

Numb Chin Syndrome: A Subtle Clue to Possible Serious Illness

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Numb chin syndrome (NCS), also called *mental neuropathy*, is a sensory neuropathy characterized by numbness involving the distribution of the mental nerve and is an uncommon, but also underappreciated, manifestation of metastatic malignancy.¹ The most common cause of NCS is breast cancer or lymphoma that has metastasized to the mandible with invasion or compression of the inferior alveolar or mental nerve.^{1,2} Compression of the mandibular division of the trigeminal nerve at the base of the skull by a tumor mass or leptomeningeal invasion may also cause NCS.³ Because the inferior alveolar nerve has no motor fibers, NCS is a purely sensory neuropathy. Common symptoms include numbness over the lower lip, chin, and gingival mucosa; pain is not usually a feature of NCS.¹ Prognosis of NCS in patients with cancer is poor, and survival is usually measured in months. Because NCS may be the first manifestation of malignancy or a sign of metastatic disease in a patient with known malignancy, clinicians must be aware that the seemingly trivial symptom of lower facial numbness may signal serious disease.

ANATOMY AND PATHOPHYSIOLOGY

The trigeminal nerve has three branches, designated V1, V2, and V3, which provide several sensory and motor functions to the face. The mandibular branch of the trigeminal nerve (V3) exits the skull through the foramen ovale and divides into an anterior motor division that supplies the muscles of mastication and a posterior sensory division that continues through the mandible as the inferior alveolar nerve.^{2,4} The inferior alveolar nerve provides sensory innervation to the gingiva, lower lip, and chin area. The inferior alveolar nerve exits the mental foramen of the mandible as the mental nerve, which also supplies sensation to the skin of the chin, mucous membranes of the lower lip, and the mandibular gingiva around the incisors.⁴

NCS is usually caused by malignant cell infiltration of the inferior alveolar nerve sheath or direct compression by a local tumor or metastatic deposit involving the mandible.⁵ The inferior alveolar nerve may be in-

involved anywhere along its course within the mandible, or alternatively, the mental nerve may be involved.^{1,5,6} NCS may less commonly occur from compression of the intracranial trigeminal nerve root by a local metastatic deposit or metastasis to the meninges in this area.^{2,5}

SIGNS AND SYMPTOMS

Symptoms of NCS typically include unilateral numbness of the skin of the chin, the lip, and, occasionally, the gingiva.^{1,7-9} Numbness is usually unilateral, not circumoral as in cases of hyperventilation or hypocalcemia.^{6,7} Pain and swelling may be present in cases of a locally destructive process such as malignancy or infection.⁶ Hypoesthesia or anesthesia is usually present over the chin, lip, and gingiva, but motor function of the lower face is intact.^{1,3,10} Percussion-induced pain and loosening of the mandibular teeth may occur in cases of infiltration of the mandibular canal with leukemic cells.¹⁰ If metastatic malignancy is present, patients may have symptoms such as weight loss, fever, fatigue, and pain in addition to symptoms and signs related to the primary tumor. However, symptoms of NCS may precede any other symptoms of malignancy.¹

ETIOLOGY

Various etiologies of NCS have been reported; however, malignancy is the most common cause, often in patients with known disease.¹⁻⁴ In adults, metastatic breast cancer and lymphoma account for most cases of NCS,^{2,9} and acute lymphoblastic leukemia accounts for a significant number of cases in children.¹⁰ One large study of NCS in cancer patients reported metastatic breast cancer in 64% of patients and lymphoma in 14% of patients; 50% of patients with NCS had mandibular metastases and 36% had a tumor mass or leptomeningeal involvement in the area of the trigeminal nerve root.² Other malignancies less commonly associated with NCS include

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Table 1. Etiologies of Numb Chin Syndrome

Odontogenic	Malignant
Dental abscess	Breast cancer
Osteomyelitis	Lymphoma
Dental trauma	Leukemia
Dental anesthesia	Lung cancer
Facial trauma	Renal cell carcinoma
Benign tumors	Melanoma
Systemic	Prostate cancer
Amyloidosis	Thyroid cancer
Sickle cell anemia	Sarcomas
Syphilis	Gastrointestinal cancers
Diabetes mellitus	Multiple myeloma
Vasculitis	Head and neck cancers
Sarcoidosis	
Aneurysms	

lung cancer, melanoma, prostate cancer, sarcomas, renal cell carcinoma, multiple myeloma, and head and neck cancers.^{1-3,6,10,11} Nonmalignant conditions occasionally cause NCS and include odontogenic infections, trauma, diabetes, amyloidosis, syphilis, sarcoidosis, sickle cell disease, and systemic vasculitis.^{3,7} Patients with AIDS may also develop NCS because of the presence of a high-grade lymphoma involving the central nervous system or mandible.¹²⁻¹⁴ **Table 1** displays some of the reported conditions associated with NCS.

