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Parotid gland squamous cell carcinoma invading the temporomandibular joint

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The American Academy of Orofacial Pain defines temporomandibular disorders (TMDs) as “a collective term that embraces a number of clinical problems that involve the masticatory muscles, the [temporomandibular joint] TMJ, and the associated structures.”¹ TMDs are considered a musculoskeletal disorder in the classification of orofacial pain disorders.² Pain, dysfunctional symptoms, signs such as limitation in the ability to open the mouth, asymmetric jaw movements and TMJ sounds are the most common findings. Other symptoms commonly associated with TMDs include earache, tinnitus, headache and neck pain. In most cases, a conservative and reversible management approach will provide symptom relief for TMDs. However, a clinician could interpret as TMDs a patient’s pain or dysfunction that actually is attributable to nonmusculoskeletal causes such as neurological, neurovascular, neoplastic and glandular sources and subsequently could misdiagnose and treat them as TMDs.

Clinicians must differentiate malignant diseases from TMDs in the head and neck. Investigators in large surveys of patients with head and neck cancer found that between

ABSTRACT

Background. Tumor invasion of the temporomandibular joint from the parotid gland is rare. Practitioners should be able to differentiate tumor involvement from temporomandibular disorders (TMDs).

Case Descriptions. The authors present case reports of two patients with parotid gland masses accompanied by pain, dysfunction and other symptoms not consistent with musculoskeletal disorders. In both cases, clinicians initially reached an incorrect diagnosis and treated the masses as if they were TMDs, which delayed a definitive diagnosis and provision of appropriate treatment.

Conclusions. Dentists must take a thorough patient history, perform a detailed clinical examination and request proper radiographic imaging, when necessary, to render an accurate diagnosis and avoid mistreatment. Dentists who treat TMDs must recognize the possibility that a head or neck malignancy may manifest with symptoms and signs that mimic TMDs. If dentists are in doubt about a diagnosis, referral to the appropriate specialist should be considered.

Clinical Implications. A thorough history, a comprehensive clinical examination and an understanding of salivary gland disorders should facilitate an accurate initial diagnosis, allowing delivery of the appropriate and necessary medical treatment.

Key Words. Temporomandibular disorders; squamous cell carcinoma; salivary gland disorders; tumor invasion.

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85.0 and 92.5 percent of these patients reported pain associated with the tumor.^{3,4} Primary squamous cell carcinomas (SCCs) of the oral mucosa are associated with pain and other sensory disturbances when the disease is at an advanced stage, and these symptoms can interfere with oral function. Tumor invasion of the masticatory muscles and adjacent structures may cause musculoskeletal pain and limitation of movement.⁵ Investigators recognize nasopharyngeal carcinoma as a primary malignancy that clinicians also must differentiate from TMDs.⁶ Forty-four percent of patients with nasopharyngeal carcinoma complain of headache, earache and pain in the jaw, face and neck, and 13.5 percent have common signs of TMDs.^{6,7} Osteosarcoma and chondrosarcoma of the jaws require differentiation from TMDs because they manifest with swelling, pain, ulceration or neurological deficit.^{8,9} Clinicians also must distinguish intracranial malignancies from TMDs because these conditions may cause orofacial pain, headache or both, with the most common manifestation being similar to that of classic trigeminal neuralgia.¹⁰ Furthermore, clinicians must rule out metastatic disease to the jaw from cancers at distant sites¹¹ and orofacial manifestations resulting from systemic cancer such as lymphoma, leukemia and multiple myeloma.^{12,13}

Salivary gland disorders involving the parotid, submandibular, sublingual and minor salivary glands may mimic TMDs. Disorders of the parotid gland are the most frequent glandular disorders confused with TMDs because of the proximity of this gland to the masseter muscle and the TMJ. Glandular disorders may involve inflammatory, infectious, traumatic and neoplastic processes. The most common findings are pain and enlargement of the parotid gland, which may indicate sialadenitis, sialolithiasis, epidemic parotitis or tumor, or a combination of these.

