



# Radiological Presentation of a Patient With Multiple Sclerosis and Hepatic Disorder



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## ABSTRACT

In this case study, we presented the radiological characteristics of a 43-year-old female patient diagnosed with Multiple Sclerosis (MS). Following mitoxantrone administration, she developed liver failure. Magnetic Resonance Imaging (MRI) revealed multiple periventricular lesions in T2 and bilateral involvement of putamen and Globus Pallidus (GP) areas in T1 sequences.

## Introduction

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his case study presents the radiological characteristics of a patient with Multiple Sclerosis (MS). She also suffered from hepatic disorder.

## Case Presentation

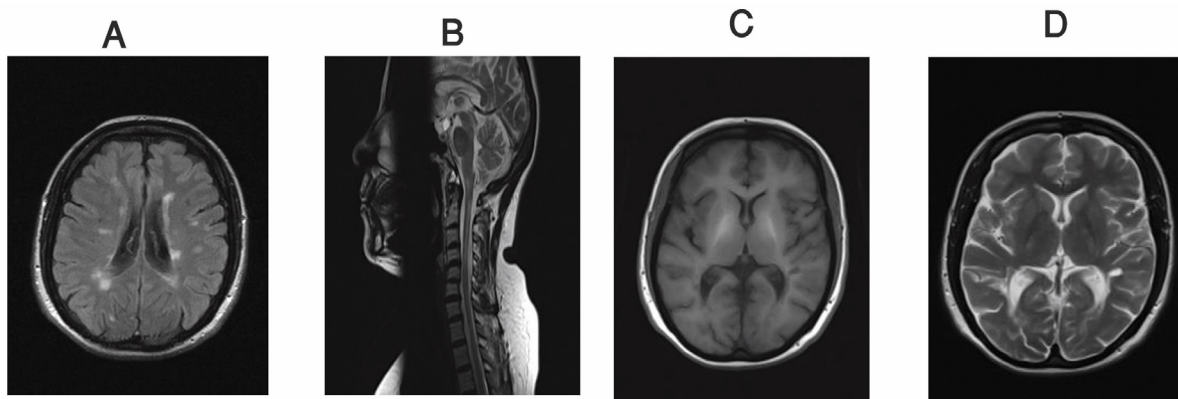
The patient was a 43-year-old woman diagnosed with MS with abdominal paresthesia as the first clinical manifestation, 15 years ago. She was indifferent to her symptoms, and recovered spontaneously. After two years, she was admitted to the hospital with left optic

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**Figure 1.** Brain and cervical MRI



A. Axial T2-weighted image showing multiple periventricular hyperintense plaques, subcortical plaques and ovoid hypersignal lesions perpendicular to the ventricles; B. Magnetic Resonance Imaging results show cervical lesions; C. Axial T1-weighted image indicates symmetric hyperintense foci in the globus pallidus; D. Axial T2-weighted image shows bilateral hypointense foci in the globus pallidus.

neuritis and was treated with intravenous methylprednisolone (1 g/d).

However, no specific drug was prescribed for her. One year later, the patient was referred again complaining of progressive right foot paresis. Nine months ago, she was re-evaluated and diagnosed with MS.

She was treated with mitoxantrone (Novantrone) (12 mg/m<sup>2</sup>) every three months. Following two cycles of mitoxantrone administration, the patient developed icterus, abdominal pain, nausea, vomiting, ascites, and lethargy.

She denied alcohol consumption. Her liver enzymes and bilirubin levels were high: Alanine aminotransferase (ALT), 1500 U/L, and Aspartate aminotransferase (AST), 1100 U/L. An intensive diagnostic workup, including viral serologic tests, Gamma-Glutamyl Transferase (GGT), autoimmune and metabolic studies, liver imaging and biopsy did not show the cause of liver failure. The symptoms improved gradually without specific treatment. After stopping mitoxantrone, the patient was treated with azathioprine 50 mg TDS and ursodeoxycholic acid 250 mg BD.

Since then, the patient was under close observation. Although her liver enzymes and bilirubin levels were always mildly elevated, her clinical condition was stable. According to her Magnetic Resonance Imaging (MRI) results and MS manifestations, her brain involvement due to liver failure was significant in the follow-up.

Axial T2-weighted image showed multiple periventricular plaques, subcortical plaques, and ovoid hypersignal lesions perpendicular to the ventricles (Figure 1. A).

Cervical MRI showed demyelinating lesions at the level of C1-C5 and T1 (Figure 1.B). Besides, axial T1-weighted image depicted symmetric hyperintense foci in the Globus Pallidus (GP), which was considered to be hypointense in T2-weighted image (Figure 1.C and 1.D).

## Discussion

Due to manganese deposition in liver diseases, hyper-signal lesions are seen on T1- weighted MRI scan. These lesions are bilateral and symmetrical, which involve putamen and GP areas [1].

Novantrone can cause liver disorders [2]. Novantrone is essentially a chemotherapy drug used for MS patients, especially in cases of progressive MS or rapid disabling attacks [3]. It also has several side effects, including heart and blood problems (e.g. leukemia) [4]. However, liver complications have also been reported due to taking Novantrone. Although liver complications usually can increase the level of relevant enzymes, they rarely cause severe liver disorders [5].

Regarding our studied case, since all possible causes were rejected, the most probable cause of liver complications can be the side effects of Novantrone.

## Ethical Considerations

### Compliance with ethical guidelines

The written informed consent was taken from patient.

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### Conflict of interest

The authors declare there is no conflict of interest.

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