

# MR imaging of multiple sclerosis simulating brain tumor

Ercan Armagan, MD, Gokmen Kabilogullari, MD, Hasan C. Ugur, MD, PhD, Aylin O. Heper, MD, Ayhan Attar, MD.

## ABSTRACT

Multiple sclerosis (MS) may sometimes present as a mass lesion that is clinically and radiologically indistinguishable from brain tumor. The initial recognition of such cases is essential to avoid a surgical intervention and supplementary treatment. Sometimes areas adjacent to a tumor may present similar histopathological features with non-neoplastic demyelinating lesions. Thus, the proper preparation of the specimen is the key for correct pathological diagnosis. We report a case of MS with large cranial involvement showing a mass effect. The operative procedure associated with medical treatment was performed, and a good result was obtained. Our case presentation and others in the literature suggest strategies for detecting MS presenting as a mass lesion.

*Neurosciences 2007; Vol. 12 (2): 158-159*

*From the Departments of Neurosurgery (Armagan, Kabilogullari, Ugur, Attar), and Pathology (Heper), Faculty of Medicine, University of Ankara, Ankara, Turkey.*

*Received 3rd January 2006. Accepted 23rd July 2006.*

*Address correspondence and reprint request to: Dr. Gokmen Kabilogullari, Ankara Üniversitesi Tıp Fakültesi, Nöroşirürji Anabilim Dalı 06100, Samanpazarı, Ankara, Turkey. Tel. +90 (312) 3103333 Ext. 2598. Fax. +90 (312) 3094340. E-mail: gokmenkabil@hotmail.com*

Multiple sclerosis (MS) is a demyelinating disease of the CNS. It may present as plaque lesions in the brain. However, this disease sometimes presents with a cerebral mass that is difficult to distinguish from a brain tumor.<sup>1-6</sup> A common radiological feature is the lack of a mass effect or edema in the white matter surrounding even large lesions.<sup>2,7,8</sup> Sometimes MS may present as a focal cerebral mass and distinguishing between these can be difficult or impossible. Medical treatment, including corticosteroids and immunosuppressive agents, is the first choice for the ordinary cases.<sup>7,9,10</sup> Surgery, especially biopsy, is preferred for the

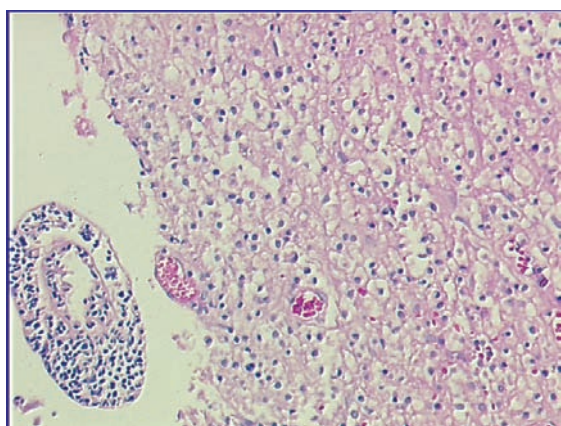
insufficiently proved cases which are examined in detail with radiological studies.<sup>1,6,9</sup> We present a case of MS with a left parietal lobe white matter location. Different behavior and clinical circumstances were observed, and management was based on this issue.

**Case Report.** A 30-year-old woman was admitted to our department with right-sided weakness and sensorial changes of 2 weeks duration. Neurological examination revealed right hemiparesis and hemihypoesthesia. An MRI revealed a mass lesion resembling a brain tumor in the left parietal lobe region, a large heterogeneous contrast-enhancing lesion with edema (Figure 1). Since a tumor was suspected, the patient was not medically examined for other possible diseases. The left parietal mass lesion was microsurgically explored through left parietal mini-craniotomy with the aid of a neuronavigation system and functional MRI. During the operation, a solid mass lesion that had different characteristics from the brain tissue was observed. The lesion was removed totally. Nevertheless, it presented with no definite evidence to suggest a tumor. Perioperative histological examination of the frozen sections from the left deep parietal region revealed an accumulation of mononuclear, large cells with foamy cytoplasm and lymphocytes cuffing around the vessels in the edematous background. Reactive astrocytic proliferation and relative sparing of oligodendroglial cells were detected in the neighboring glial tissue. Neither atypical cells nor any findings of tumor were available. The same histological features persisted during the postoperative evaluation of the routine paraffin embedded material. Immunohistochemical analysis was performed to demonstrate the histiocytic nature of the foamy cells. All the foamy cells were stained positively with CD68, which is a marker of histiocytes and macrophages. All these histopathological findings were consistent with demyelinating disease (active plaque of multiple sclerosis) (Figure 2). The postoperative period was uneventful, and she was discharged without any complication on the second postoperative day.