Because of these overlapping signs and symptoms, accurate diagnosis may be delayed and inappropriate therapies may be administered. We report two cases of parotid masses accompanied by pain and dysfunction. Clinicians initially treated the masses as if they were TMDs, thus contributing to a delay in correct diagnosis and appropriate treatment.

CASE REPORTS

Case 1. A 65-year-old man's otolaryngologist referred him to a clinician (M.Y.) in the otolaryngology department at the University of Illinois

Medical Center, Chicago, in April 2007 for consultation regarding a mass in the right parotid gland region accompanied by numbness on the right side of the face, facial and ear pain and a limited ability to open the mouth. His history was significant for pancreatic cancer, for which he had undergone partial resection of his pancreas, chemotherapy and radiation therapy in December 2003. Approximately one year later, he developed a mass in the right parotid gland. After a fine-needle aspiration (FNA) biopsy was performed, his oncologist diagnosed Warthin tumor (a benign parotid neoplasm). In August 2005, the patient chose palliative radiation therapy rather than surgical resection for treatment of the Warthin tumor because of concerns regarding his pancreatic cancer. He reported resolution of symptoms for approximately three months, after which the pain and swelling recurred.

In November 2005, the radiation oncologist examined the patient and referred him to his regular dentist. According to the dentist, the patient had pain on the right side of the face and swelling in the preauricular and masseter muscle regions, as well as an intermittent foul taste in his mouth. The patient stated that the pain had begun several months earlier after he had undergone radiation therapy for a parotid gland tumor. The patient described having a constant, dull ache that did not increase or decrease in intensity regardless of what he tried to do to alleviate or avoid the pain. The patient noted a slight limitation in his ability to open his mouth and reported no pain at awakening. Clinical examination results revealed tenderness along the right inferior border of the mandible and pain in the posterior aspect of the body of the masseter muscle at palpation. Furthermore, the dentist detected a hard, bulky nodule in this region. The patient's range of mandibular movements (comfortable opening as much as 35 millimeters) was decreased from his normal mandibular opening of 45 mm; however, he could stretch his mouth open further (as much as 38 mm), with discomfort at maximum opening but without any intracapsular sounds. The clinician detected no oral mucosal abnormalities, and the patient's dentition was intact.

ABBREVIATION KEY. **CT:** Computed tomographic. **FNA:** Fine-needle aspiration. **MR:** Magnetic resonance. **PET:** Positron emission tomography. **SCC:** Squamous cell carcinoma. **TMD:** Temporomandibular disorder. **TMJ:** Temporomandibular joint.

The dentist diagnosed TMD. He provided an oral appliance and prescribed analgesic, anti-inflammatory and muscle-relaxant medications. The patient's right-side facial pain and swelling decreased, but he began to complain of ear and neck pain on the right side. The dentist referred the patient for physical therapy for TMD in March 2006. Across the next year, the patient alternated visits between the dentist and physical therapist without resolution of the initial complaints. Also during this time, he began to experience numbness in the right side of the face and a decrease in his ability to open his mouth.

The patient's otolaryngologist performed a needle biopsy of the right parotid gland that showed results consistent with chronic inflammation. Because of his continued symptoms, his otolaryngologist referred the patient to our medical center. At the initial examination, the patient complained of sharp ear pain on the right side radiating to the neck, and he reported eating a soft diet because of pain during chewing. Cranial nerve examination results revealed numbness and hypoesthesia in the right maxillary and mandibular branches of the trigeminal nerve and paresis of the frontal branch of the right facial nerve. Clinical examination results revealed a firm, tender parotid mass on the right side (4.0 × 5.5 centimeters) that was fixed to underlying tissues. The right external ear canal was obstructed partially with debris and was swollen and erythematous. The maximum interincisal opening was 16 mm, and such opening caused pain. Intraoral palpation produced a thick, gelatinous material at the Stensen duct. The patient's symptoms and previous FNA biopsy results were consistent with a chronic infection of the parotid gland. One of the authors (M.Y.) prescribed antibiotics, analgesics, increased hydration and massage of the parotid gland.

