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A Study of Correlation of Clinical, Radiological and Intra Operative Findings in Management of Perianal Fistulas

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Abstract: ***This observational study evaluated the role of magnetic resonance imaging (MRI) in the assessment and management of perianal fistulas and correlated clinical, radiological, and intraoperative findings. Ninety-four patients with symptomatic perianal fistulas underwent clinical examination and preoperative MR fistulography. MRI findings were compared with intraoperative observations, and postoperative outcomes were assessed. Low-lying fistulas were more common than high-lying fistulas. MRI demonstrated excellent diagnostic performance with a sensitivity of 97.85% and specificity of 96.81% and showed strong correlation with operative findings. Fistulectomy was the most frequently performed procedure. Recurrence was observed in a small proportion of patients. MRI accurately delineated fistulous tracts and sphincter involvement, assisting surgical planning and improving management outcomes. MRI should be considered an essential preoperative tool in the evaluation of perianal fistulas.***

Keywords: Perianal fistula, MR fistulography, Magnetic resonance imaging, Fistulectomy, Fistulotomy, Seton, Surgical outcomes.

1. Introduction

The word *fistula* is derived from the Latin term meaning "pipe" or "tube". [13]. Fistula in Ano refers to a chronic abnormal passage extending from the anal canal (internal opening) to an external opening on the skin of the perineum or buttocks, and rarely to the vagina in women. This tract is typically lined with inflammatory granulation tissue and fibrous material[14 15]. Approximately 90% of fistulas are non-specific or idiopathic, believed to originate from chronic infection of anal glands that open into anal crypts at the dentate line (Cryptoglandular hypothesis, Love and Bailey ed. 28)[18-20]. However, perianal fistulas can also result from inflammatory bowel disease, sequelae of perianal abscess, or conditions such as anal or rectal cancer, tuberculosis, radiation therapy, trauma, or pelvic infection[15-26] Patients commonly report intermittent purulent discharge, sometimes bloody, along with discomfort that worsens until temporary relief follows the discharge of pus[24 26]. Anorectal sepsis often precedes these symptoms.

Successful management of fistula requires thorough evaluation of the fistulous tract, assessment of sphincter integrity and function, and considerations of patient expectations, especially concerning continence, following surgical intervention. Clinical examination provides information on the functional aspects of anal sphincter length, resting tone, and voluntary squeeze, which can be further evaluated objectively using manometry. **Endoanal ultrasound (EAUS)** offers insights into sphincter integrity, influencing surgical strategies based on the findings**. MRI** is considered the 'Gold Standard' for imaging fistulas[28 29]. Short tau inversion recovery (STIR) sequencing, a fat suppression technique used in MRI, highlights pus and granulation tissue without the need for contrast medium. MRI excels in revealing secondary extensions that may be overlooked during surgery, potentially leading to persistent fistulas[28]. **Fistulography and computed tomography** (CT) are valuable if an extra sphincteric fistula is suspected.

2. Aims and Objectives

- To evaluate the role of Magnetic Resonance Imaging in detection and characterization of perianal fistulae.
- To Correlate Clinical findings with MR Fistulogram in operative management.
- To evaluate different methods of Management of perianal fistulae.
- To Predict and manage complications of Different methods used for Management of perianal fistulae.
- To evaluate the rate of recurrences of Different methods.

3. Materials and Methods

The study will be conducted among outdoor / indoor patients admitted to our tertiary care hospital.

- Study Design- Observational study
- Study Duration- After ethical approval, the study will be conducted in General Surgery tertiary care hospital over a period of 18 months. Sample collection (patients) will be done for period of six months. After surgery patient will be closely monitored and evaluated in follow up examinations for next six month

Inclusion Criteria:

- Patients aged 18 years and above of any gender suspected of having perianal fistulae, undergoing preoperative MRI with informed consent.
- Patients with single or multiple discharging sinuses in the perianal region who have undergone preoperative MRI.
- Patients with recurrent perianal abscess to detect undetected tracts by MR Fistulogram.

