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ORIGINAL ARTICLE

PRE OPERATIVE EVALUATION OF FISTULA IN ANO BY MR FISTULOGRAPHY WITH SURGICAL CORRELATION

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ABSTRACT

AIM AND OBJECTIVES: The objective of this study is to evaluate the accuracy of MRI findings of MR Fistulography in correlation with per-operative findings. **Materials and Methods**: MR imaging studies of MR Fistulography were performed in 61 clinically suspected patients using a 1.5T MR machine. Various sequences in coronal, sagittal and axial planes were obtained to evaluate the type of fistula, involvement of muscles and sphincter complexes, to locate the exact site of primary tracts, abcess, horse-shoe fistulas and internal opening. **RESULTS:** MR findings are more closely associated with Per op findings with specificity of 100 % for all grades of Fistula other than G I with sensitivity of 66.67% and sensitivity of 100 %. **CONCLUSION:** High spatial resolution MR imaging with CP spine Array coil is accurate for the detection of Perianal fistulas. It shows the surgical anatomy and maps out the perianal fistulas accurately and provides additional information on secondary extensions in patients with complex fistulas

Keywords: Pre Operative Evaluation, Fistula

1.INTRODUCTION

1. To evaluate the accuracy of Magnetic resonance imaging and its use as a pre- operative evaluation modality for perianal fistulae.

This has ben done by analyzing its abitity to delineate.

A) The primary Tract
B) Secondary tract and its ramifications.
C) Abscess / Source of persistent infection.
D) Relation of the tract to the sphincter complex.
E) Relation of the tract to levatorani

2. To correlate the accuracy of MR Fistulography with surgical findings.

2.MATERIALS AND METHODS:

A Prospective study of 61 patients with suspected fistula in ano, primary or recurrent, referred from the surgery out patient department was done in the Rajah muthiah medical college, Annamalai University, Chidambaram between October 2014 to September 2016. All the 61 patients were subjected to MR Fistulography. MR fistulography was performed using Philips 1.5 tesla, using CP spine Array coil.

INCLUSION CRITERA:

All the patients included in the study were referred from the surgery department with complaints of perianal discharging sinuses. Broadly, the patients included fell into the following criteria :

I. Preoperative evaluation for proven fistula in ano
II. Single / multiple discharging sinuses in the perianal region
III. Recurrent fistulas and for detection of epithelialized tracts
IV. Recurrent perianal abscess for detection for undetected tracts

EXCLUSION CRITERIA:

- Patients with MR incompatible devices or implants
- Patients on life support systems.
- Patients with profound septicaemia with inability to lie down in supine position.
- Patients with claustrophobia.

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3.DATA ANALYSIS AND RESULTS:

Table – 1Distribution of cases according to grades

	Surgical Grading		MR Grading		Per op Grading	
	N	%	N	%	N	%
Normal	-	-	1	1.6	-	-
Grade I	20	32.8	4	6.6	6	9.8
Grade II	4	6.6	14	23.0	13	21.3
Grade III	19	31.1	13	21.3	13	21.3
Grade IV	6	9.8	16	26.2	16	26.2
Grade V	2	3.3	10	16.4	10	16.4
Abscess	2	3.3	3	49	3	4.9
Sinus	8	13.1	-	-	-	-
Total	61	100	61	100	61	100

The distribution of cases according to grades is presented in Table – 1. The distribution with specific to clinical grading, MR grading and per-operative grading is presented. As per-op grading is superior to other grades, it is taken into account for interpretations. About 26.2% are in grade IV classifications and which is the common grading of fistula. Each of 21.3% has grade II and grade III classifications. About 16.4% have grade V classifications.

