

## Hypoxic Ischemic Encephalopathy can be a Radiologic Mimicker of Multiple Sclerosis

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### Abstract

Many neurologic and non-neurologic diseases can mimic Multiple Sclerosis. One of these conditions is silent perinatal ischemic injury, which can mimic MS on brain MRI. Here, we present 3 cases of patients who presented to the American University of Beirut Medical Center, Lebanon, and Wake Forest Baptist Medical Center, NC, USA, with nonspecific neurologic symptoms and brain MRI findings that mimic MS. After an extensive workup and thorough history, these patients recall having a prolonged and difficult delivery, which was the most probable cause of their MRI findings given their distribution and their characteristics on MRI.

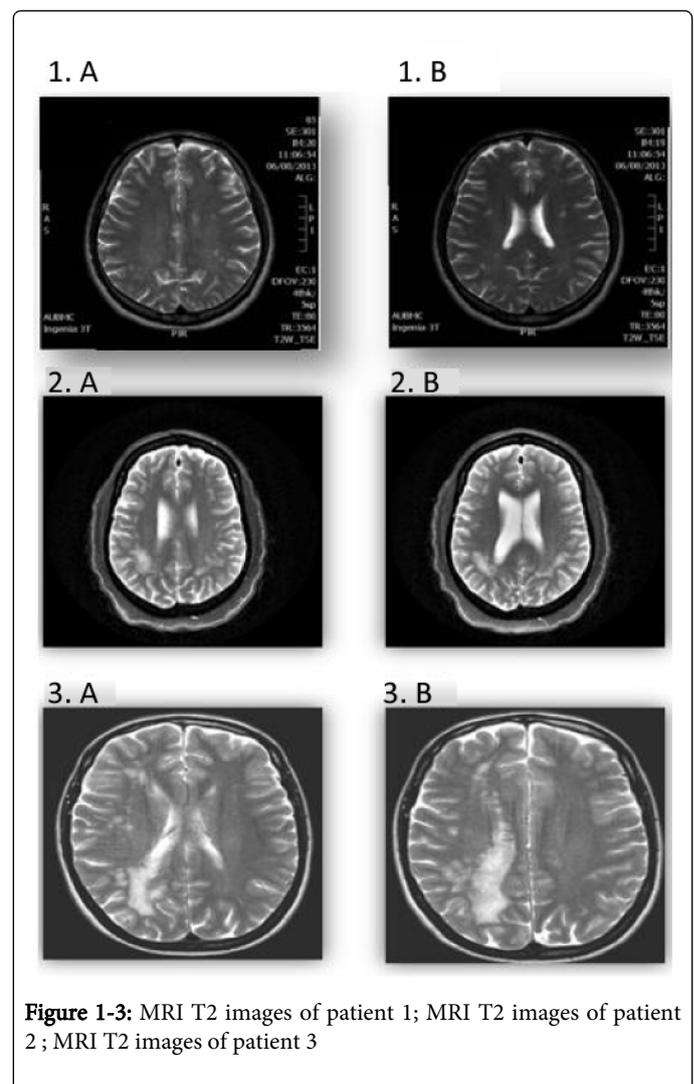
**Keywords:** Multiple sclerosis; MRI; Hypoxic ischemic encephalopathy

### Introduction

There is no single radiologic or blood test that can diagnose Multiple Sclerosis (MS). Rather, it is the clinical picture coupled with radiologic and CSF findings that help in the diagnosis. Other conditions have to be ruled out before initiating therapy, to avoid misdiagnosis and unnecessary chronic and expensive treatments [1]. There are many radiologic mimickers of Multiple Sclerosis, including migraine, acute disseminated encephalomyelitis, neurosarcoidosis, vitamin B12 deficiency, traumatic brain injury, drug, and/or radiation induced white matter changes, antiphospholipid syndrome, Behçet disease, ischemic white matter disease related to age, hypertension, or diabetes mellitus [2]. Another under-recognized condition that can cause brain lesions similar to those seen in MS is silent perinatal ischemic injury. Here, we present 3 cases of adults referred to the MS clinic, and found to have a history of a prolonged and difficult delivery and brain MRI lesions suggestive of subclinical perinatal ischemia.