Exclusion Criteria:

- Patients unable to undergo MRI due to reasons such as metallic implants, claustrophobia, or pregnancy.
- Specific types of fistulas (e.g., Crohn's disease, tuberculosis).
- Patients who decline to give consent for participation.

MRI Protocol (MR Fistulography)

MRI Technique
All patients underwent preoperative MRI examination using a 1.5 Tesla (or 3 Tesla, if applicable) MRI scanner with a phased-array pelvic coil. Patients were examined in the supine position. The imaging protocol included:

- Axial T1-weighted spin echo
- Axial, coronal and sagittal T2-weighted fast spin echo
- Axial and coronal Short Tau Inversion Recovery (STIR) sequences for fat suppression
- Axial and coronal fat-suppressed T2-weighted images
- Post-contrast fat-suppressed T1-weighted images (when clinically indicated)

Slice thickness was maintained at 3–4 mm with a small field of view centered on the anal canal.

Calculation of no of cases (Sampling size)

Sample size calculated considering the proportion of requirement of Surgery of fistula diagnosed patient out of total fistula patient is 30% P=30% Q=1-P Zα/2= level of significance=95% L= Allowable error=7% N= $(Z2\alpha/2\ PQ)/L2$ N=94 over 6 months period.

Continuous variables were expressed as mean ± standard deviation (SD), whereas categorical variables were expressed as frequencies and percentages.

Agreement between:

- Clinical findings and MRI findings
- MRI findings and intraoperative findings

was assessed using the Chi-square test (or Fisher's Exact test whenever expected cell frequencies were <5).

A p-value <0.05 was considered statistically significant.

Diagnostic Accuracy

Taking intraoperative findings as the reference (gold standard), MRI diagnostic performance was evaluated by calculating:

Sensitivity and specificity were calculated as:

$$\text{Sensitivity} = \frac{TP}{TP + FN} \times 100$$

$$\text{Specificity} = \frac{TN}{TN + FP} \times 100$$

Sensitivity = 97.85%
Specificity = 96.81%

During the six-month period of sample collection, patients will be recruited, and their cases will be followed up for an additional six months post-operatively for the study. At each follow-up visit, patients will be evaluated for several parameters:

Postoperative pain severity will be assessed using a Visual Analogue Scale (VAS) ranging from 0 to 10. **Pain scores** will be recorded at 24 hours and 48 hours after surgery. **Postoperative wound discharge** will be defined as the presence of non-infected serosanguinous secretion from the open postoperative wound. **Wound infection** will be identified by the presence of erythema, induration around the wound, or constitutional symptoms like fever. Each follow-up visit will include an examination for wound discharge, and the duration until complete cessation of discharge will be noted for each patient. The **operating time for the procedure** will be measured from the initiation of the dye test to the commencement of dressing the post-operative wound. **Complete healing of the postoperative wound** will be defined as the time taken for the wound to completely heal with no areas showing unepithelialized surfaces.

4. Observation and Results

In this study 94 patients of symptomatic perianal fistulas Symptoms included are: a) perianal pus discharge b) perianal swelling with pus discharge, c) perianal pain d) perianal pain with pus discharge out of which:

1) High lying fistulas (above dentate line) are 36
2) Low lying fistulas (below dentate line) are 58 on clinical examination.

