ORIGINAL RESEARCH

Role of diffusion-weighted imaging in the assessment of perianal fistulae

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ABSTRACT

Background: Anal canal and perianal tissues are frequently inflamed, and this is represented by perianal fistulas. Idiopathic inflammation of the cryptogenic glands in the anal mucosa is the cause of the majority of these fistulas. This study evaluated the role of diffusion-weighted imaging in patients with perianal fistulae. **Materials &Methods:** 60 patients of perianal fistulaeof both genders underwent pelvic MRI using a phased-array surface coil while supine on the Philips Ingenia 1.5 Tesla machine. Using T1W, T2W, DWI, VISTA, and fat-suppressed postcontrast T1W sequences, the perianal fistula was assessed. **Results:** Out of 60 patients, 32 were males and 28 were females. Out of 60 patients, 35 were active and 25 inactive fistulae. Secondary ramification of the primary fistula tract was seen in ischioanal space/ ischiorectal fossa in 31, intersphincteric space in 18 and supralevator space in 11 cases. St James classification grade 1 was seen in 24, grade 2 in 10, grade 3 in 8, grade 4 in 11 and grade 5 in 7 patients. The difference was significant ($P< 0.05$).MRI sequence DWI had visibility score 2 was seen in 32 in active and 14 inactive, score 1 seen in 3 active and 11 inactive. T2W score 2 in 22 active, score 1 in 8 and score 0 in 5 active and score 2 in 15 inactive, score 1 in 3 and score 0 in 3 inactive. Combined score 2 in 35 active and 25 inactive. DWI-T2W score 1 was seen in 1 inactive and score 2 in 1 inactive. CEMRI score 2 was seen in 40 active and 23 inactive and score 1 in 2 inactive cases. The difference was significant ($P< 0.05$). **Conclusion:** The combined DWI-T2W image evaluation in perianal fistulas showed the best results.

Keywords: perianal fistulas, MRI, supralevator space

INTRODUCTION

Anal canal and perianal tissues are frequently inflamed, and this is represented by perianal fistulas. Idiopathic inflammation of the cryptogenic glands in the anal mucosa is the cause of the majority of these fistulas.[1] Less frequent causes include radiation therapy, trauma linked to childbirth, and Crohn's disease. Perianal fistulas can be treated with surgical removal of the fistulous tract. Up to 25–30% of fistulas recur after surgery; these are typically the result of an infection that escaped during the procedure or an untreated fistula.[2]These patients have benefited greatly from the development of magnetic resonance imaging (MRI), which has made it possible to directly visualize the fistulous tract, its location in relation to the anal sphincters, and the length of the fistula—as well as its abscess—in relation to the levator ani muscle. For some individuals, the surgical result has improved even more as a result.[3]

MRI is the best preoperative imaging modality for characterizing perianal fistulae due to its excellent soft-tissue contrast and multiplanar capability.[4] It is superior to other imaging modalities like conventional fistulogram, endoanal/endorectal ultrasonography, perianal ultrasonography, and computed tomography fistulography. Preoperative MRI in FIA can affect surgical strategy, lower the recurrence rate, and change how different types of fistulae heal after surgery.[5]The question of whether diffusion-weighted imaging (DWI) is useful in assessing perianal inflammation in addition to other MRI sequences has been thoroughly investigated. A small number of researches noted that when it comes to the fistula's appearance, DWI is more sensitive than T2W sequence. According to some, limited diffusion is a good substitute for gadolinium in post-contrast imaging when it is not possible to utilize it to show fistula activity.[6] This study evaluated the role of diffusion-weighted imaging in patients withperianal fistulae.

MATERIALS &METHODS

The present study comprised of 60 patients of perianal fistulaeof both genders. All patients gave their written consent before starting the study.

Data such as name, age, gender etc. was recorded. Every patient had a pelvic MRI using a phased-array surface coil while supine on the Philips Ingenia 1.5 Tesla machine. Recorded were the existence and quantity of external perianal fistulas, internal apertures, secondary ramifications, sphincteric extension, and related problems such as abscess formation or horseshoe fistula. When no T2-weighted (T2W) hyperintense signal intensity was seen in a perianal fistula with no contrast enhancement following gadolinium injection, the fistula was considered fully healed. Using T1W, T2W, DWI, VISTA, and fat-suppressed postcontrast T1W sequences, the perianal fistula was assessed. The results were subjected tostatistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 60		
Gender	**Males**	**Females**
Number	32	28

Table I shows that out of 60 patients, 32 were males and 28 were females.