### Case 1

A 42 year old man presented with nonspecific sensory symptoms: bilateral heel pain and numbness that is relieved by rest, and transient numbness in his upper extremities. His neurologic exam was normal. His brain MRI (Figure 1.A and 1.B) showed multiple nonspecific white matter lesions not typical of MS. The patient does not have a history of smoking, migraine headaches, diabetes, hyperlipidemia or hypertension. CSF was negative for oligoclonal bands, cervical and thoracic spine MRI was normal, and SSEPs were normal. The patient reports a very prolonged delivery at birth, and forceps extraction was used; detailed apgars were not available. The MRI white matter changes were in a pattern suggestive of bilateral pediatric watershed involvement.



**Figure 1-3:** MRI T2 images of patient 1; MRI T2 images of patient 2; MRI T2 images of patient 3

## Case 2

A 37 year old woman presented with one year history of headaches. The headache was pressure-like, diffuses, and recurred throughout the day. The headache was not positional, and not associated with nausea or vomiting. She had brief episodic tingling sensations in her scalp, and mild bladder frequency and urgency. Her neurologic exam was normal. Her MRI (Figure 2.A and 2.B) showed diffuse subcortical white matter lesions. Extensive work up was done and was negative including CSF (oligoclonal bands and IgG index), evoked potentials, hypercoagulable panel and vascular studies. Urology evaluation revealed overactive bladder that improved with lifestyle modifications. The headache resolved after using a tricyclic antidepressant for tension headache. The MRI changes followed the pediatric watershed areas and were suspected to be a result of subtle perinatal ischemic injury. After further questioning, the patient reports a history of a very prolonged breech delivery; detailed apgars were not available. The lesions were stable on follow up imaging at 1 and 2 years.

## Case 3

A 51 year old woman presented with subacute left hearing loss, positional vertigo, nausea, and vomiting. Her CSF studies were normal (negative for oligoclonal bands, normal IgG index). Her brain MRI (Figure 3A and 3.B) showed white matter lesions not related to the symptoms. After receiving intravenous solumedrol at another hospital, the vertigo improved significantly but the hearing loss persisted. Her presentation and ENT work up were consistent with vestibular neuritis. Perinatal ischemic injury was the suspected reason for the MRI changes since the lesions involved unilateral, confluent white matter that followed the pediatric watershed distribution. The patient was born after a very prolonged breech delivery; detailed apgars were not available. Her early motor and cognitive development was normal. Detailed measurement of her hand size showed hemiatrophy contralateral to the MRI findings. Her repeat MRI was stable at 1 and 2 years.

The incidence of Hypoxic Ischemic Encephalopathy for non-anomalous term infants in developed countries in 2008 is estimated to be 2.5 of 1000 live births [3]. The pattern of injury on MRI is important. The site of cerebral injury is related to the blood flow to the various brain regions and to their metabolic activity. The watershed areas in the periphery of the cerebral vascular supply are the most susceptible to reduced cerebral perfusion pressure and ischemia [4]. Therefore, these sites are more vulnerable to oxidative stress and show the effects of hypoxia to a greater degree than the rest of the brain. This is the pattern we see in all 3 of the cases described above.

The MRI findings are most likely incidental since the presenting symptoms were nonspecific, did not correlate with the MRI findings, and had alternative clinical explanations. Furthermore, the MRI findings did not change over time, although the follow up period is relatively short. In conclusion, identifying silent perinatal ischemia as a radiologic mimicker of MS lesions would help clinicians avoid making an inaccurate MS diagnosis, especially in patients with nonspecific neurologic symptoms.

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