Table 1: Age Wise Distribution

Age	<=30	31- 40	41- 50	>50	Total
Recurrence	1 1.06	0 0	2 2.12	3 3.2	6 6.38
Wound Infection	4 4.25	3 3.2	4 4.25	3 3.2	14 14.9
Incontinence	0 0	1 1.06	0 0	2 2.12	3 3.2

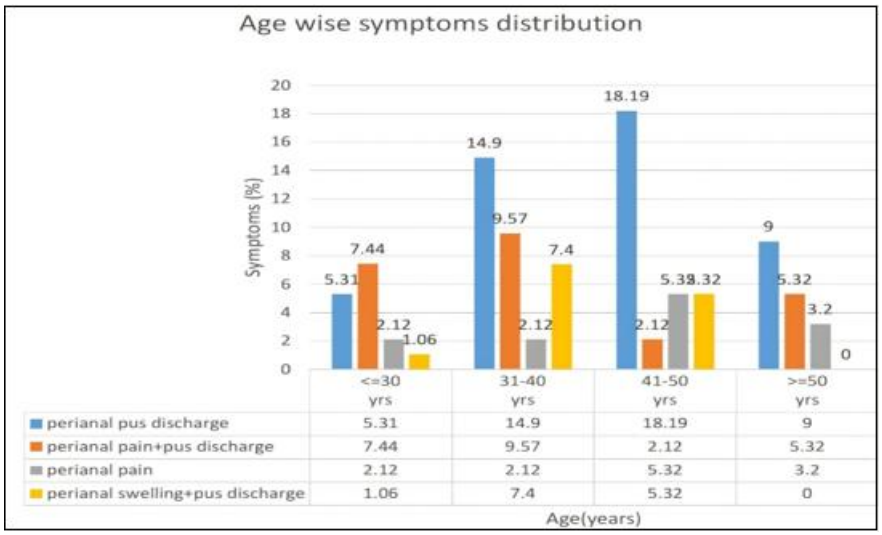


Figure 4: Age Wise Distribution of Symptoms

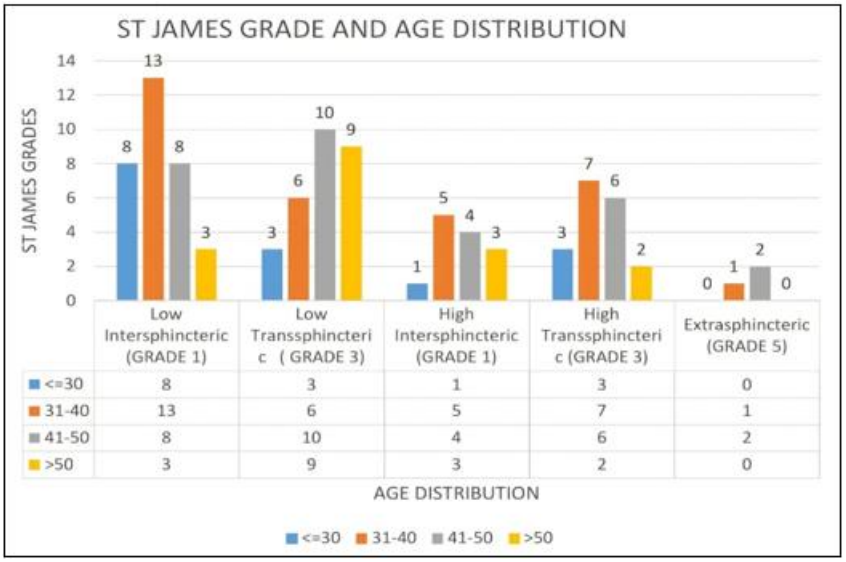


Figure 2: Age Wise type of Fistula Distribution