DIAGNOSIS

The diagnosis of NCS is largely clinical, however, various radiographic studies are helpful to confirm diagnosis. Perhaps the most important step in the diagnosis of NCS is recognizing the potential clinical significance of unilateral chin or lip numbness. The clinician's ability to recognize these key symptoms, especially because these symptoms may signal a serious illness, cannot be overstated.¹⁵ Indeed, the quote by the German writer Goethe (1749-1832), "What one knows, one sees,"¹⁶ is fully applicable to NCS because the astute clinician who realizes that chin numbness is a potentially significant symptom can then exclude an underlying malignancy in the patient.

Imaging studies useful for the diagnosis of NCS include panoramic jaw radiography, computerized tomographic (CT) scanning, magnetic resonance imaging (MRI), and nuclear bone scintigraphy. Because a large

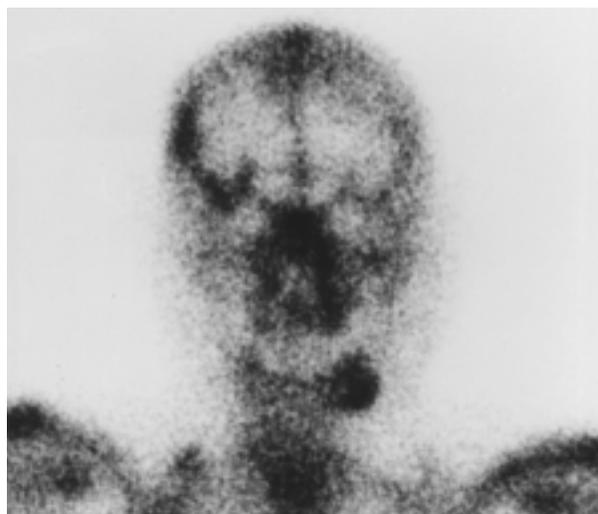


Figure 1. Nuclear bone scan in a patient with numb chin syndrome caused by metastatic lung cancer. The scan shows a metastatic deposit involving the left mandible in the area of the mental foramen.

number of NCS cases are caused by metastases to the mandible, panoramic radiography of the jaw is a useful starting point.¹ Radiographic findings may include an osteoblastic lesion or an osteolytic defect anywhere along the mandible or in the region of the mental foramen. Underlying dental pathology (eg, thinning of lamina dura, tooth displacement) has also been discovered in more than 50% of patients with acute lymphoblastic leukemia.^{10,17}

In patients with NCS caused by underlying cancer, CT imaging of the brain and skull base may reveal evidence of a mass lesion, parenchymal brain metastases, or leptomeningeal invasion by tumor in the area of the root of the mandibular division of the trigeminal nerve.^{2,7,12,13} In addition, CT imaging of the mandible performed in several planes can yield an accurate anatomic image of the inferior alveolar nerve and its surroundings. Osteoblastic and osteolytic lesions as well as osteomyelitis and malignant invasion of the inferior alveolar nerve by tumor can be imaged with mandibular CT scanning, which is more sensitive than plain film panoramic radiography.⁷

MRI is useful for evaluating the mandible and inferior alveolar nerve.¹⁸ Some authors recommend MRI scanning of the mandible if the etiology of mental neuropathy is unclear after routine imaging studies have been completed.² Nuclear bone scintigraphy (bone scanning) may also identify mandibular bone disease such as metastases or osteomyelitis (**Figure 1**).^{1,3} In

addition, bone scanning may reveal other areas of bony metastases in patients with widespread malignancy.

Lumbar puncture with cytologic analysis of cerebrospinal fluid may also be necessary to exclude carcinomatous meningitis or leptomeningeal metastases if imaging studies fail to reveal an anatomic lesion. In one study, the combination of CT scanning of the brain, base of skull, and mandible, in conjunction with cytologic analysis of cerebrospinal fluid, yielded a diagnosis in 89% of patients with NCS and known malignancy.²

THERAPY AND MANAGEMENT

In general, treatment of the underlying disease causing NCS is the primary mode of therapy. For instance, in cases of dental disease (eg, abscess), primary treatment by a dental consultant is warranted. However, in patients with NCS caused by metastatic cancer, treatment does little to affect outcome; average survival after NCS is diagnosed is approximately 5 months if caused by mandibular metastases and 12 months if leptomeningeal metastases are present.² Local radiotherapy has been utilized in patients with skull-base metastases, and cranial irradiation has been used to treat patients with leptomeningeal metastases or carcinomatous meningitis. Mandibular lesions do not typically require local radiotherapy because symptoms of NCS resolve spontaneously in many patients.²

SUMMARY

Unilateral numbness of the lip or chin should prompt the clinician to consider the diagnosis of NCS and to search for an underlying etiology. If local dental disease is excluded, the possibility of metastatic cancer, usually lymphoma or breast cancer, must be considered. Radiologic evaluation of the mandible beginning with plain film panoramic radiography may reveal an osteolytic or osteoblastic lesion. In addition, a CT scan of the brain and skull base is warranted to exclude brain, leptomeningeal, or skull metastases. If radiography or CT scan is unrevealing, MRI may be useful. Treatment is aimed at the underlying illness. However, after NCS is diagnosed, prognosis is very poor, and survival is typically measured in months. HP

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