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Fluid-Fluid Levels in Benign Neurogenic Tumors

Peter Catalano, Elizabeth Fang-Hui, and Peter M. Som

Summary: We report two cases of cystic lesions in the head and neck, one a cystic schwannoma and the other a neurofibroma, both of which showed fluid-fluid levels on MR images. The differential diagnosis of fluid-fluid levels in the head and neck region should include cystic hygromas, aneurysmal bone cysts, soft-tissue cavernous hemangiomas, and simple bone cysts.

Index terms: Neck, magnetic resonance; Neck, neoplasms

The sectional imaging characterization of fluid-fluid levels, although uncommon and nonspecific, is typically seen with soft-tissue cystic hygromas and osseous aneurysmal bone cysts (1, 2). In fact, the presence of fluid-fluid levels on computed tomographic (CT) scans and magnetic resonance (MR) images should initially suggest the diagnosis of one of these lesions. However, there have also been isolated case reports of fluid-fluid levels associated with soft-tissue cavernous hemangiomas, pineal glial cysts, synovial sarcoma, fibrosarcoma of soft tissue, myositis ossificans, slow-flowing blood without thrombosis, ovarian cystic teratoma, pseudocystic hepatic tumors, mesenteric chyle cyst, endometriosis, necrotic liver metastases, unicameral bone cyst, simple bone cyst, giant cell tumor, osteosarcoma, and metastatic lung carcinoma to bone (3–16). We describe two cases in the head and neck, one a cystic schwannoma and the other a neurofibroma, both with MR demonstration of fluid-fluid levels.

Case Reports

Case 1

A 43-year-old man had had a left-sided parotid mass for 1½ months. The mass was somewhat tender to touch and he had some intermittent numbness of the left cheek, but there was no pain, trismus, decreased sensation in the distribution of the fifth cranial nerve, or facial nerve weakness. The patient reported no weight loss and his medical history was noncontributory. He was not on any medication, and he had no known drug allergies. At physical examination, a 3-cm mass was palpated in the left parotid gland that was firm and minimally mobile. Findings at intraoral and neck examinations were normal. The patient was treated with antibiotics for 2 weeks for presumed parotitis, with no response. A contrast-enhanced CT scan of the neck showed a large lobulated low-density mass involving the posterior and medial aspects of the left parotid gland. Fluid-fluid levels were not visible on CT scans. The largest portion of the mass was approximately 3 cm in diameter and was situated medially. There was erosion of the left lateral pterygoid plate, and enlargement of the foramen ovale (Fig 1A) was noted. Separation between the mass and the brain was not well seen.

An enhanced MR image showed a large, complex cystic and solid mass within the left infratemporal fossa extending superiorly into the left foramen ovale. Fluid-fluid levels were present within the mass, but the brain and remaining skull base were normal (Fig 1B).

The differential diagnosis was between a trigeminal schwannoma and a deep lobe salivary gland tumor. At surgery, the left maxilla and zygoma were mobilized on a hinged osteoplastic flap to expose the infratemporal fossa. A retrograde parotidectomy was also performed to identify the facial nerve, which was lateral to the tumor. A multilobulated neurogenic tumor of the third division of the trigeminal nerve was identified and resected. A temporalis flap was used to reconstruct the skull base. The entire tumor was removed and sent for pathologic examination, which showed a schwannoma with degenerative changes. The patient recovered uneventfully, and was discharged home on the 10th day following surgery. Facial nerve function was normal.

Case 2

A 54-year-old woman with neurofibromatosis type I had intermittent odontophagia and mild trismus. Physical examination showed mild trismus and a left-sided parapharyngeal space mass. Facial sensation was normal in all areas. A CT scan of the neck showed a mass within the left