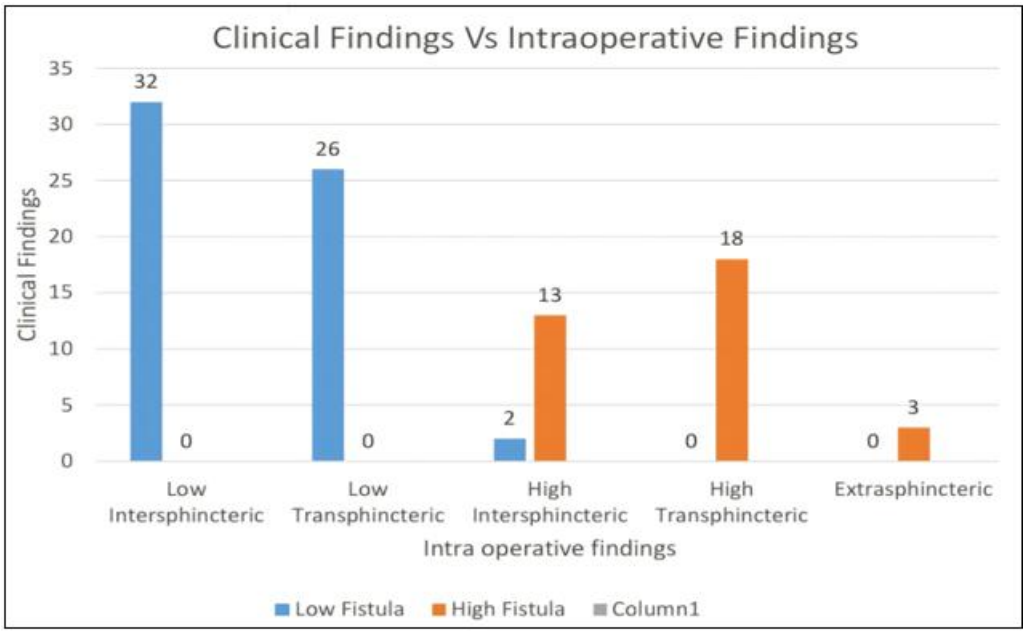


Figure 12: Clinical Findings Vs Intraoperative Findings

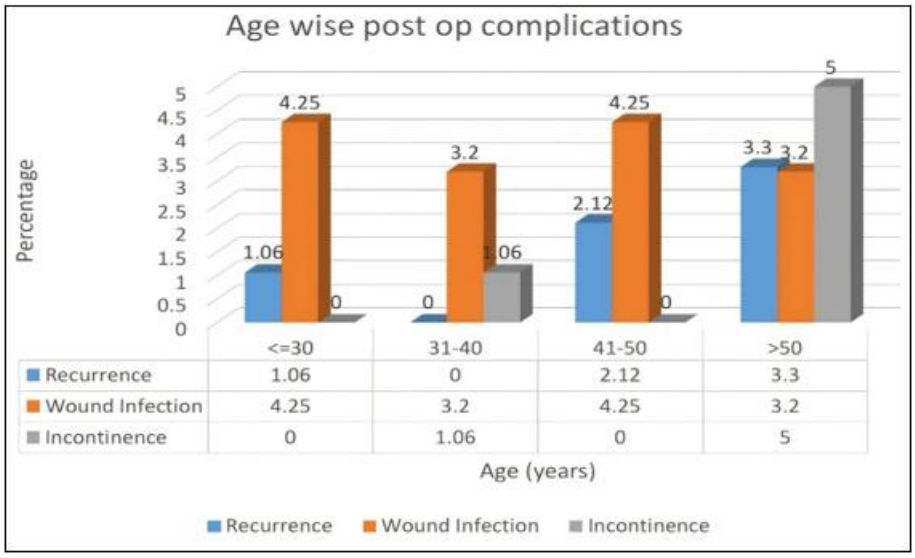


Figure 6: Age Wise post OP Complications

