CASE REPORT

Reversible Focal Splenial Lesion of the Corpus Callosum on MR Images in a Patient with Malnutrition

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T2-weighted MR (magnetic resonance) images of a 19-year-old woman undergoing concurrent chemoradiotherapy for a nasopharyngeal carcinoma revealed a lesion marked by focal hyper signal intensity in the splenium of the corpus callosum. The lesion was not visible two weeks later. She suffered from malnutrition caused by appetite loss during chemotherapy. We concluded that the lesion revealed by the abnormal signal intensity in the splenium had been caused by malnutrition.

Keywords: corpus callosum, splenium, MRI, malnutrition, reversible

Introduction

Many diseases such as multiple sclerosis (MS), infarction, trauma, brain tumor, lymphoma, and viral encephalitis have reportedly shown lesions marked by high signal intensity in the splenium of the corpus callosum in T2-weighted MR (magnetic resonance) images.1 Seizure, use of antiepileptic drugs2 and Marchiafava-Bignami disease3,4 have reportedly revealed the same MR findings. Published papers have stated that these diseases can be differentiated according to the clinical and radiological findings.

We encountered a case of a 19-year-old woman with nasopharyngeal carcinoma who had a lesion marked by focal high signal intensity in the splenium of the corpus callosum as revealed in T2-weighted MR images during concurrent chemoradiotherapy. The lesion was not visible two weeks later. She had no neurological findings associated with this abnormal finding. We concluded that malnutrition had caused this lesion marked by abnormal signal intensity in the splenium.

Case report

A 19-year-old woman with neck tumors visited a local doctor in October 2002. She had no remarkable history. The doctor suspected a malignant tumor and referred her to our hospital. Histologic examination of the nasopharynx revealed an undifferentiated carcinoma (stage 3, UICC 2001).

On December 11, we began the following course of chemotherapy: docetaxel, 60 mg/m²; carboplatin, AUC = 5.0; and 5-fluorouracil, 600 mg/m². At the second course of chemotherapy, we began radiotherapy as follows: 80 Gy/40 fractions/58 days for nasopharyngeal tumor and 70 Gy/35 fractions/51 days for neck lymphadenopathy. To evaluate the effect of the treatment, neck MR imaging was performed 50 days from the start of chemotherapy. When we retrospectively viewed these MR images, we incidentally noticed the absence of the lesion marked by abnormal signal intensity in the splenium (Fig. 1). At the end of the third course of chemotherapy, 84 days from the start of the therapy, head MR imaging was undertaken to rule out brain metastasis. We found an oval lesion marked by high signal intensity in the splenium of the corpus callosum in a T2-weighted image (Fig. 2), although the patient exhibited no neurological abnormalities. Of course, the lesion was beyond the radiation field. The patient had no seizures and wasn’t taking any antiepileptic drugs. She lost 7 kg during chemotherapy because of appetite loss, her weight dropping to 45 kg by the end of the third course of chemotherapy. The fourth course of chemotherapy began 89 days after the start of treatment. On day 96 of the therapy, the lesion marked by the abnormal signal intensity in the splenium of the corpus callosum was no longer visible in the MR images (Fig. 3). Although her appetite had been increasing slightly, she didn’t...
Fig. 1. A 19-year-old woman with nasopharyngeal carcinoma. MR images were obtained 50 days after the start of treatment.  
A: $T_2$-weighted axial image. B: $T_1$-weighted axial image. No remarkable findings.

Fig. 2. A 19-year-old woman with nasopharyngeal carcinoma. MR images were obtained 84 days after the start of treatment.  
A: $T_2$-weighted axial image showing an oval lesion marked by high signal intensity in the center of splenium of the corpus callosum (white arrow). The longer diameter is about 12 mm. The lesion does not reach the margin of the splenium.  
B: $T_1$-weighted axial image showing a slightly lower signal intensity in the lesion than in the white matter.

gain weight and didn’t take any nutritional supplements.

Discussion

Reversible lesions marked by high signal intensity in the splenium of the corpus callosum in $T_2$-weighted images have been reported for patients with multiple sclerosis, acute disseminated encephalomyelitis, brain infarction, trauma, brain tumor, lymphoma, hydrocephalus, Rotavirus encephalopathy, encephalitis unknown origin, hemolytic uremic syndrome with mild encephalopathy, seizure, and usage of antiepileptic drugs. These diseases are considered distinguishable based on clinical and radiological findings.

Lesions marked by abnormal signal intensity arising from tumors and infarctions are usually...
irreversible. Therefore, tumor lesions and infarctions were excluded because the lesion in this case had disappeared no later than six weeks after the initial abnormal findings in the MR images. Multiple sclerosis was also excluded because no lesions marked by abnormal signals were found except for that in the splenium. Although no cerebrospinal fluid examination was performed, encephalitis was excluded because no neurological or inflammatory findings were observed. The patient had no history of head trauma. Head trauma lesions marked by abnormal signal intensity in the splenium have reportedly exhibited severe neurological symptoms such as coma. Drug-induced lesions marked by abnormal signal intensity were also excluded because the lesion disappeared during the fourth course of chemotherapy with the same drugs used in the 1st to 3rd chemotherapy courses. Leukoencephalopathy associated with camofur, a derivative of 5-fluorouracil, has reportedly shown an abnormal signal lesion in the splenium. In the report, T2-weighted images revealed lesions marked by diffuse high signal intensity not only in the splenium but also in the cerebral white matter. In addition, neurological symptoms such as memory deficit, cognitive impairment, and unsteady gait were observed. In our case, the lesion marked by abnormal signal intensity was limited to within the splenium and no neurological symptoms were observed.

This case revealed some remarkable findings in the MR images, such as an oval and well-circumscribed lesion marked by abnormal signal intensity in the median of the splenium, disappearance within two weeks, and no enhancement with Gd-DTPA. These findings were similar to those of patients taking antiepileptic drugs. However, our patient had no seizures and was not taking antiepileptic drugs. We considered malnutrition as the cause of the abnormal signal intensity in her splenium. By the time we discovered the abnormal signal intensity in the splenium of her corpus callosum, she had lost 7 kg due to appetite loss during chemotherapy. Furthermore, her appetite had improved slightly by the time the abnormal signal intensity lesion had disappeared. However, we wondered whether appetite loss could have caused this type of lesion and whether the subsequent improvement in appetite could have caused the lesion to disappear. If abnormal signal lesions appeared at the level of malnutrition shown in this paper, we believe that the incidence of abnormal signal intensity in the splenium would have been much higher. It has been reported that the lesion marked by abnormal signal intensity seen in Marchiafava-Bignami disease is necrotic and demyelinated and that the signal changes caused by demyelination were irreversible. In our case, the lesion marked by abnormal signal intensity was reversible, in contrast to that of Marchiafava-Bignami disease.

We thought that the lesion caused by malnutrition shown in this paper might be reversible. Vasogenic edematous lesions marked by abnormal signal intensity in the splenium caused by encephalitis or use of antiepileptic drugs are reversible. Diffusion-weighted images can discriminate vasogenic edema from cytotoxic edema. Unfortunately,
however, we could not obtain diffusion-weighted images in this case.

**Conclusion**

We reported a patient with malnutrition who had a transient oval lesion marked by high signal intensity in T2-weighted images in the mid portion of the splenium of the corpus callosum. In this case, the malnutrition was mild, so the signal change was thought to be reversible. Invasive examinations and therapies for focal lesions in the splenium caused by appetite loss may not be necessary.

**References**