Because of continuing symptoms and signs, the clinician (M.Y.) performed a core needle biopsy of the right parotid mass. The results of this biopsy were consistent with chronic infection. A computed tomographic (CT) scan revealed findings that another of the authors (P.H.N.) interpreted to represent areas of either necrosis or ductal dilatation (Figure 1). Approximately three weeks later, the patient reported increased pain and fluid draining from the external auditory canal, with no change in the mass in the right parotid gland. To alleviate the patient's severe pain in the region, the clinician (M.Y.) performed a total

parotidectomy in July 2007. Biopsy results from a frozen section of tissue obtained at the time of surgery showed SCC. The tumor extended into the right TMJ, the right external auditory canal and the lateral and medial pterygoid muscles. As a result, in July 2007, the clinician performed surgery to remove the articular disk and portions of the involved muscles. The final pathology report revealed SCC with multiple positive margins, perineural involvement and facial nerve invasion. Two of the authors (M.Y. and P.H.N.) reviewed the patient's CT scans obtained 12 and five months before surgery and found an enlarging soft-tissue mass displacing the right mandibular condyle out of the right TMJ space (Figure 2). The growth of the mass and the increased displacement of the mandibular condyle made both the surgeon (M.Y.) and the radiologist (P.H.N.) highly suspicious of the tumor's malignancy.

Two weeks after surgery, the patient's interincisal opening was limited (10 mm), although the patient reported less pain and an increased ability to eat normally without pain. He received radiation therapy after surgery to minimize the risk of recurrence.

Magnetic resonance (MR) imaging performed after surgery showed the right mandibular condyle to be displaced anteriorly out of the fossa with space behind it but without evidence of residual cancer (Figure 3, page 996). In April 2008, clinical examination results revealed healing of the surgical site, an interincisal opening of 28 mm and minimal tenderness in the right preauricular and masseteric regions.

Case 2. A 65-year-old man's oncologist referred him to a clinician (M.Y.) in the otolaryngology department at the University of Illinois Medical Center in October 2006 for consultation regarding a mass in the right preauricular region. The patient reported a history of SCC of the skin on the right side of the scalp treated by means of surgical excision in July 2006. Subsequently, he experienced paralysis in the right side of the face, diagnosed initially as Bell palsy. MR images of this region obtained at another facility before October 2006 revealed a right parotid gland mass. The results of FNA of the parotid mass revealed SCC. Because of the extent and aggressive nature of the cancer, his oncologist referred the patient to our medical center.

Before MR imaging and FNA, his regular dentist had been treating the patient for approxi-

mately one year. According to the dentist, the patient initially complained of pain and tightness in the right preauricular region with clicking, popping sounds emanating from this area. Furthermore, the patient reported alternating tingling and numbness on the right side of the face. The patient reported a constant, dull, tingling pain that increased in intensity when he chewed hard foods and decreased only when he followed a soft diet. He described that, at times, it felt as though his jaw was unable to open “smoothly” but this did not produce any pain. Although he reported some limitation in his ability to open his mouth, he denied episodes of being prevented from opening to his normal limits. Clinical examination results revealed a low level of sensation in the right side of the face, with no tenderness or pain at palpation in the masticatory muscles, external auditory canal or TMJ. The dentist noticed a tender, hard mass in the right masseter muscle but was unable to elicit any pain at palpation. The patient could open his mouth comfortably as much as 25 mm, and he could stretch his mouth to 28 mm. When he opened his mouth, he noticed a clicking, popping sound accompanying a deviation in movement in the right TMJ. The oral mucosa and dentition appeared intact.