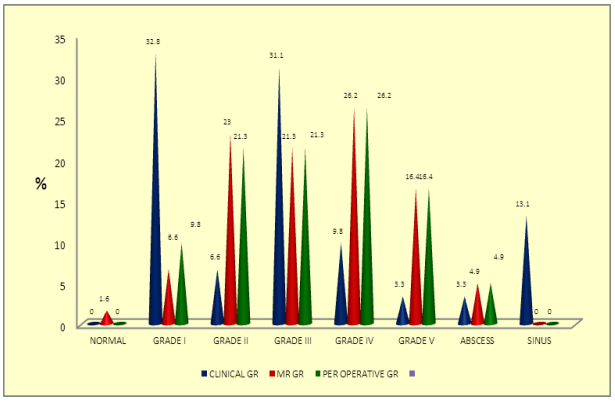

Fig. 1 - Distribution of cases according to grades

Table – 2: Association of Mode of Presentation with Type of Fistula

Mode of Presentation	Coll-is		Coll-Es		Coll-SL		Second Tra		Hor-Shoe		Total
	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	
Primary	4	24	7	21	0	28	9	19	6	22	28
Recurrence	3	30	11	22	1	32	15	18	6	27	33
Total	7	54	18	43	1	33	24	37	12	49	61

	Value	'P' Value	Value	'P' Value	Value	'P' Value	Value	'P' Value	Value	'P' Value
Chi-Square Test										
	0.402	0.526	0.506	0.475	0.863	0.353	1.125	0.289	0.101	0.751

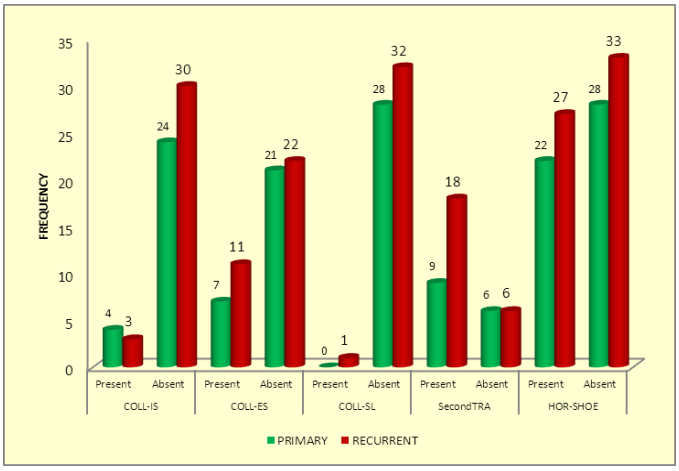

Fig. 2 - Association of Mode of Presentation with Type of Fistula

The association of mode of presentation with type of fistula is presented in Table – 2. The chi-square test of association is insignificant (P > 0.05) for all the types of fistula with mode of presentation. Hence there is no statistical association is observed between mode of presentation and fistula types

Table – 3:Comparison of MR and Surgical Findings with Per-Operative Findings

MR Finding – Grade I				Clinical Grade I			
MR Finding	Per Operative Present	Per Operative Absent	Total	Clinical	Per Operative Present	Per Operative Absent	Total
Present	4	0	4	Present	4	16	20
Absent	2	55	57	Absent	2	39	41
Total	6	55	61		6	54	61

	MR	Clinical
Sensitivity	66.67	66.67
Specificity	100	70.91
Positive Predicted Value	100	20
Negative Predicted Value	96.49	95.12
False Positive Rate	0	0
False Negative Rate	33.33	33.33
Chi-square value	39.24	3.47
'P' value	0.001	0.063

The comparison of MR and clinical findings for grade I classification of fistula is analysed with per-operative findings. Per-operative findings are taken as gold standard method of classification of fistula. The sensitivity (Ability to rightly identifying true positive cases) of MR in diagnosing Grade I fistula is 66.67%. The sensitivity of clinical evaluation is also similar to MR that is 66.67%. But the specificity (ability of the test in rightly identifying the absence of disease) of MR is comparatively higher (100%) than clinical evaluation (70.91%).