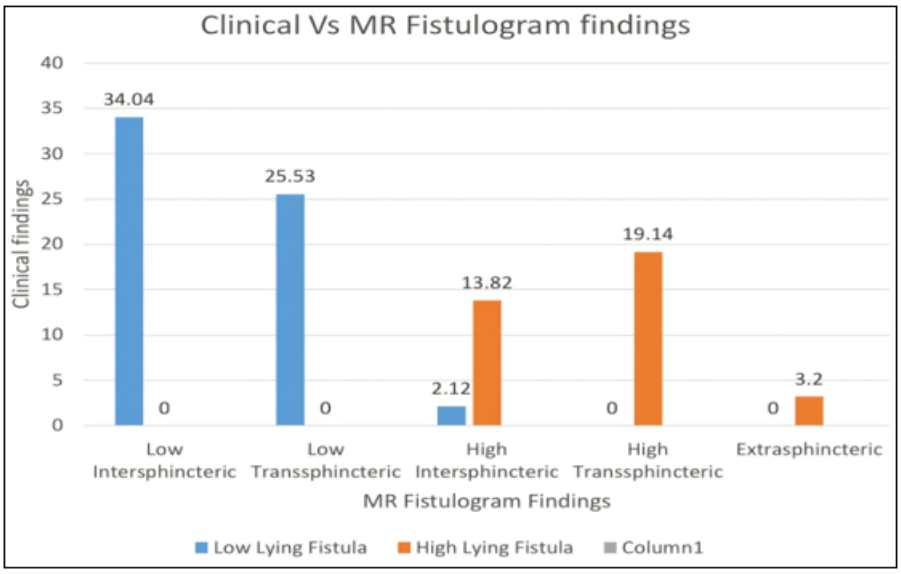


Figure 8: Clinical Vs MR Fistulogram

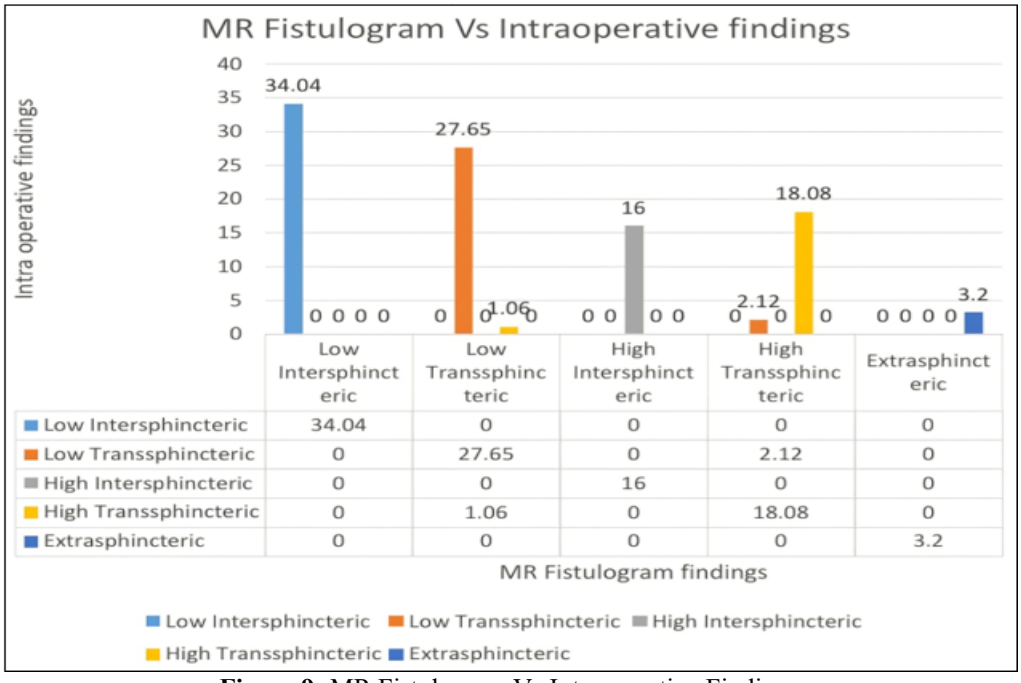
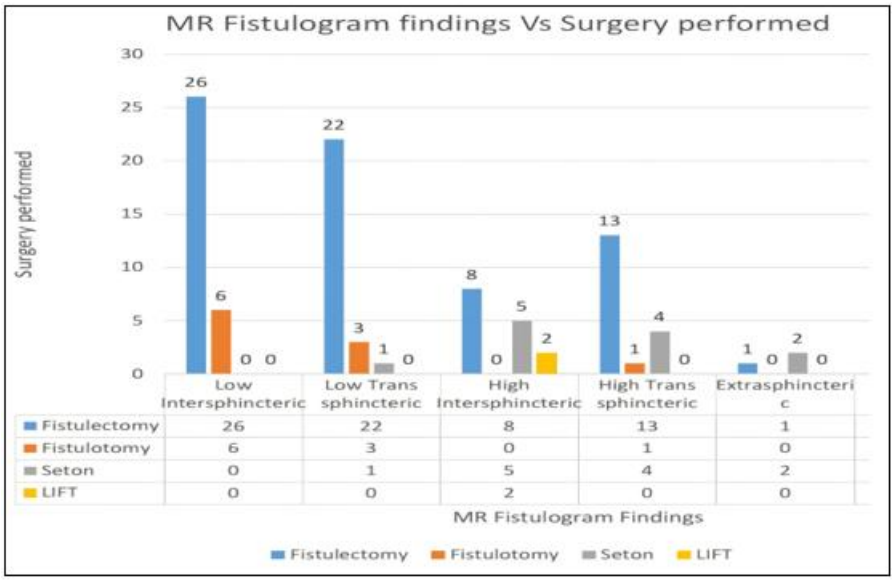
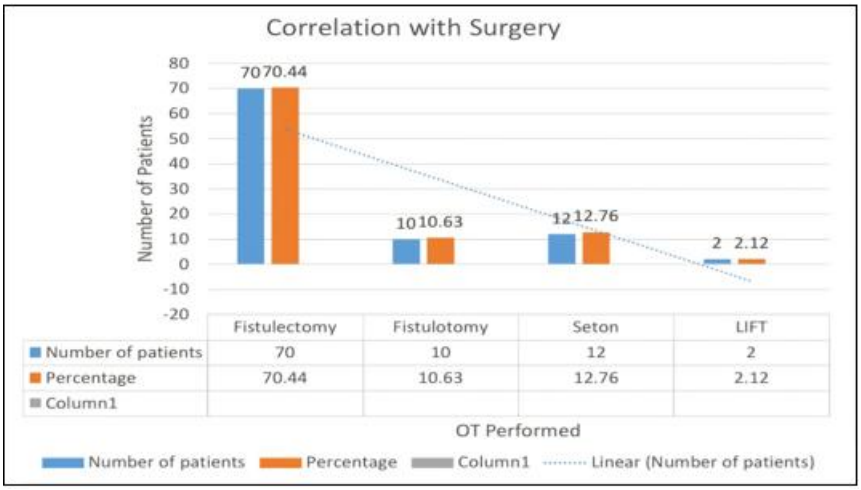


