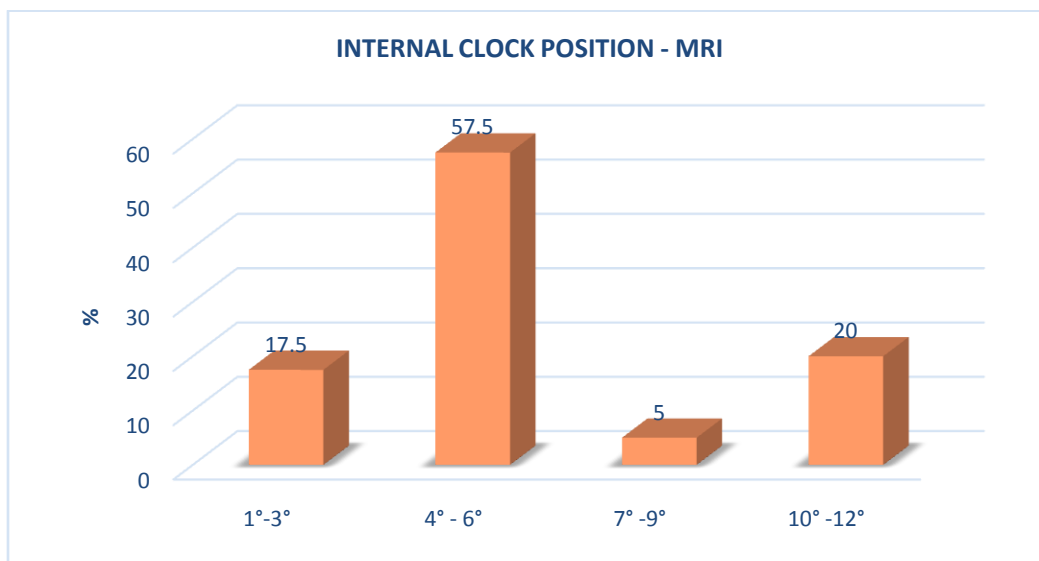| CLOCK POSITION	NUMBER OF PATIENTS	%
1°-3°	7	17.5
4° - 6°	23	57.5
7° -9°	2	5.0
10° -12°	8	20.0

Figure 7:-

8) Identification and distribution of internal opening-surgical.
Table 8 and the bar chart in Fig. 8 show the distribution of internal opening according to clock position during surgery.

Table 8:- Internal opening clock position – Surgical.

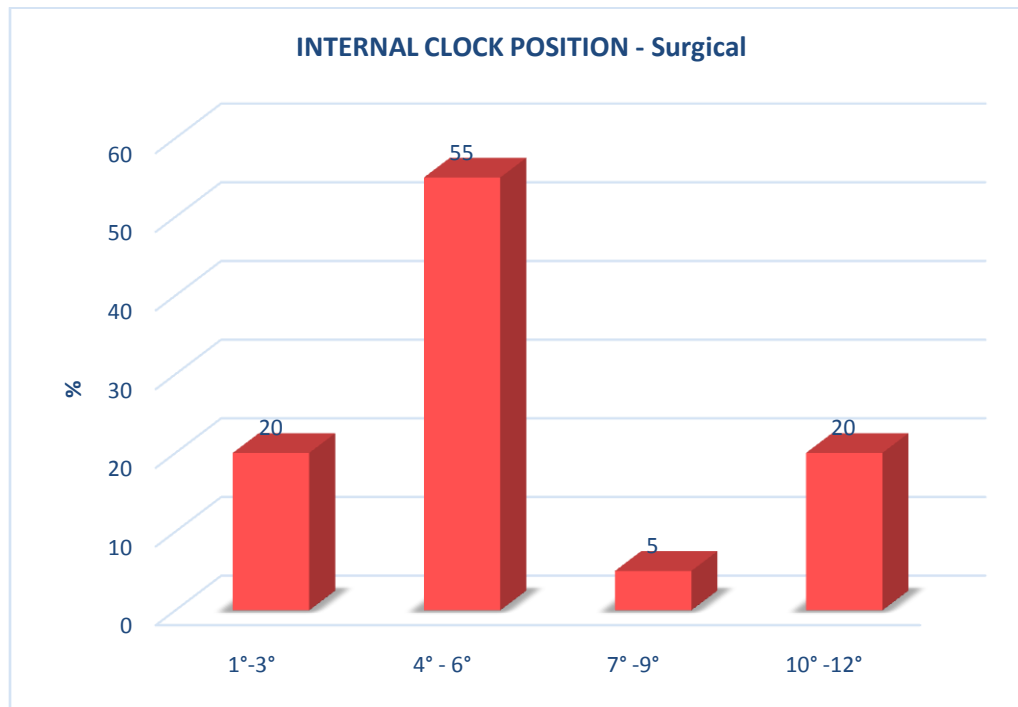| CLOCK POSITION	NUMBER OF PATIENTS	%
1°-3°	8	20.0
4° - 6°	22	55.0
7° -9°	2	5.0
10° -12°	8	20.0

Figure 8:-

9. Contrastenhancement in fistula in ano.
Table 9 and the pie chart in Fig. 9 show the number of cases of fistula in which a contrast study was performed, which was done in cases where there was doubt in the identification of tracts or internal openings or where there were abscesses.post contrast images were acquired only in 9 patients, in which all of them showed contrast enhancement.

