The Egyptian Journal of Radiology and Nuclear Medicine 49 (2018) 181–189

Contents lists available at ScienceDirect

The Egyptian Journal of Radiology and Nuclear Medicine

journal homepage: www.elsevier.com/locate/ejrnm

Original Article

Delayed post contrast magnetic resonance imaging (MRI) of the brain in multiple sclerosis (MS) patients: Is it of value?

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ARTICLE INFO

Keywords:
Delayed T1 post contrast
Multiple sclerosis (MS)
Delayed enhancement
MS activity

ABSTRACT

Aim of the work: The aim of this study was to assess the rule of delayed T1 post contrast sequence in detection of active lesions in multiple sclerosis patients by comparing the early and delayed T1 post contrast images.
Materials: This was a prospective study and included 30 known multiple sclerosis patients with clinically suspected activity referred form neurology department to radiology department for MRI examination.
Methods: All patients were subjected to the followings:
– Conventional routine MRI of the brain using 1.5 T machine.
– T1 delayed post contrast sequence (about 10 min after contrast injection).
Results: The included MS cases showed 162 lesions of variable distribution as 113 lesions were supratentorial while 49 lesions were infratentorial. Among 162 lesions in the current cases 58 lesions showed post contrast enhancement while the remaining 104 lesions were non enhancing. From the total of enhancing lesions (58), 16 lesions showed early enhancement while 42 lesions showed delayed enhancement.
Conclusion: Delayed T1 post contrast is an important sequence for detection of active MS plaques as it increases the sensitivity of MRI.

1. Introduction

Multiple sclerosis (MS) is an immune-mediated disease and is considered the commonest chronic inflammatory demyelinating disabling disorder involving the brain and the spinal cord in young adults [1,2].

In conjunction with clinical data MRI is the imaging modality of choice in diagnosis, follow up and monitoring cases with MS due to its high sensitivity mainly with the recent advances of MRI machines using higher magnetic field [3].

FLAIR sequence is considered one of the most important routine conventional MRI sequences in detection of MS plaques [4].

Post contrast MRI is highly sensitive in diagnosing MS, detecting active enhancing MS plaques which is essential for management [5].

Contrast enhanced MRI may be variable in cases of MS depending upon the dose of the administrated contrast material as well as the timing of acquisition after contrast injection [6].

Conventional MRI together with recent advanced MRI techniques such as MR spectroscopy, diffusion tensor imaging, magnetization transfer imaging, double inversion recovery and functional MRI play an important role in diagnosis and, follow up of MS cases as well as to assess response to therapy [7].

2. Aim of the work

The aim of this study was to assess the rule of delayed T1 post contrast sequence in detection of active lesions in multiple sclerosis patients by comparing the early and delayed T1 post contrast images.

3. Materials and methods

This was a prospective study and included 30 known multiple sclerosis patients with clinically suspected activity referred form neurology department to radiology department for MRI examination.

The study protocol was approved by the Research Review Committee of the Alexandria Faculty of Medicine and an informed consent was obtained from each subject included in the study.

3.1. Methods

All patients were subjected to the followings:

Peer review under responsibility of The Egyptian Society of Radiology and Nuclear Medicine.
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https://doi.org/10.1016/j.ejrnm.2017.12.006
Received 10 September 2017; Accepted 11 December 2017
Available online 17 April 2018

Table 1
Inter-observer agreement between early and delayed post contrast magnetic resonance imaging (MRI) in diagnosing activity.

	Early n(%)	Delayed n(%)	Agreement Kappa coefficient (95% CI)
Enhanced lesions	16(9.87)	58(35.80)	−0.5 (95% CI = −0.632–0.455)
Activity	7(23.33)	27(90)	0.133 (95% CI = 0.05–0.32)

Conventional routine MRI of the brain using 1.5 Tesla MRI machine. T1 delayed post contrast sequence (about 10 min after contrast injection). The sequences were rearranged, to keep the time of examination within normal, as follow:

- Axial and sagittal FLAIR.
- 3D T1 pre-contrast.
- 3D T1 post contrast. (Early phase).
- Axial and coronal T2.
- DWI/ADC.