**Discussion.** The diagnosis of MS largely depends on the clinical course, which features the exacerbation and remission of neurological deficits. The onset occurs from the ages of 15-45 years in the majority of patients. Electrophysiological tests, CSF analysis and imaging studies can assist in the diagnosis. Clinicians have recently come to rely on MR Imaging because it is more sensitive in detecting white matter lesions than



**Figure 1** - The lesion is seen in preoperative contrast-enhanced T1 axial MRI section.



**Figure 2** - Accumulation of foamy histiocytes with lymphocytic cuffing around a vessel in the left bottom corner of the figure Hematoxylin and Eosin x 200.

CT.<sup>2,3,7-9</sup> Imaging studies usually reveal multiple small plaques ranging from a few millimeters to 16 mm in size. However, MS sometimes presents as a large solitary mass lesion that is indistinguishable from a brain tumor, as in our patient.<sup>3,7,9,10</sup>

Primary demyelinating disease of the CNS generally does not produce a focal or diffuse mass lesion, a feature that has been used to distinguish these lesions from tumor. An intense inflammatory response in demyelinating plaques may occasionally give rise to a mass lesion from the confluence of the lesions and associated edema. This can cause a high signal area on the CT scan simulating a tumor or an abscess.<sup>2,8</sup> Our patient had MR imaging with similar high signal area.

The MRI findings of mass effect and peripheral contrast enhancement in cases of MS have led to

mistaken diagnosis of glioma.<sup>9</sup> Many of the patients underwent surgical biopsy, and our patient is one of them. After craniotomy, we performed piecemeal biopsy of the lesion because of demyelinating disease suspicion and pathological examination confirmed this suspicion. Our report emphasizes the importance of considering primary demyelinating disease in the differential diagnosis of a radiologically detected cerebral mass, thus, avoiding surgery in these cases. If there is a large lesion with a significant edema, the surgical procedure must be considered after all diagnostic studies, and biopsy must be the primary consideration. Al-Bunyan<sup>1</sup> described the importance of cerebral biopsy for diagnostic procedures.

In summary, recognition of a limited mass effect and surrounding edema in comparison with the size of a lesion, and the detection of other lesions (especially by MR Imaging) may lead to the correct diagnosis of MS simulating a brain tumor. Thus, the possibility of MS should be kept in mind when assessing such mass lesions. In addition, successive imaging studies would be very helpful in making a diagnosis.

## References

1. Al-Bunyan MA. Tumour-like presentation of multiple sclerosis. *Saudi Med J* 2000; 21: 393-395.
2. Vander Velden M, Bots GTAM, Endtz LJ. Cranial CT in multiple sclerosis showing a mass effect. *Surg Neurol* 1979; 12: 307-310.
3. Weinstein M, Chuang S. Diseases of the white matter. In: Latchaw RE, editor. MR and CT Imaging of the Head, Neck and Spine. 2nd ed. St. Louis: Mosby Year Book; 1991. p. 347-396.
4. Nelson MJ, Miller SL, Mclain LW, Gold LHA. Multiple Sclerosis: Large plaque mass effect and ring sign. *J Comput Assist Tomogr* 1981; 5: 892-894.
5. Giang DW, Poduri KR, Eskin TA, Ketonen LM, Friedman PA, Wang DD, et al. Multiple sclerosis masquerading as a mass lesion. *Neuroradiology* 1992; 34: 150-154.
6. Mastrostefano R, Occhipinti E, Bigotti G, Pompili A. Multiple sclerosis simulating cerebral tumour: case report and review of the literature. *Neurosurgery* 1987; 21: 244-246.
7. Mirosowitz S, Sartor K. Demyelinating and degenerative diseases. In: Sartor K, editor. MR Imaging of the Skull and Brain: A Correlative Text-Atlas. Heidelberg: Springer; 1992. p. 693-768.
8. Aita JF, Bennett DR, Anderson RE, Ziter F. Cranial CT appearance of acute multiple sclerosis. *Neurology* 1978; 28: 251-255.
9. Edwards MK, Bonnin JM. White matter diseases. In: Atlas SW, editors. Magnetic Resonance Imaging of Brain and Spine. New York: Raven Press; 1991. p. 468-477.
10. National Multiple Sclerosis Society Working Group on Neuroimaging for the Medical Advisory Board. Policy statement. Use of magnetic resonance imaging in the diagnosis of multiple sclerosis. *Neuroradiology* 1987; 29: 119.