Table 9:- Post contrast images acquired.

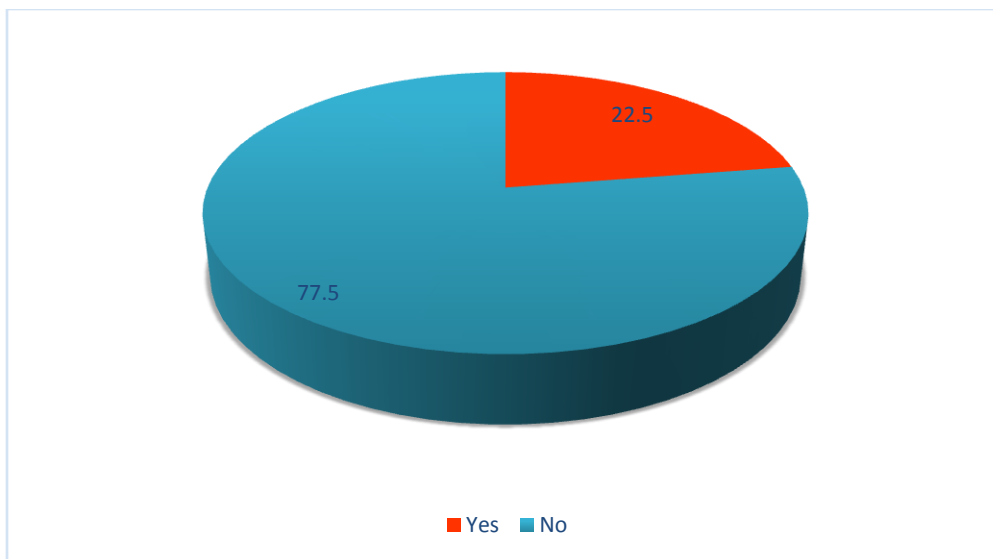| Post contrast images acquired	Number of patients	%
Yes	9	22.5
No	31	77.5

Figure 9:-

10) Distribution of fistula in ano according to SJUHS classification.
Table 10 and the bar chart in Fig. 10 show the distribution of fistulas in ano, according to St. James's University Hospital classification (SJUHS). In our study, the majority of fistulas were of type 1 (simple linear intersphincteric); the remaining were equally distributed in grades II, III, and IV.

Table 10:- SJUHS Classification.