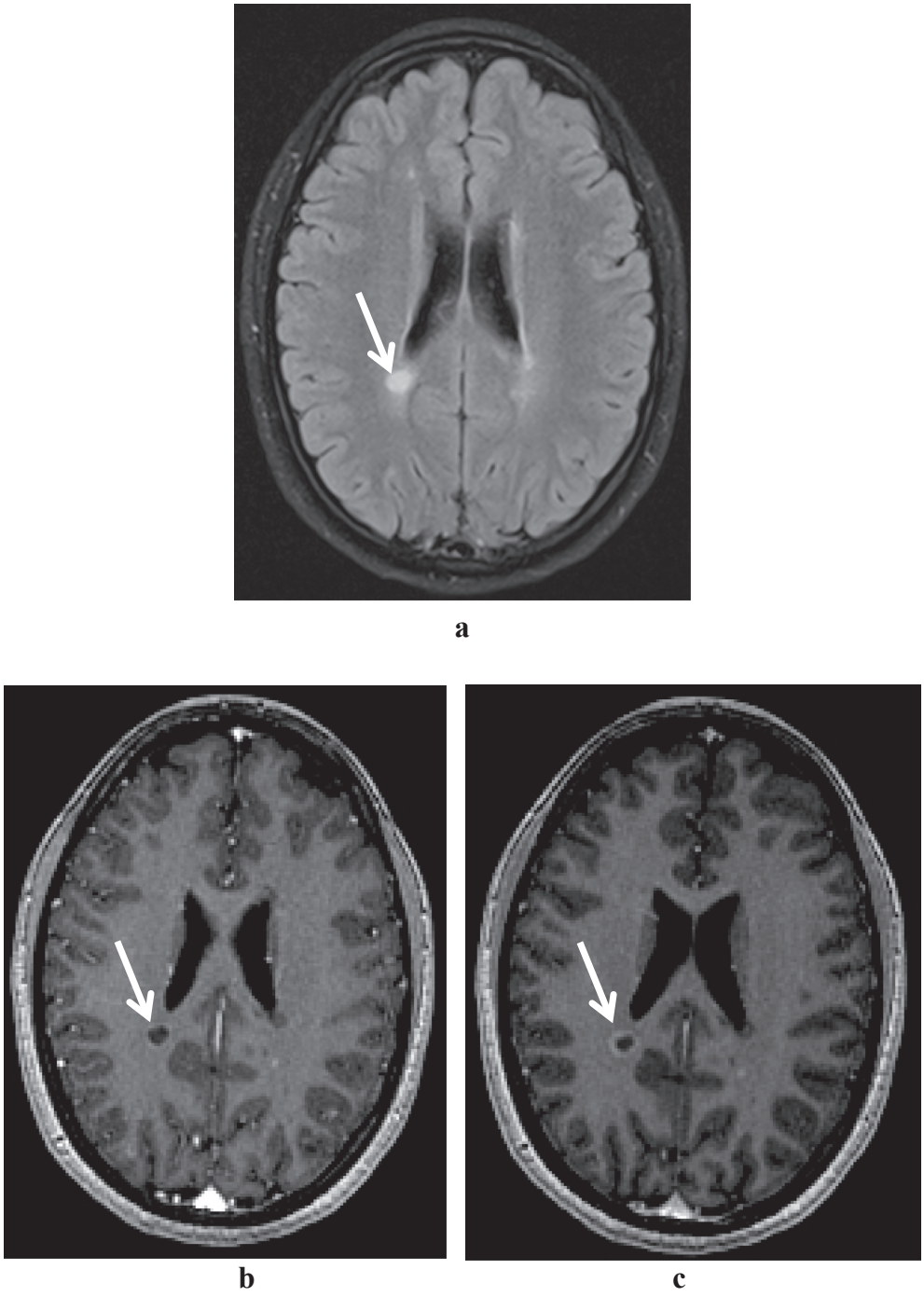

Fig. 1. 32 years old female patient with MS (a) axial FLAIR showed right periventricular hyperintense plaque 'white arrow' (b) the same lesion in axial 3D T1 early post contrast showed faint marginal enhancement which became more evident in delayed phase (c).