Magnetic resonance imaging/spectroscopy of an intraaxial epidermoid: similarity to an abscess

Case illustration

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KEY WORDS • epidermoid tumor • abscess • magnetic resonance imaging • magnetic resonance spectroscopy

This 26-year-old woman who presented with headache, vomiting for 2 to 3 days, no evidence of infection, and an unremarkable neurological examination underwent magnetic resonance (MR) imaging and single-voxel MR spectroscopy at 1.5 tesla, which revealed a 4-cm diameter heterogeneous long T1 and long T2 intraparenchymal mass with associated edema in the right temporal lobe, not extending to the pial surface (Fig. 1). The appearance of smooth rim enhancement and central reduced diffusion indicated abscess rather than a necrotic primary brain tumor.

Reports have demonstrated MR spectroscopy to be useful in differentiating brain abscess from brain tumors.1,3 Spectra acquired from the nonenhancing contents of the lesion by using a point resolved spin-echo spectroscopic localization technique at 270 msec TE demonstrated prominent peaks at 1.5 parts per million (ppm), 1.3 ppm, and 0.97 ppm. These peaks inverted below baseline in the spectra acquired with TE 135 msec, confirming the assignment of these resonances to alanine (Ala; 1.5 ppm), lactate (Lac; 1.3 ppm) and amino acids (AAs) such as valine and/or leucine (0.97 ppm; Fig. 2). Spectral peaks attributable to acetate, succinate, and valine or leucine have been demonstrated in the contents of brain abscesses, but not from the nonenhancing portions of brain neoplasms. Additional peaks at 3.6 ppm and 4 ppm, likely representing unassigned amino acid resonances, have been revealed by MR spectroscopy of brain abscesses.1,3 Lactate and Ala resonances have been observed in both abscess and tumor spectra.1,3 Given the MR image and MR spectroscopy findings supported the diagnosis of abscess, the patient underwent a right pterional craniotomy. A temporal mass, composed of milky fluid with solid material, was excised completely. The dura overlying the middle fossa floor was intact, demonstrating that the lesion did not arise from the middle ear. The pathological composition was consistent with a benign epidermoid. Gram staining revealed numerous polymorphonuclear neutrophils (PMNs), but no organisms. No antibiotic agents were given prior to surgery and cultures remained negative.

Intracranial epidermoids are benign lesions, most commonly located in the cerebellopontine angle, parapituitary region, and diploe spaces of the skull. Only 52 cases of intraparenchymal epidermoids have been described.2 In the reported cases, MR imaging shows a homogeneous, nonenhancing mass that is near isointense to cerebrospinal fluid and MR spectroscopy reveals a lactate peak at 1.3 ppm.1,3 In contrast, our patient’s MR study revealed a rim-enhancing cystic lesion with heterogeneous contents and MR spectra suggestive of brain abscess.1,3 An infected epidermoid would be the simplest explanation, but the cultures remained negative. Thus, PMNs alone likely produced the protein degradation products observed in the spectra. Amino acids such as valine and leucine are end products of proteolysis caused by enzymes released from neutrophils. Epidermoids can cause aseptic meningitis, and it is possible that sufficient local brain irritation from breakdown of epidermoid cells resulted in accumulation of PMNs in the tumor bed.

Although, MR spectroscopy should exclude primary brain neoplasm from the differential diagnosis of this rim-enhancing lesion, in our case, MR imaging and spectroscopy findings were indistinguishable from brain abscess. Although rare, sterile intraparenchymal epidermoid tumor should be considered along with abscess in the differential diagnosis of rim-enhancing brain lesions when MR spectroscopy detection of PMN-associated proteolysis products has excluded primary brain neoplasm.

Fig. 2. Spectroscopy images acquired from the contents of the epidermoid at TE 270 msec (left) and 135 msec (right). Prominent Ala, Lac, and AA peaks at TE 270 msec (left) are inverted due to J-coupling at TE 135 msec (right). No choline, creatine, or N-acetyl-aspartate peaks are seen. These findings are consistent with spectra seen in brain abscesses.

References