Mandibular Nerve Perineural Tumor Spread in Cutaneous and Parotid Malignancies: Role of the Auriculotemporal Nerve

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Purpose
The auriculotemporal nerve (ATN), a branch of the mandibular division of the trigeminal nerve, provides cutaneous innervation to a broad area of the lateral and upper face. It also serves as a conduit for postganglionic parasympathetic innervation to the parotid gland through fibers that originate in the facial and glossopharyngeal nerves as the lesser superficial petrosal nerve. The ATN is at risk for perineural tumor spread (PNS) from malignancies arising not only along its cutaneous distribution, but from the parotid gland as well. Parotid malignancies may spread also directly into the masticator space and thus gain access to the main trunk of V3. We present the clinical and imaging features of 8 cases of radiographically demonstrated PNS along the ATN or main mandibular nerve, in which the lesion originated in the parotid gland or cutaneous distribution of the ATN. The anatomy of the ATN also is reviewed briefly.

Materials & Methods
Eight cases were identified in which perineural tumor spread could be demonstrated along the auriculotemporal branch of the mandibular nerve. MR imaging was available in all cases, often including earlier scans obtained elsewhere as well as follow-up scans obtained at our institution. The imaging technique used in the outside studies was variable but generally nonhigh-resolution. Our studies included 16-cm FOV axial noncontrast, and coronal and axial fat-suppressed, postcontrast T1-weighted sequences.

Results
Five cases were parotid in origin (one each salivary duct carcinoma, myoepithelial carcinoma, adenocarcinoma, squamous cell carcinoma, and adenoid cystic carcinoma), and 3 cases were of cutaneous origin (all squamous cell carcinoma). In regard to symptoms, 2 patients had mandibular nerve sensory symptoms prior to the diagnosis of cancer (both of these patients also had facial nerve palsy prior to diagnosis). Three patients had trigeminal symptoms coinciding with recurrence of tumor (one parotid recurrence, 2 with cutaneous lesion recurrences involving parotid extension). Two patients never had trigeminal symptoms; one presented with a parotid mass and only facial palsy, and one patient had had previous resection of a parotid tumor and the perineural spread represented recurrence. Facial nerve palsy was typical but often followed parotid tumor resection.

On MR imaging, foramen ovale was involved in all cases and Meckel’s cave in all but one case (this case had Meckel’s cave involvement subsequently). The cavernous sinus was involved in 3 cases, the main trigeminal trunk in 4 cases, and the greater superficial petrosal nerve in 3 cases. There was antegrade PNS in 3 cases (pterygopalatine fossa in 2 cases including the infraorbital nerve in 1, and inferior alveolar nerve in one case). All but 1 case ultimately demonstrated
imaging evidence of masticator muscle denervation. There was bulky masticator space tumor involvement in only 2 cases.

**Conclusion**

Patients with cutaneous cancers in the preauricular region or parotid malignancies, are at risk for PNS along the auriculotemporal branch of the mandibular nerve. Occasionally, such spread is asymptomatic; in some cases, trigeminal neuropathy may predate the diagnosis of a parotid tumor. In other cases, mandibular nerve perineural tumor spread may herald recurrence of a previously resected tumor, either parotid in origin, or a cutaneous cancer with intraparotid recurrence. The radiologist should be familiar with these patterns of spread in order to avoid misdiagnosis.

**References**