Figure 9: MR Fistulogram Vs Intraoperative Findings



	Low Intersphincteric	Low Trans sphincteric	High Intersphincteric	High Trans sphincteric	Extrasphincteric
Fistulectomy	26	22	8	13	1
Fistulotomy	6	3	0	1	0
Seton	0	1	5	4	2
LIFT	0	0	2	0	0

Figure 10: MR Finding Vs Surgery Performed



	Fistulectomy	Fistulotomy	Seton	LIFT
Number of patients	70	10	12	2
Percentage	70.44	10.63	12.76	2.12
Column1				

Figure 7: Surgical Corelation

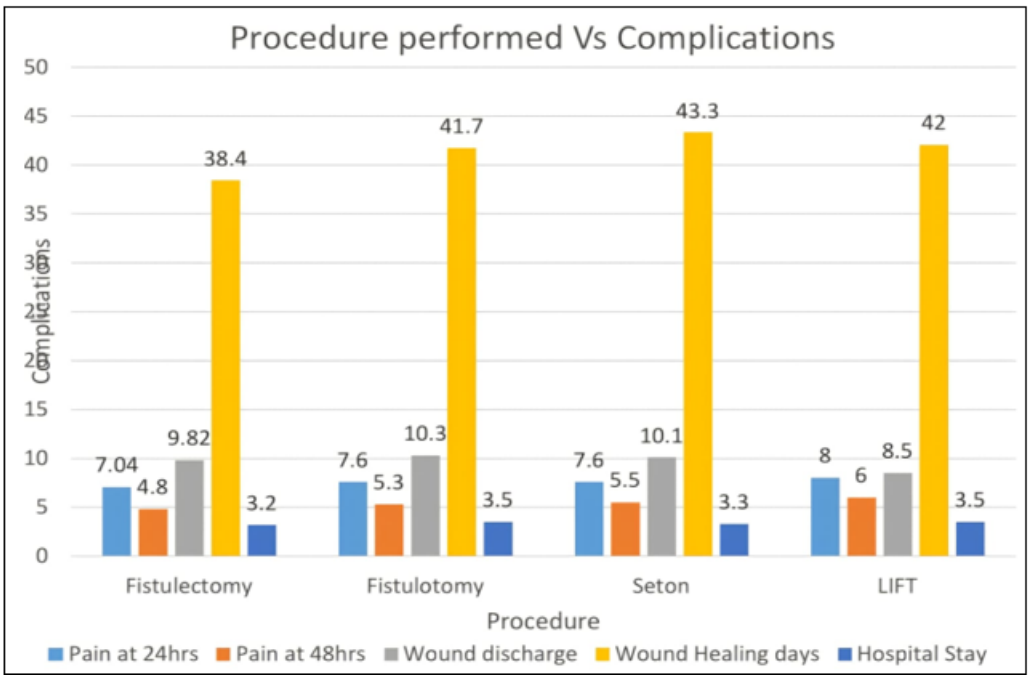


Figure 11: Procedure Performed Vs Complications

Table 2: MR Fistulogram Co relation

Variable	Category	Low Inter	Low Trans	High Inter	High Trans	Extra	p value
Clinical	High	0	0	13	18	3	
		0	0	13.82	19.14	3.2	
	Low	32	26	2	0	0	
		34.04	25.53	2.12	0	0	
Intra op findings	Low	32	0	0	0	0	
	Inter	34.04	0	0	0	0	
	Low	0	24	0	1	0	
	Trans	0	27.65	0	1.06	0	
	High	0	0	15	0	0	
	Inter	0	0	16	0	0	
	High	0	2	0	17	0	
	Trans	0	2.12	0	18.08	0	
	Extra	0	0	0	0	3	
		0	0	0	0	3.2	
OT Performed	Fistulectomy	26	22	8	13	1	
		27.65	23.4	8.51	13.82	1.06	
	Fistulotomy	6	3	0	1	0	
		6.38	3.2	0	1.06	0	
	Seton	0	1	5	4	2	
		0	1.06	5.32	4.25	2.12	
	LIFT	0	0	2	0	0	
	(%)	0	0	2.12	0	0	
Wound Infection		3	3	2	5	1	>0.05
		3.2	3.2	2.12	5.32	1.06	
Recurrence		0	2	2	2	0	>0.05
		0	2.12	2.12	2.12	0	
Incontinence		0	1	1	1	0	>0.05
		0	1.06	1.06	1.06	0	

Results

Demographic Characteristics

A total of **94 patients** with symptomatic perianal fistula were included in the study.

The mean age of the study population was **41 years**, with the highest incidence observed in the **31–40 years** age group. Male patients predominated, accounting for **87 (92.55%)** cases, while females comprised **7 (7.45%)** cases.

Clinical Presentation

The most common presenting complaint was **perianal pain**, either alone or associated with purulent discharge. Other presenting symptoms included perianal swelling with discharge and isolated purulent discharge.