Figure 1. Contrast material-enhanced axial computed tomographic scan of the patient in case 1 shows enlargement of the right parotid gland (arrowhead) with multiple low-attenuation foci with apparent nonenhancement (arrow). Diagnostic considerations included chronic infection with cyst formation from salivary ductal dilatation or areas of tumor necrosis.



Figure 2. Axial computed tomographic scans of the patient in case 1 from August 2006 (**A**) and March 2007 (**B**) show worsening of the soft-tissue swelling surrounding the right temporomandibular joint (arrows). This swelling is poorly defined and infiltrative, which suggests malignancy or infection. Arrowheads indicate the condyle of the mandible.

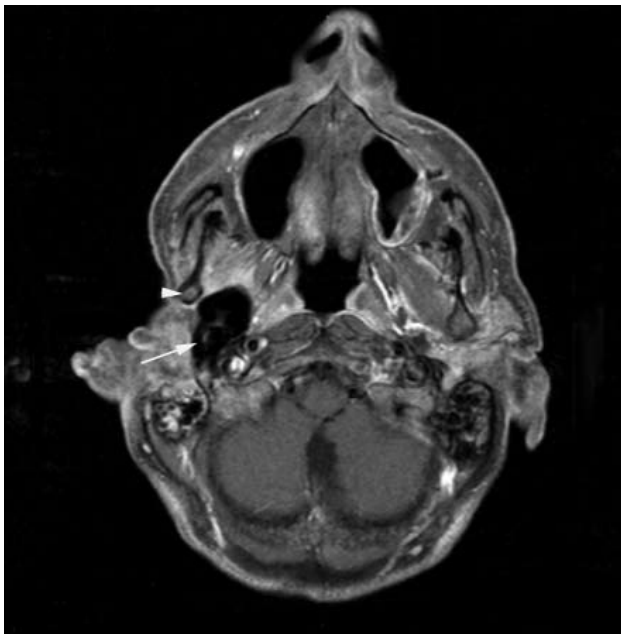


Figure 3. Contrast-enhanced axial magnetic resonance image obtained after resection of the parotid tumor in the patient in case 1. During surgery, the tumor had infiltrated the temporomandibular joint but apparently not yet the mandible. This postsurgical image indicates an anteriorly displaced mandibular condyle (arrowhead) and a dead space (arrow) in the region of the temporomandibular joint.

Although his dentist had not recorded a differential diagnosis, he had conducted occlusal equilibration and provided an oral appliance and analgesics.

At the initial examination in our otolaryngology department, the patient reported minimal pain in the right parotid region and ear and limited ability to open his mouth. The patient also reported a recent weight loss of 30 pounds, which he attributed to an altered diet. Extraoral examination results revealed a well-healed scar on the right side of the scalp at the site of the excision of the SCC. One of the authors (M.Y.) noted a palpable, fixed, indurated and immobile mass that measured 6.5 × 5.0 cm in the right parotid region. The patient had facial paralysis on the right side and a limited ability to open the mouth (as much as 22 mm) without pain. One of the authors (M.Y.) performed a biopsy of the skin on the right side of the scalp, and another author (P.H.N.) conducted positron emission tomography (PET)/CT scanning of the patient's head, neck and chest. The biopsy results showed normal skin on the right side of the scalp. On the basis of the previous FNA results showing SCC, one of the authors (M.Y.) thought this was a parotid metastasis from the

primary cancer of the skin on the right side of the scalp despite control of the primary lesion. The CT results showed a large parotid mass that had invaded the TMJ.

The oncologists treated the patient with concomitant chemotherapy and radiation therapy. He completed the course of treatment in January 2007 and, initially, responded well. However, at the end of July 2007, he had developed persistent otorrhea in the right external auditory canal, and biopsy results revealed a well-differentiated metastatic SCC. PET/CT scans showed uptake of contrast material in the parotid gland and around the TMJ (Figure 4), and CT scans showed erosion of the posterior aspect of the TMJ (Figure 5) that suggested malignancy.