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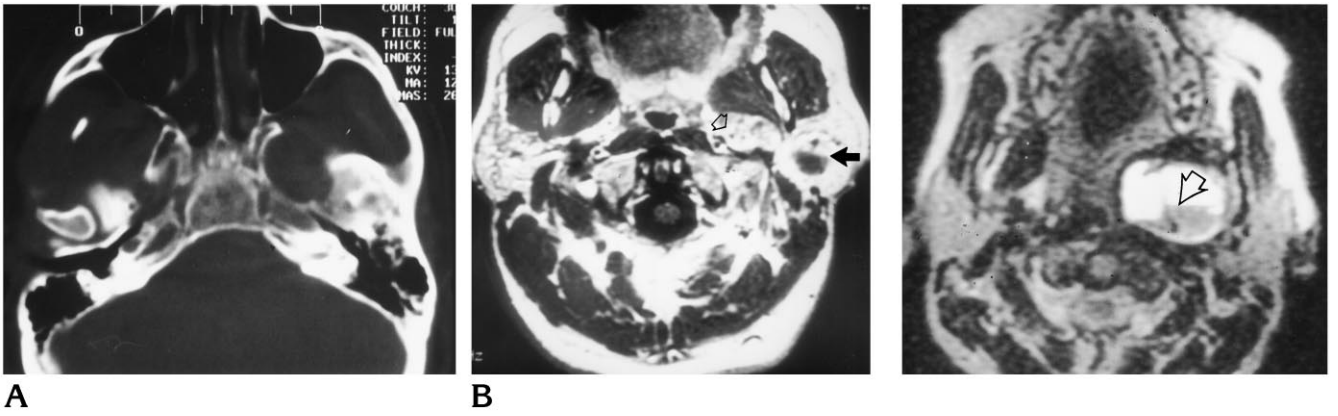

Fig 1. A 43-year-old man with left-sided parotid mass.
A, Axial CT scan with bone algorithm shows enlarged foramen ovale.
B, Axial contrast-enhanced T1-weighted MR image of the neck shows fluid-fluid level (*solid arrow*) in plexiform trigeminal neuroma. *Open arrow* indicates solid component of lesion.

Fig 2. A 54-year-old woman with left-sided parapharyngeal space mass. Axial T2-weighted MR image of neck shows fluid-fluid level in trigeminal neurofibroma (*arrow*).

masticator space with a small intracranial component and associated compression of the pharynx. MR imaging showed a large lobulated mass that had overall high signal intensity on T2-weighted images with fluid-fluid levels (Fig 2). The findings were compatible with the diagnosis of neurofibroma. Another neurofibroma was present on the left side of the neck, more caudally in the region of the left scalene muscle.

The patient was treated surgically via a preauricular infratemporal fossa approach to the parapharyngeal space and pterygomaxillary fossa. The mass was excised and sent for histopathologic examination, which was consistent with neurofibroma. The patient recovered uneventfully from the surgery, and was discharged home on postoperative day seven.

Discussion

Benign neurogenic tumors can occur in the head and neck. Specifically, 25% to 45% of benign schwannomas arise in this region. Similarly, neurofibromas, which can occur throughout the body either commonly as part of neurofibromatosis or rarely as an isolated lesion, also are known to arise in the head and neck. Symptoms are usually slowly progressive and result from impingement of surrounding structures and rarely from direct involvement of an affected nerve. At the skull base, these uncommon neurogenic tumors may pose diagnostic and management dilemmas, and a rational approach to their treatment cannot be planned until a diagnosis is established. Since the clinical presentation may not always suggest a neurogenic tumor, imaging studies are important to help narrow the differential diagnosis. Only then can the clinician appropriately counsel the patient with respect to treatment options and their potential morbidity, especially if surgical resection of a cranial nerve is a possibility, as in both cases presented here.

It is not uncommon for cystic areas to develop within intracranial and extracranial schwannomas and neurofibromas. These regions are believed to be the result of a confluence of mucinous areas or microcysts, or as a result of hemorrhage and necrosis. Most often this blood does not clot, so that some of the fluid is unclotted blood against serous (interstitial) fluid. In addition, in areas of necrosis within these tumors, fluid that fills a necrotic cavity early on tends to be more proteinaceous than newer interstitial fluid. In such cases, fluid separation, based on viscosity and protein content, may occur. The characterization of these cystic regions has improved with the use of MR imaging (17–26).

The imaging features of these benign masses include noninfiltrative smooth margins, the possible presence of bone remodeling without bone infiltration, nonhomogeneous MR signal intensities, and the presence of fluid-fluid levels. If such a mass occurs along a nerve distribution, and the mass is relatively silent clinically, with an absence of associated lymphadenopathy, a benign cystic schwannoma or neurofibroma should be considered high in the differential diagnosis.

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