The positive predicted values (the probability of getting positive results if test is positive) of MR is higher (ppv = 100%) than clinical findings (ppv = 20%). The negative predicted values (the probability of getting negative results when test result is negative) is again higher for MR (NPV = 96.49) when compared to clinical (NPV = 95.12). The false positive rate (The rate of occurrence of positive test results in those who do not have the attribute or disease for which they are being tested) is nil for both the tests. The false negative rate (the rate of occurrence of negative test result in those who have the attribute or disease for which they are being tested) is again quite similar for two tests (FNR = 33.33 for both measures). The chi-square test of association is significant for MR (P = 0.001) but not for clinical (P = 0.063). Hence the MR finding is more closely association with per-operative findings.

Table – 4: Comparison of MR and Clinical Findings in Grade II Fistula with Per-operative findings

MR Finding – Grade II				Clinical Grade II			
MR Finding	Per Operative Present	Per Operative Absent	Total	Clinical	Per Operative Present	Per Operative Absent	Total
Present	13	1	14	Present	4	0	4
Absent	0	47	47	Absent	9	48	57
Total	13	48	61	Total	13	48	61

	MR	Clinical
Sensitivity	100%	30.77%
Specificity	97.92%	100%
Positive Predicted Value	92.86%	100%
Negative Predicted Value	100%	84.21%
False Positive Rate	2.08%	0%
False Negative Rate	0%	69.23%
Chi-square value	55.46%	15.81%
'P' value	0.001	0.001

The comparisons of grade II fistula by different methods in presented in Table – 10. The sensitivity is higher for MR (100%) than clinical method (30.77%). The speciality is higher (100%) for clinical than MR (97.92%) method. The chi-square test of association is significant for both methods (P < 0.05). Therefore, both of the methods (MR and clinical) are closely associated with per-operative findings in detecting Grade II fistula.

Table – 5: Comparison of Grade III Fistula

MR Finding – Grade III				Clinical Grade III			
MR Finding	Per Operative Present	Per Operative Absent	Total	Clinical	Per Operative Present	Per Operative Absent	Total
Present	13	0	13	Present	9	10	19
Absent	0	48	48	Absent	4	38	42
Total	13	48	61	Total	13	48	61

	MR-Grading	Clinical
Sensitivity	100%	69.23%
Specificity	100%	79.17%
Positive Predicted Value	100%	47.37%
Negative Predicted Value	100%	90.48%
False Positive Rate	0	20.83%
False Negative Rate	0	30.77%
Chi-square value	61.000	11.17
'P' value	0.001	0.001

The sensitivity, specificity, ppv and NPV are almost 100% for MR in predicting grade III fistula. The sensitivity and specificity are only 69.23% and 77.17% respectively for clinical findings. The chi-square test of association is significant (P < 0.05) for both MR and clinical methods when compared it with per-operative findings.

Table – 6: Comparison of Grade IV Fistula

MR Finding – Grade IV				Clinical Grade IV			
MR Finding	Per Operative Present	Per Operative Absent	Total	Clinical	Per Operative Present	Per Operative Absent	Total
Present	16	0	16	Present	6	0	6
Absent	0	45	45	Absent	10	45	55
Total	16	45	61	Total	16	45	61

	MR-Grading	Clinical
Sensitivity	100%	37.5%
Specificity	100%	100%
Positive Predicted Value	100%	100%
Negative Predicted Value	100%	81.82%
False Positive Rate	0	0
False Negative Rate	0	62.5%
Chi-square value	61.000	18.72
'P' value	0.001	0.001

The sensitivity of clinical methods in estimating grade IV fistula is comparatively lower (37.5%) than MR method (100%). Therefore negative prediction value for clinical is less (NPV = 81.82%). The chi-square test of association is significant for both the methods (P < 0.05).

Table – 7: Comparative of Grade V Fistula

MR Finding	MR Finding – Grade V Per Operative Grading		Total	Clinical	Clinical Grade V Per Operative Grading		Total
	Present	Absent			Present	Absent	
Present	10	0	10	Present	2	0	2
Absent	0	51	51	Absent	8	51	59
Total	10	51	61	Total	10	51	61

	MR-Grading	Clinical
Sensitivity	100%	20%
Specificity	100%	100%
Positive Predicted Value	100%	100%
Negative Predicted Value	100%	86.44%
False Positive Rate	0	0
False Negative Rate	0	80%
Chi-square value	61.000	10.55
'P' value	0.001	0.001

The sensitivity of MR is much higher (100%) than clinical method (20%). The negative predicted value for clinical method is 86.44%, which is quite lower than MR method (NPR = 100%). The false negative rate is very high for clinical method (80%). The chi-square test of association is significant for grade V fistula findings ($P < 0.05$) for both the clinical and MR method when compared to gold standard investigation.