Table II Assessment of parameters

Parameters	Variables	Number	P value
Type	Active	35	0.86
	Inactive	25	
Secondary ramification of the primary fistula tract	Ischioanalspace/ischiorectal fossa	31	0.67
	intersphincteric space	18	
	supralevator space	11	
St James classification	Grade 1	24	0.05
	Grade 2	10	
	Grade 3	8	
	Grade 4	11	
	Grade 5	7	

Table II, graph I shows that out of 60 patients, 35 were active and 25 inactive fistulae. Secondary ramification of the primary fistula tract was seen in ischioanal space/ ischiorectal fossain 31, intersphincteric space in 18 and supralevator space in 11 cases. St James classification grade 1 was seen in 24, grade 2 in 10, grade 3in 8, grade 4in 11 and grade 5 in 7 patients. The difference was significant (P< 0.05).

Graph I Assessment of parameters

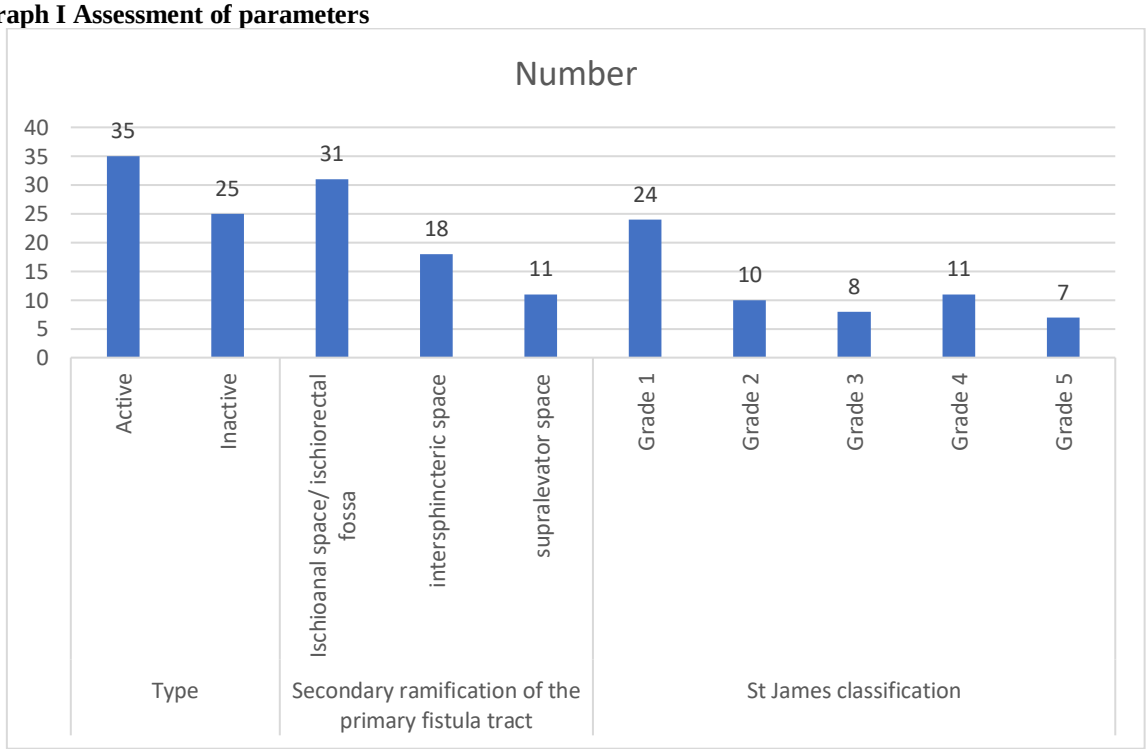

Table III Visibility score of DWI, T2W, CEMRI, and combined T2W-DWI MRI sequences

MRI sequence	Visibility score	Active (35)	Inactive (25)	P value
DWI	Score 2	32	14	0.05
	Score 1	3	11	
	Score 0	0	0	
T2W	Score 2	22	15	0.01
	Score 1	8	7	
	Score 0	5	3	
Combined	Score 2	35	25	0.09
DWI-T2W	Score 1	0	1	0.85
	Score 2	0	1	
CEMRI	Score 2	40	23	0.01
	Score 1	0	2	
	Score 0	0	0	

Table III shows that MRI sequence DWI had visibility score 2 was seen in 32 in active and 14 inactive, score 1 seen in 3 active and 11 inactive. T2W score 2 in 22active, score 1 in 8 and score 0 in 5 active and score 2 in 15 inactive, score 1 in 3 and score 0 in 3 inactive. Combined score 2 in 35 active and 25 inactive. DWI-T2W score 1 was seen in 1 inactive and score 2 in 1 inactive. CEMRI score 2 was seen in 40 active and 23 inactive and score 1 in 2 inactive cases.The difference was significant (P< 0.05).

