Diagnostic accuracy and correlation between Double Inversion Recovery (DIR), FLAIR and T2W imaging sequences with EDSS in detection of lesions at different anatomical regions in MS patients

ABSTRACT

The aim of our study is to evaluate the diagnostic accuracy of double inversion recovery (DIR) in detection of multiple sclerosis (MS) lesions as well as the correlation between the expanded disability status scale (EDSS) and lesion load measurement detected by DIR, fluid attenuated inversion recovery (FLAIR) and T2 weighted imaging (T2WI) in order to reveal the essential role of DIR sequence in assessing clinical inability as a practicable experiment. A total of 97 patients were assessed on a 3T Siemens Skyra MRI scanner using DIR, FLAIR, and T2W_TSE sequences. EDSS was used to assess the physical disability in patients with MS. The diagnostic accuracy of DIR, FLAIR and T2WI sequences was also determined in different anatomical regions. Sensitivity and specificity were assessed by relative operating characteristics/ receiver operating characteristics (ROC) curve at different cut off points. Spearman correlation was applied to identify the significant relationships between the number of lesions displayed by DIR, FLAIR and T2WI at different regions and EDSS score. Our results pointed out the highest sensitivity (92.9%) and specificity (73.5%) for the number of lesions in infratentorial region at the cut-off point of 4.5 and the highest correlation between the number of lesions and EDSS was observed in infratentorial region ($r= 0.584$, $p<0.001$) for DIR sequence. According to the findings of ROC analysis, the number of lesions detected by DIR technique in the infratentorial region is the best predictor of EDSS as a gold standard. DIR can be used as a complementary technique comparing to conventional T2 and FLAIR sequences and describe physical and cognitive dysfunction as well. Due to the higher potential of the DIR sequence to reveal a greater number of MS lesions and to overcome the technical defect of conventional MRI sequences in the diagnosis of cortical lesions, it is recommended that DIR sequences be routinely added to MRI imaging protocols for patients with MS.

Keyword: Multiple Sclerosis (MS); Magnetic Resonance Imaging (MRI); Double Inversion Recovery (DIR); Expanded Disability Status Scale (EDSS); Relative Operating Characteristics/ Receiver Operating Characteristics (ROC)