4.DISCUSSION:

It was observed that the majority of cases i.e.86.9% had a complicated fistula[1]. Grades II and above were designated as complicated because of the presence of secondary tracts or abscess collections and / or involvement of planes other than the intersphincterplane. In the study conducted by Beet,(2001) the percentage of complex fistulas was 57% and in the study by Juijpers and Suhulpen, (1985) 40% of patients had complex fistulas.

It was felt that higher percentage of complex fistulas in our study was due to a general bias of the surgeons towards referring recurrent and suspected complex fistulas for MRFG, Probably because of the economic variations between the western countries and the Indian subcontinent. Also as our institute is a tertiary care centre, more number of complex and recurrent case tends to be referred.

Out of the 61 patients referred, the primary tract was seen in 58 cases. The remaining three patients with clinically suspected fistulas were found to have superficial perianal abscess collections only.

One such patient was found in the study of 40 patients by Juijpers and Suhulpen, (1985).The detection and prevalence of the surgically relevant criteria have been separately dealt with. These include internal opening of the primary fistulous tract, secondary tract, horsehoe tracts, abscess collection, and supralevator extension.

The correct location of internal opening of the fistula, as diagnosed on MRFG and was later confirmed by surgery. However, the exact opening not seen in all the cases, it was inferred according to the course and plane of the primary tract. An internal opening was considered as correctly identified when it was at the correct level in the anal canal and was within the correct quadrant.

Among the 58 patients diagnosed to have primary tracts by MRFG, the diagnosis for internal opening was found to match with the surgical report in 50 patients, out of 55 detected by surgery. This gave the sensitivity of 90.91% for detection of internal opening by MRFG, compared to 96% sensitivity obtained in the study by BEETS(Beets,2001)

As regards the detection of primary tracts, we obtained a sensitivity of 8.5% and specificity of 100%, in comparison to a sensivity of 100% and specificity of 86% in the study of -(Beets,2001).As the detection of secondary tracts has significant implications on the prognosis and outcome of surgery for fistulae in ano, their detection by MRFG is crucial.

If not identified and properly eradicated, these extensions and tracts may lead to recurrences. Results of the study by lunniss et al[19,20] suggested that MR imaging could depict more extensions than could conventional fistulography or surgical exploration. In the study by Beets,(2001)they concluded that pre operative MR imaging was 100% accurate in detection of secondary extensions.

Horsehoe tracts are also included in secondary tracts as they are ramifications from the primary tract. However, because the presence of horse dhoe tracts greatly alters the surgical approach and its boutcome, they have been separately mentioned. 39.34% of the patients in our study were found to have secondary tracts out of which 50% had horse shoe tracts only and 100% had both horse shoe tracts and other secondary tracts. Comparatively in a study off 56 patients by Beets,(2001),39% of the cases had horseshoe tracts.

It was also observed that the majority (50%) of the cases with horse shoe tracts were those who had recurrent fistulas. It was felt that horseshoe fistula were more common in recurrent cases.

On surgery, 100% concordance was recorded in detection of horse shoe tracts by MRFG. Out of the 12 cases with horseshoe tracts, only 4 (33.3%) cases were suspected on pre-operative clinical examinations, thus having sensitivity for detection of horseshoe tracts of only 28% clinically and compared to 100% by MRFG.

5.CONCLUSION

High spatial resolution MR imaging with CP spine Array coil is accurate for the detection of Perianal fistulas. It shows the surgical anatomy and maps out the perianal fistulas accurately and provides additional information on secondary extensions in patients with complex fistulas.

6.BIBLOGRAPHY

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