A new MR-based Perianal Crohn's disease activity score

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Introduction: Perianal Crohn's disease (pCD) is a potential complication in Crohn's Disease(1). Absence of reliable disease measures make perianal sepsis treatment challenging. MRI has been increasingly used for monitoring and diagnosing pCD patients and shows potential for assessing therapeutic response and inflammation. New MRI sequences such as diffusion-weighted image(DWI), magnetization transfer and (MT) offer opportunities to improve efficiency and diagnostic capability (2). The aim of this study was to measure disease activity within pCD using quantitative MRI sequences (DWI and MT) before and after biological therapy.

Table 1 MRI parameters for MT and DWI sequences on 1.5 and 3T scanners

	1.5T		3T	
	DWI (Axial)	MTR (Cor oblique)	DWI (Axial)	MTR (Cor oblique)
TR/TE ms	2000/70.8	33/3.8	6017/88	72/4.5
FOV mm^2	350 x 350	380 x 380	320 x 296	298 x 298
Slice thickness (gap) mm	4 (0.4)	4 (0.4)	4 (0.4)	3 (0)
No. Slices	50	26	40	40
b-value	0, 600	N/A	0,100, 300,600	N/A

Methods: This is an on-going study to recruit 20 patients in this prospective, REC, NHS, R& D approved study. Patients underwent imaging at 1.5T and 3T on two occasions, once before starting biological therapy and once at 12 weeks after biological therapy onset. DWI and MT-MRI sequences were added to the standard clinical protocol. MRI parameters for DWI and MT on 1.5 and 3T scanners are given in table 1. Regions of interest (ROIs) identified by a Radiologist were drawn on the diffusion and MT maps generated in diseased regions and mean (std dev) of the regions calculated. The Van Assche MRI score(3) C-reactive protein concentration (CRP), Perianal disease activity index (PDAI), score were calculated, fistula drainage was assessed.

Results: Amongst the 19 patients studied so far, the mean age is 38 (13) years. 12 patients have completed both scans to date. The PDAI decreased in 10 patients while increased in one patient and remained the same in one patients. Initial MRI data from 3 patients are presented in figure 1 and example images shown in figure 2.

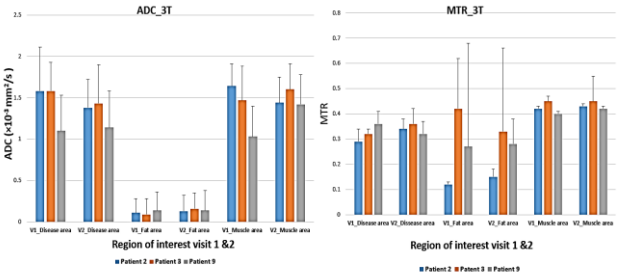

Figure 1. The signal intensity of diseased, fat and muscle areas across visit 1 and visit 2 in MT (right graph) and ADC (left graph)

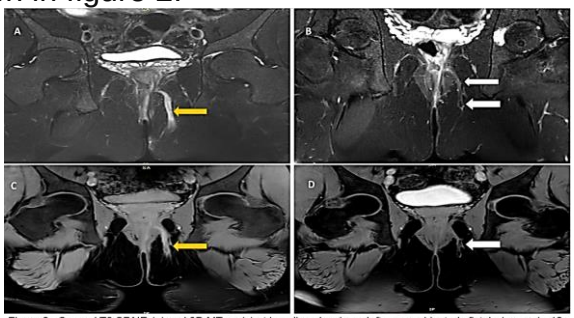

Figure 2: Coronal T2 SPAIR (a) and 3D MT on (c) at baseline showing a left suprasphincteric fistula (arrows) . 12-weeks cor T2 SPAIR(b) and MT on(d) on infliximab showing reduction in volume of track for same patient

Discussion

The data that this study will produce will allow us to determine whether these newer sequences will make it possible to more accurately quantify the inflammatory burden within pCD, allowing better patient follow-up and more effective clinical decision making. Our results at 3T may also be able to improve 1.5T imaging where the majority of clinical scans are carried out.

References

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