In August 2007, the patient underwent resection of the right parotid gland during which the facial nerve, the external auditory canal and the condyle of the right mandible were removed because of tumor invasion into the TMJ and skull base. At follow-up, cytologic test results revealed recurrent tumor. In October 2007, the patient began weekly palliative chemotherapy. At recall examinations, the patient reported a decrease in pain and an increased ability to open his mouth as much as 28 mm without pain. As of July 2008, the patient had an interincisal opening of 40 mm without pain.

DISCUSSION

We cannot overemphasize the importance of obtaining a thorough patient history and performing a complete examination. The current criterion standard to identify TMDs is a comprehensive evaluation of the patient's history and a clinical examination, supplemented, when appropriate, with imaging.^{2,14-16} The results in both cases indicate that the patients' health care providers did not follow this protocol, which resulted in misdiagnosis of TMDs.

In case 1, members of the medical community initially diagnosed the condition incorrectly because of inaccurate biopsy results, even though the patient had undergone all of the appropriate tests and biopsies so that the clinician could make an accurate diagnosis. The radiation oncologist then referred the patient to his regular dentist for further evaluation and treatment. The dentist subsequently misdiagnosed and incorrectly treated the condition for approximately 18 months despite the patient's history and initial clinical examination results, which suggested

cancer. This patient's age and sex were not usual for a patient with a complaint of TMDs, other than one with TMDs caused by osteoarthritis. The dentist did not pursue the patient's history of parotid gland tumor, presence of swelling, intermittent foul taste in the mouth and jaw use that did not elicit an increase in pain, as patients with TMDs commonly experience. During the clinical examination, the dentist also did not investigate the parotid mass.

In case 2, a dentist initially misdiagnosed and treated the condition before referring the patient for medical evaluation of his facial paralysis, during which the clinician identified the parotid mass. Again, the findings should have alerted the dentist to consider other diagnostic possibilities. Once more, the age and sex of the patient were not usual for a patient with a musculoskeletal disorder such as TMD. The patient complained of alternating tingling and numbness, which the clinician later confirmed. The dentist should have investigated this crucial symptom further. Clinical examination results revealed a lack of tenderness or pain in several anatomical locations, yet this finding was inconsistent with the patient's chief complaint and with the finding of a limitation in the ability to open his mouth. The dentist also identified a mass in the right masseter muscle and mistook it for a possible muscle trigger point.

Both patients had histories of cancer. In case 1, a thorough history taken by the dentist would have revealed the history of Warthin tumor, which is associated with a 0.3 percent risk of malignant transformation.¹⁷ Furthermore, both patients reported a history of invasive cancer. The reported median time for the development of nodal metastases after treatment of high-risk SCC of the skin is approximately 12 months, although late relapse (two to three years) is well documented.¹⁸ The dentist should have been alert to the possibility that these were not signs and symptoms of a musculoskeletal disorder and should have ruled out malignant disease, especially because the patient had a history of it. Even though metastases to bone are more common in patients with primary carcinoma of the prostate, breast, lung, colon or thyroid gland,¹⁹⁻²² orofacial findings were the first manifestation leading to diagnosis in 60 percent of cases in one study.¹¹ Signs and symptoms of TMDs, coupled with swelling, neurological disturbances and radiographic evidence of a destructive lesion or patho-

