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EDİTÖRE MEKTUP / LETTER TO THE EDITOR

Leptomeningeal carcinomatosis: remarkable diagnosis with diffusion weighted MR imaging

Leptomeningeal karsinomatoz: difüzyon ağırlıklı MR görüntüleme ile dikkat çekici tanı

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To the Editor,

Leptomeningeal tumor spreading can be encountered with various malignancies. However, such distant organ involvement is seen relatively rare. Leptomeningeal carcinomatosis (LC) occurs in 5-10 % of patients with malignant tumors and 0.14-0.24 % of patients with gastric carcinoma[1,2]. Clinical findings in LC are variable. Patients presents with non-specific symptoms including, but not limited to, headaches, nerve palsies, seizures and vomiting[3,4]. In addition to its rarity, diagnosis of the disease is difficult. Due to heterogeneity of symptoms and low sensitivity rates of diagnostic tests[3], detection of LC without delay is challenging. Here, we report a case of LC which had normal findings in almost all standard diagnostic tests and imaging techniques, except for diffusion weighted magnetic resonance imaging.

A 55 years-old male patient admitted to emergency service with left sided weakness. He had a history of gastric cancer diagnosed one year ago. Physical and neurologic examination revealed drowsiness along with left hemiparesis. His muscle strength was 3/5 for left upper and left lower extremity. Further neurologic examination showed positive signs of Kernig and Brudzinski. He had a body temperature of 37.7 °C, blood pressure of 130/80 mmHg and heart rate of 70 beats per minute. Laboratory test results were in normal range by means of blood cell count and biochemical tests.

To delineate the inflammatory or ischemic causes of these findings, lumbar puncture and computed tomography (CT) examination of the brain were performed. CT examination of the brain was performed with 4-row multi detector computed tomography scanner (Somatom Spirit, Siemens Healthcare, Forcheim, Germany). Brain parenchyma was normal on CT images (not shown). Lumbar puncture showed normal opening pressure with normal CSF cell count. Cytological examination of the CSF yielded no significant cell traces. To solve this ambiguity, contrast enhanced magnetic resonance (MR) imaging was performed. MR examination performed with a 1.5-T MR imaging system (Magnetom, Avanto,Siemens Healthcare, Forchheim, Germany). T1-weighted images with and without contrast administration, T2-weighted, fluid attenuation inversion recovery (FLAIR) and diffusion weighted (DW) images were obtained. Apparent diffusion coefficient (ADC) maps of corresponding DW images were also obtained. On conventional and contrast enhanced MR images, again, there was no significant abnormalities detected (Figure 1). On DW images, however, nodular and gyriform areas of restricted diffusion were seen at the level of centrum semiovale and vertex. On corresponding ADC images, hypointensities with similar pattern which resembling restricted diffusion were detected (Figure 2). At this point, based on diffusion MR imaging findings, LC was considered and brain biopsy was

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planned. Histopathologic findings were consistent with leptomeningeal tumor spreading (Figure 3).

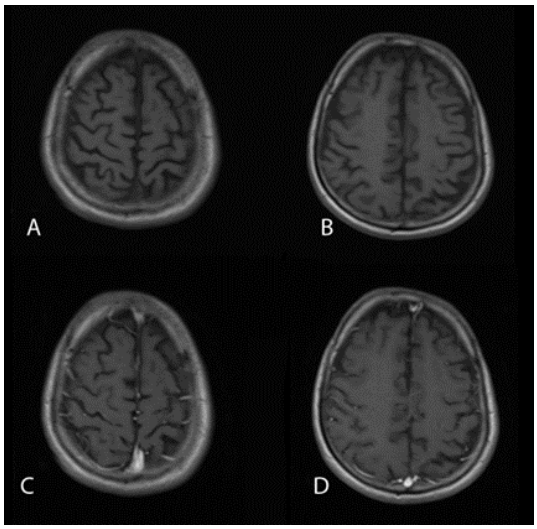

Figure 1 (A-D). Two consecutive non-contrast enhanced (A-B) and contrast enhanced (C-D) T1 weighted MR images acquired from the level of sentum semiovale and vertex. There are no signs of tumor spread.