DISCUSSION

When perianal inflammatory diseases are suspected, magnetic resonance imaging (MR imaging) is a well-established technique for diagnosing and quantifying inflammation.[7] Basic anatomical sequences including pre- and post-contrast pictures are among the typical MRI sequences utilized for such patients.[8,9] When there are perianal fistulas, magnetic resonance imaging (MRI) is primarily used to characterize the tract's extension, side branches, and presence of any deep abscesses, particularly at the supra-levator level.[10,11]

We found that out of 60 patients, 32 were males and 28 were females. Yoshizako Tet al[12]assessed the feasibility of using diffusion-weighted magnetic resonance (MR) imaging (DWI) for evaluating perianal fistula activity.This study retrospectively assessed 24 patients with clinically suspected perianal fistula who underwent a total of 28 MR examinations after conservative treatment with antibiotics. DWI was performed at 1.5 T, using b-values of 0 and 1000 s/mm(2). Apparent diffusion coefficient (ADC) maps were created and ADCs of the lesions were measured. Lesions were classified into two groups based on the need for surgery and surgical findings: positive inflammation activity (PIA) and negative inflammation activity (NIA). ADCs of both groups were compared using an unpaired t-test, and Receiver Operating Characteristic (ROC) analysis was performed.The ADC (in 10(-3) mm(2)/s) of the PIA group (0.908±0.171) was significantly lower (P=0.0019) than that of the NIA group (1.124±0.244). The area under the ROC curve was 0.749. An optimal cut-off ADC of 1.109 yielded a sensitivity of 95.7%, a specificity of 50%, a positive predictive value of 71%, and a negative predictive value of 90%.

We observed that out of 60 patients, 35 were active and 25 inactive fistulae. Secondary ramification of the primary fistula tract was seen in ischioanal space/ ischiorectal fossa in 31, intersphincteric space in 18 and supralevator space in 11 cases. St James classification grade 1 was seen in 24, grade 2 in 10, grade 3 in 8, grade 4 in 11 and grade 5 in 7 patients. We found that MRI sequence DWI had visibility score 2 was seen in 32 in active and 14 inactive, score 1 seen in 3 active and 11 inactive. T2W score 2 in 22 active, score 1 in 8 and score 0 in 5 active and score 2 in 15 inactive, score 1 in 3 and score 0 in 3 inactive. Combined score 2 in 35 active and 25 inactive. DWI-T2W score 1 was seen in 1 inactive and score 2 in 1 inactive. CEMRI score 2 was seen in 40 active and 23 inactive and score 1 in 2 inactive cases. Hori et al[13]retrospectively determined the additional value of diffusion-weighted magnetic resonance imaging (MRI) to T2-weighted imaging in the evaluation of anal fistulae in comparison with gadolinium (Gd)-enhanced imaging.Thirteen patients (mean age, 35.2 years) with 20 anal fistulae were included. The protocol consisted of fat-suppressed T2-weighted fast spin-echo, diffusion-weighted single-shot echo-planar (b factors 0 and 800 s/mm(2)), and fat-suppressed Gd-enhanced T1-weighted gradient echo sequences. Two radiologists evaluated images in consensus.Eighteen (90%) fistulae were detected on T2-weighted images, and 19 (95%) and 19 (95%) were detected on diffusion-weighted and T2-weighted images combined and on Gd-enhanced and T2-weighted images combined, respectively. There was no statistically significant difference in sensitivity of the techniques. Confidence scores with diffusion-weighted and T2-weighted images combined or those with Gd-enhanced and T2-weighted images combined were significantly greater than those with T2-weighted images alone (P = 0.0047 and 0.014, respectively).

CONCLUSION

Authors found that the combined DWI-T2W image evaluation in perianal fistulas showed the best results.

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