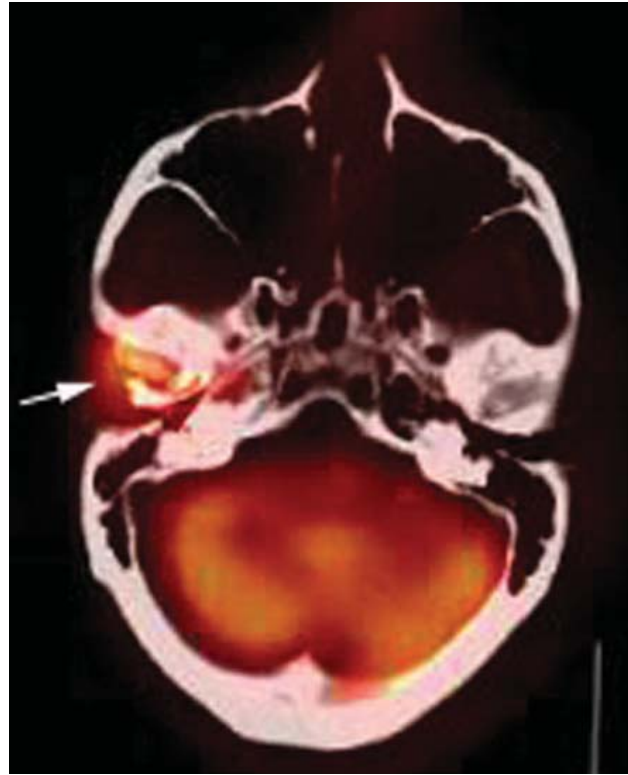


Figure 4. Fused positron emission tomographic and computed tomographic scan obtained seven months after treatment of squamous cell carcinoma of the right parotid gland in the patient in case 2 shows abnormal contrast material uptake in the region around the right temporomandibular joint (arrow).

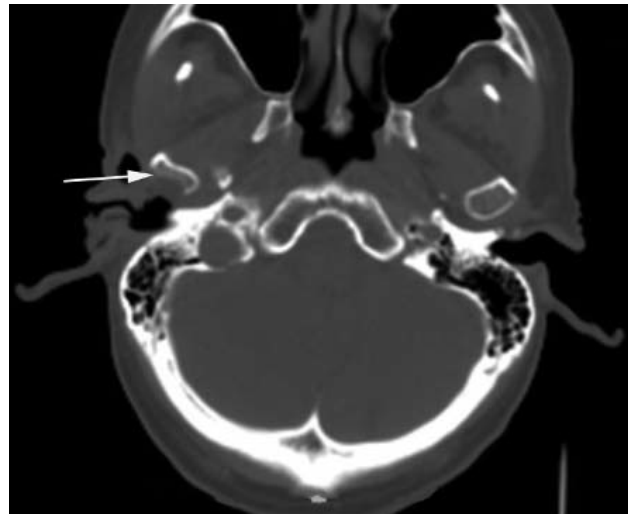


Figure 5. Axial computed tomographic scan obtained seven months after treatment of squamous cell carcinoma of the right parotid gland in the patient in case 2 shows erosion of the posterior aspect of the right mandibular condyle (arrow). This area of erosion corresponded to an area of increased fluorodeoxyglucose uptake and was suggestive of cancer recurrence.

logical fracture of the mandibular condyle, may suggest a malignant process, either primary or metastatic. The potential overlap in symptoms

BOX

Common features of orofacial neoplastic conditions.*

- Neurological signs: numbness in the distribution of the trigeminal nerve
- Regional mass that may or may not be tender
- Lymphadenopathy in the head and neck
- Auditory complaints, such as a decrease in hearing
- Constant pain that is not influenced by mandibular movements (although in some patients who have primary cancer or metastatic disease, pain may increase with function if the joint, masticatory muscle or both are involved)
- Increase in severity of symptoms across time
- Absence of change in symptoms, despite several treatment attempts
- Unexplained weight loss
- Dysphagia, odynophagia or both in patients with oropharyngeal cancer
- Bleeding: nosebleed, oral bleeding
- If nasopharyngeal carcinoma is present, the presence of swelling, including lymphadenopathy, as well as ear, nose and throat signs and symptoms such as nosebleed, nasal stiffness, hemoptysis, drainage from the ear and dysphagia

* Sources: Epstein and Jones,⁶ D'Silva and colleagues¹¹ and Orhan and colleagues.²⁷

mandates care in diagnosis and reassessment or, if symptoms do not improve or other symptoms suggest that malignant disease is present, referral to a specialist.