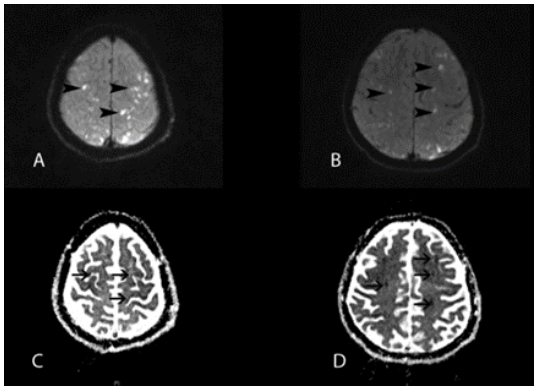

Figure 2 (A-D). Two consecutive diffusion weighted MR images (A-B) and correspondent ADC maps (C-D) acquired from same levels in Figure 1. Leptomeningeal tumor deposits are seen as a bright linear and tubular hyperintensities on DW images (arrowheads) and hypointense areas on ADC maps (arrows).

Considering the normal results acquired from laboratory tests and imaging modalities, diagnosis of LC was challenging in this case. Sole positive finding was provided by DW imaging and ultimate diagnosis was established by brain biopsy. Encountered problems in the diagnosis of LC depend on many factors. Establishing the diagnosis even in patients with known malignancy is difficult due to low sensitivity rates of diagnostic tests. One of these tests that yield useful information in the diagnosis of LC is cytological examination of CSF. This type of investigation based on biochemical analysis and presence of malign cell traces. However, its sensitivity is presumed to be around 50-71 % and this rate reaches about 85-92 % following repeated lumbar punctures[5]. However one must keep in mind that, situations such as increased intracranial pressure and coagulopathy pose life threatening problems when performing lumbar puncture.

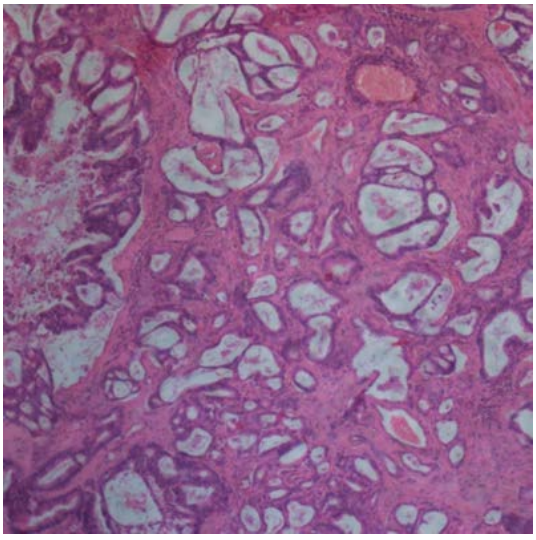

Figure 3. Histopathologic view of the brain biopsy specimen. Histopathologic examination was consistent with malign tumor cell infiltration.

On the other hand, magnetic resonance imaging is a noninvasive and widely used imaging technique which can be used in the diagnosis of LC. Previous studies conducted on patients with LC demonstrated that sensitivity of contrast-enhanced MR is between 36-70 %[6,7]. Most common imaging findings in LC include; linear and nodular deposits in the subarachnoid spaces along with leptomeningeal contrast enhancement[6]. DW MR imaging rely on Brownian motion of water molecules which constitutes water diffusion. The degree of restriction of water diffusion in biologic tissue is inversely related to tissue cellularity and the integrity of cell membranes. The motion of water molecules is more restricted in tissues with the high

cellularity associated with numerous intact cell membranes (e.g., tumor tissue)[8]. Restriction of water diffusion is seen on DW images as hyperintense areas whereas it is hypointense on corresponding ADC maps. Leptomeningeal deposition of malignant cells would be expected to demonstrate restricted diffusion. Thus, deposition site would be characterized by hyperintense linear or nodular areas as seen in Figure 2. No supportive data is present in the literature regarding the success of DW MR imaging in the diagnosis of LC except for one case report in which authors detected DW imaging findings accidentally[9]. From this standpoint, DW imaging findings must be well-established by studies which will be conducted on large group LC patients. Prognosis of LC is presumed to be poor[10]. Nevertheless, patients would benefit from new treatment options which aim to improve survival[10].

DW imaging may have potential in the diagnosis of LC and it provides supportive data about the deposition of tumor cells. As in our case, it might be the only positive sign of disease among the laboratory and imaging studies. We think that clinician could benefit from adding DW imaging into the routine MR investigation.

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