Clinical Classification of Fistula

On clinical examination,

- **Low-lying fistulas**: 58 (61.7%)
- **High-lying fistulas**: 36 (38.3%)

MRI Findings

According to the **St. James's University Hospital MRI Classification**,

- Grade I fistulas: 45 patients
- Grade III fistulas: 46 patients

MRI identified the primary fistulous tract and demonstrated excellent agreement with operative findings.
Only two clinically low fistulas were reclassified as high intersphincteric fistulas on MRI.

Correlation Between MRI and Intraoperative Findings

MRI findings correlated closely with intraoperative findings. Discrepancies were observed in **three patients**, including:

- Two cases diagnosed as low trans-sphincteric fistula on MRI but found intraoperatively to be high trans-sphincteric fistula.
- One case diagnosed as high trans-sphincteric fistula on MRI but found intraoperatively to be low trans-sphincteric fistula.

MRI demonstrated: **Sensitivity:** 97.85% Specificity**:** 96.81% for identification of fistulous tracts.

Operative Procedures: The operative procedures performed were:

Procedure	Number (%)
Fistulectomy	70
Fistulotomy	10
Seton Placement	12
LIFT	2

Fistulectomy was the most frequently performed surgical procedure.

Postoperative Outcomes: The mean postoperative pain score at 24 hours was:

Procedure	Mean VAS
Fistulectomy	7.04
Fistulotomy	7.6
Seton	7.6
LIFT	8

Mean wound discharge duration was:
- Fistulectomy: 10.3 days
- Fistulotomy: 9.82 days
- Seton: 10.1 days
- LIFT: 8.5 days

Mean wound healing time after fistulectomy was **41.7 days**.

Return to normal activities ranged from **3.2 to 3.5 days** among all surgical procedures.

Recurrence
Recurrence occurred in **six patients**:
- Four following fistulectomy
- Two following Seton placement

Recurrences were observed between **6 and 8 weeks** after surgery.

5. Discussion

The present study evaluated the correlation between clinical examination, MR fistulography, and intraoperative findings in patients with perianal fistula.

The majority of patients were males in the fourth decade of life, consistent with previous studies by **Veerendra Kumar**, **Buchanan et al.**, and **Morris et al.**, which also reported a predominance of disease among middle-aged men.

Low-lying fistulas were more common than high-lying fistulas in the present study. This distribution is comparable with reports from previous Indian studies, where low intersphincteric fistulas represented the predominant disease pattern.

MRI demonstrated excellent agreement with operative findings, with sensitivity of **97.85%** and specificity of **96.81%**. These findings are comparable to those reported by **Buchanan et al.** and **Morris et al.**, who concluded that MRI accurately identifies the primary tract, secondary extensions, and sphincter involvement, thereby facilitating appropriate surgical planning.

Only three discrepancies were observed between MRI and operative findings. These discrepancies mainly involved trans-sphincteric fistulas, highlighting the complexity of these lesions and the potential difficulty in distinguishing low from high trans-sphincteric tracts.

Fistulectomy was the most commonly performed operation because most patients presented with low-lying fistulas. Seton placement was primarily reserved for high fistulas to preserve sphincter function and minimize the risk of postoperative incontinence.

Postoperative pain, wound discharge, and healing times were generally comparable across the different procedures, although fistulectomy demonstrated a longer healing period owing to the larger wound created during surgery.

The recurrence rate in the present study was low, suggesting that accurate preoperative MRI mapping contributes to complete identification of fistulous tracts and appropriate operative planning.

Overall, the findings support the routine use of preoperative MR fistulography in the management of perianal fistula, particularly in patients with complex or recurrent disease.

6. Conclusion

MRI is a highly effective modality for the preoperative evaluation of perianal fistulas. It accurately identifies fistulous tracts, secondary extensions, and sphincter involvement, demonstrating strong correlation with intraoperative findings. The information obtained from MR fistulography assists in surgical planning and may contribute to reduced recurrence and improved postoperative outcomes. Low-lying fistulas were more common in the present study, and MRI showed high diagnostic accuracy in characterizing disease extent.

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