SJUHS classification	Number of patients	%
Grade I	22	55.0
Grade II	6	15.0
Grade III	6	15.0
Grade IV	6	15.0
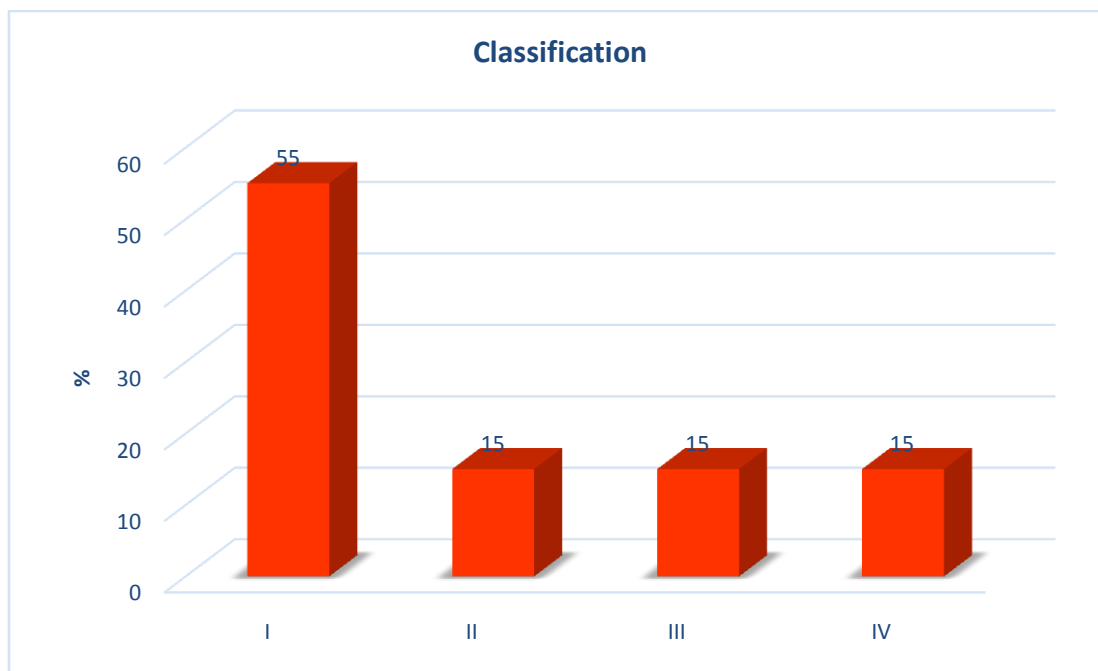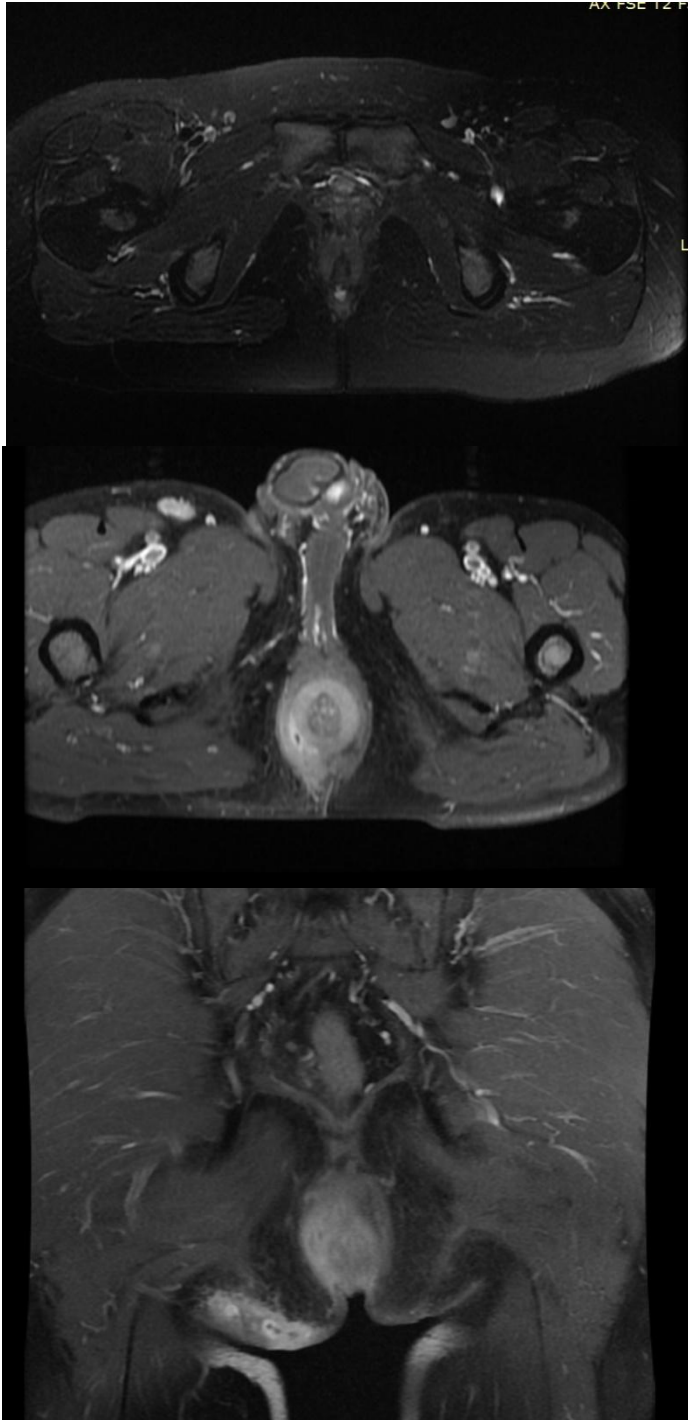
Axial STIR image showing Simple linear intersphincteric perianal fistulous tract in midline - SJUHS Grade I.

Axial and coronal post contrast axial TIFs image showing intersphincteric fistulous tract on right side with phlegmon-SJUHS grade II.

Discussion:-

This prospective observational study of patients with fistula in-ano was conducted at the Radiodiagnosis department, KMCT medical college hospital, Kozhikode. Forty patients in whom conventional MRI diagnosed to have fistula in ano and underwent surgery at KMCT medical college were enrolled for this study. Conventional MRI is followed by post-contrast imaging in few of the cases.

Intraoperative finding is taken as the gold standard and the results were compared with imaging studies. The age of patients in our study is within a range of 18 to 60 years, with a mean age of 40.87 years. The majority of the patients (about 62.5 %) were between 30- 50years of age. Only few fistulas are seen in children and in patients more than 50 years. This data is matching with study done by Shyam N. Kumar, B. Padmini, et al, in their study patients included are in the age range of 25-65 years with a mean age of 41.5 years. In another study done by DucVo, Chien Phan, et al [10] mean age is 39.3±12.4years with ages ranging from 12 to 84 years.