Both patients complained of neurological symptoms such as tingling and numbness in the facial region that are critical indicators of neural involvement.^{23,24} These neurological disturbances initially are mild and usually evolve during a prolonged period. Involvement of the facial nerve may manifest as a partial or complete facial palsy that clinicians may misdiagnose as trigeminal neuropathy or neuralgia or Bell palsy.²⁵ These symptoms are inconsistent with those of TMDs. Furthermore, in case 2, the patient reported extensive and rapid weight loss, a cardinal sign of cancer, which he incorrectly attributed to an alteration in diet.²⁶ Accurate diagnosis requires asking the patient questions about the onset of symptoms and their progression, as well as about past treatment.

Other findings that may have cast doubt on a diagnosis of TMD, despite symptoms mimicking those of TMDs, are that in case 1, the report of right parotid gland swelling generally suggests a salivary gland disorder rather than a TMD. Furthermore, patients with TMDs do not have swelling and erythema in the right external audi-

tory canal with partial obstruction and expression of abnormal exudate from the Stensen duct. The clinician may have been better able to differentiate TMDs from neoplastic conditions by noting the presence or absence of several key features of those conditions (Box).^{6,11,27} In addition, the persistence of the signs and symptoms should have prompted the clinician to reevaluate the initial diagnoses because conservative and noninvasive management strategies customarily relieve symptoms in as many as 90 percent of TMDs.¹ For patients with persistent TMDs, the clinician should provide a referral to another specialist, recommend diagnostic imaging or both. Eighty percent of all salivary gland tumors, most of which are benign,^{28,29} occur in the parotid gland. Malignant parotid gland tumors account for only 1 percent to 3 percent of all head and neck cancers.^{30,31} Tumors of the salivary gland may not be primary and may represent metastases to parotid lymph nodes from adjacent cutaneous sites, such as auricular, temporal and facial skin. High-grade tumors often manifest as advanced disease and portend a poor prognosis, with five-year survival rates of 24 percent and 10-year survival rates of 18 percent.^{32,33} Characteristic signs and symptoms associated with malignant parotid gland tumors include neurological symptoms, facial nerve paralysis, unilateral facial swelling or mass, external auditory canal destruction or TMJ dysfunction.^{28-30,32} The disease trajectory of the two cases reported here highlights the need for awareness of the complexity and diversity of manifestations of malignant salivary gland tumors. Condylar metastasis as a result of SCC is rare. Robiony and colleagues³⁴ reviewed 27 cases of condylar metastasis from previous articles, only six of which described a previous diagnosis of SCC for the primary lesion. Sanchez Aniceto and colleagues,³⁵ in a review of nine cases of metastatic tumors to the mandible, found that approximately one-half of those cases involved condylar metastasis with the manifesting signs and symptoms simulating TMDs. Therefore, those who manage TMDs must be aware of the need to reach a definitive diagnosis. Clinicians must understand that, although rare, symptoms of malignant disease can mimic many of those commonly associated with TMDs. Even though some symptoms may help the clinician differentiate a malignant disease from a chronic musculoskeletal disease, the clinician first must rule out these conditions.

CONCLUSIONS

The cases we reported here are unique in that both patients had malignant parotid masses with tumor invasion into the TMJ. Direct tumor extension from the parotid gland to the TMJ is rare. A thorough patient history, a detailed clinical examination and proper radiographic imaging are prerequisites for making an accurate diagnosis before initiating therapy. Dentists who treat patients with TMDs must be aware of the possibility that a patient with a head or neck malignancy might have symptoms that overlap with those of TMDs, especially when the patient does not respond to conventional conservative treatment. For patients with persistent facial pain, neurological symptoms and limited ability to open the mouth, clinicians must rule out malignant disease. The clinician should refer the patient to the appropriate specialist to confirm the diagnosis and to ensure the provision of timely and appropriate treatment to decrease morbidity and mortality. ■

Disclosure. None of the authors reported any disclosures.

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