In our study, 10 out of 40 patients had secondary tracts identified in the MRI, but intraoperatively, secondary tracts were identified in 13 cases. MRI failed to identify the secondary tracts in three cases. Sensitivity of MRI for identifying secondary tracts is 81%. Agreement between MRI and surgery for detecting the secondary tracts in a study done by DucVo, Chien Phan, et al ,shows Kappa value: 0.94 (0.90–0.97), p 7), p <0.001.In their study 132 secondary tracts were detected on MRI in 101 (27.5%) patients. 78 (77.2%) patients had one secondary tract. 23 (22.8%) patients had multiple secondary tracts: 18 (17.8%) had two, 3 (3.0%) had three, 1 (1.0%) had four and 1 (1.0%) had five secondary tracts. The agreement between MRI and surgical findings in identifying the location of secondary tracts in their study shows sensitivity of 98.4% and specificity of 97.75 % [10].

Of the total 40 patients included in our study, 33 patients were males (82.5%). And 7 patients were females (17.5%).This is in agreement with a study by Waniczek et al1 in their study 82% are male patients and 18% patients are female patient [11] Also in agreement with study done by Shyam N. Kumar, B. Padmini, et al, among the 40 subjects included in their study, 37 were male and three were females [12].

In our study, abscesses were identified in 8 out of 40 patients, both on MRI and intraoperatively. Among them, 6 patients had simple abscesses, and 2 patients had horseshoe abscesses. Contrast study was performed in 5 out of 8 cases with abscesses and revealed that all 5 patients showed contrast enhancement that helped in demonstrating the extent of the abscess. Hence, it could be concluded that a contrast study is essential for assessing the complications arising due to perianal fistulas. In our study, there was 100% sensitivity and specificity in identifying the abscess, which is consistent with the findings of DucVo, ChienPhanet al, who found 100% sensitivity and specificity in identifying abscess with post-contrast MRI [10]

In our study, when the fistulous tracts were analyzed, majority of the patients (38 out of 40) had a single external opening. Most commonly the opening was found between 7 and 9'o clock position followed by 4 and 6'o clock position. There was 100% agreement between MRI and intraoperative findings in the detection of an external opening. This is superior to study by DucVo, Chien Phan et al.In their study external openings were identified in 353 out of 367 patients (96.2%) with 442 external openings [10].

When analyzing the internal opening, it was single in majority of patients (37 out of 40). Most commonly, the internal opening was found in 4 - 6'o clock position. The operative findings were well correlating with the study regarding the site of the openings in majority of cases (37 out of 40). Three cases showed discrepancies in the location of the internal opening identified in the MRI and during surgery. In the first case, the mismatch is that they identified an extra internal opening during surgery that was not identified in the MRI. In the other two cases, there was a slight variation in the internal opening. That is the internal opening identified in MRI is in positions 6 and 7 in the other two cases, and their surgically identified internal openings were at positions 5 and 8 o'clock positions respectively.

In our study, we classified perianal fistulas based on St James's University Hospital Classification. Among the 40 patients included in the study group, the most prevalent (55%) type of fistula is simple linear intersphincteric type (SJUHS grade1) which is consistent with a study done by Dr. X. Infant PushpaVenishaet al, in a hospital-based prospective observational study they found that out of 60 patients included in their study SJUHS grade 1 fistula

was seen in 20 patients, followed by 16 patients (SJUHS III), 11 patients(SJUHS II) , 8 patients (SJUHS IV) and least common type was SJUHS V(5 patients). The sensitivity and specificity of MRI for grade I and II fistulas were in the order of 100%, 91.66% and 78.94%, 100%respectively [13].

Conclusion:-

This prospective observational study of Forty patients diagnosed with fistula in ano with MR fistulography with and without contrast arrived the following conclusions

1.Perianal fistula, though an uncommon problem may be chronic and recurrent. It may present with numerous complications like secondary tracts and abscess cavities. Incomplete evaluation of these complications can result in residual and recurrent disease. So, complete preoperative evaluation of perianal fistulas ishighly warranted.

2.To prevent the injury to external sphincter and resultant fecal incontinence, it is necessary to establish the relationship of sphincter with the fistulous tracts. MRI satisfies all these needs of surgeons for a better pre-operative planning well in advance.

3. Contrast enhanced MRI is aproblem saving investigation, even if it is not required for all cases of anal fistula. A contrast MR can identify active inflammation of tracts and it is ideal to distinguisha scarfrom granulation tissue. Correct identification of perianal fistulae and proper grading of fistulae are necessary for ensuring an optimum surgical outcome.

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