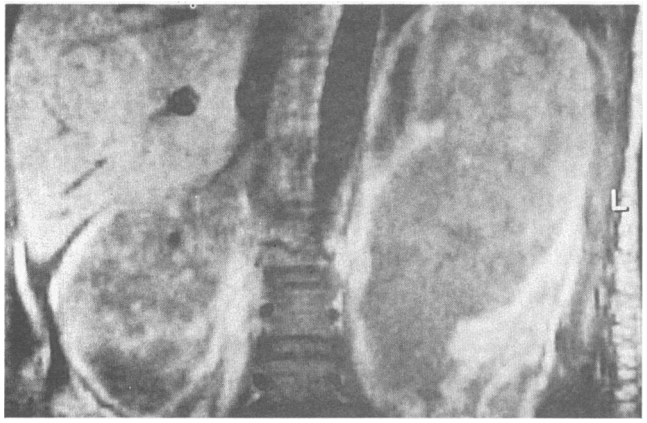

Figure 2.—A magnetic resonance image (coronal plane) 10 days after the initiation of therapy shows persistent renal enlargement and hemorrhage.

occurs in as many as 70% to 80% of patients, manifested chiefly as hematuria or proteinuria. Hypertension occurs in 50% of cases. Gastrointestinal findings due to mesenteric artery involvement are noted in 60%. Advanced disease may involve coronary arteries, resulting in myocardial infarction.[1]

Although the cause of polyarteritis nodosa is unknown, much evidence supports an autoimmune origin. As many as 30% of patients test positive for HBsAg. Hepatitis B antigen along with immunoglobulin G has been found in the walls of vessels with acute polyarteritic lesions.[2,3] An association between polyarteritis nodosa and the Australia antigen[2] as well as rheumatic fever and rheumatic heart disease[4] has been reported. A type of vasculitis that is indistinguishable from polyarteritis nodosa has been recognized in a large number of intravenous drug abusers,[5] and methamphetamine abuse appears to be a common denominator. It thus seems likely that a variety of antigens may, under appropriate circumstances, stimulate the immune system, resulting in polyarteritis nodosa.

Pathologic findings in the kidneys of patients with the disorder may be related to glomerulonephritis, arteritis of medium and small vessels, or both. Antigen-antibody complex deposition along basement membranes initiates an inflammatory response. The subsequent necrotizing reaction destroys the elastic lamina of the vessels, thus weakening the walls and resulting in aneurysm formation, thrombosis, or rupture. The arcuate and interlobular arteries are the most commonly involved renal vessels.[6,7] Aneurysm formation tends to occur at branch points and produces a characteristic "beading pattern" on angiography.[8] Renal failure remains one of the major causes of death.

Corticosteroids and cytotoxic agents are the cornerstones of medical therapy. Without treatment, half to two thirds of patients will die of renal failure or congestive heart failure within a year. With corticosteroid treatment, the five-year survival is about 40%.[1] The use of cytotoxic agents may increase survival or benefit those in whom corticosteroid therapy has failed.

Spontaneous renal hemorrhage or rupture has been reported previously in patients with polyarteritis nodosa and is typically unilateral.[9-13] In many cases, emergency surgical treatment and nephrectomy are needed. Because of the diffuse nature of the disease process, attempts at maximal renal preservation are warranted. As in the present case, aggressive medical therapy may obviate surgical intervention. Refractory cases may be successfully managed with angiographic embolization. If surgical intervention is necessary, partial nephrectomy should be attempted, if feasible, as renal failure accounts for much of the morbidity and mortality associated with the disease process.

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The Numb Chin in Metastatic Cancer

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THE MENTAL NERVE is one of the terminal branches of the third (mandibular) division of cranial nerve V, the trigeminal nerve. The mandibular division exits the base of the skull at the foramen ovale and branches until it reaches the mental foramen in the horizontal ramus of the mandible. The mental nerve has many small offshoots that supply the skin of the chin and lower lip and the mucous membranes on the buccal surface of the lower lip.[1]

Many neurologic processes produce lesions of the trigeminal nerve inside the cranial vault, including vertebrobasilar vascular disease,[2] intracranial tumors,[3] and multiple sclerosis. Lesions of the mandibular division include compression by tumors, meningeal carcinomatosis, and basilar meningitis, among many other causes.

Lesions affecting solely the mental nerve are less common and generally produce more localized symptoms than involvement of the mandibular division or of the entire trigeminal nerve. Also commonly classified under the term "mental neuropathy" are lesions of the inferior alveolar nerve, from which the mental nerve branches, occurring at the mandibular foramen. In addition to the numbness of the

(Harris CP, Baringer JR: The numb chin in metastatic cancer. West J Med 1991 Nov; 155:528-531)

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chin and anterior teeth and gums produced by the mental nerve, involvement of the inferior alveolar nerve also produces numbness of the teeth and gums in the posterior half of the mandible.

Mental neuropathy as a manifestation of metastatic malignancy has been reported in 49 cases, some of which had not been diagnosed before the neuropathy occurred. We describe two cases of neuropathy of the mental nerve and analyze the literature regarding its occurrence in metastatic cancer.

Reports of Cases

Patient 1

The patient, a 70-year-old man, for the previous five months had had right chin and gum pain and dysesthesias. The dysesthesias began suddenly and had been constant. They extended from the midline to the vermillion border of the lower lip and were also present on the buccal surface of the right lower lip.

Four months before he was seen, a course of amoxicillin was administered: it had no effect on the symptoms. Two months before he was seen, the diagnosis of trigeminal neuralgia was considered; he was treated with gradually increasing doses of carbamazepine without effect. The use of codeine relieved the pain but did not affect the numbness.

His medical history was pertinent for severe coronary artery disease, hypertension, chronic renal insufficiency, and pancreatitis. Stage C adenocarcinoma of the prostate had been diagnosed 17 months previously and was in remission. He had a 50-pack-year history of smoking.

The findings of a general physical examination were notable for a diffusely enlarged prostate without nodules but with loss of the median raphe. On neurologic examination he had an area of hypesthesia on the right chin from the midline to the corner of the lip and extending in a vertical line inferiorly. There were no sensory alterations inside the mouth.

Radiographs of the right mandible and skull were normal. A bone scan, however, revealed multiple foci of increased activity throughout the skeleton, including the femurs; left ilium; lumbar, thoracic, and cervical spine; multiple ribs; and a lesion in the inferior ramus of the right mandible. An acid phosphatase level was 10.23 U per liter (normal 0 to 0.8), and the prostate specific antigen level was 20.2 ng per ml (normal 0 to 5).

The patient underwent bilateral orchiectomy under local anesthesia. His disease continued to progress, however, and he died six weeks after the procedure, six months after his mental nerve palsy developed.

Patient 2

The patient, a 41-year-old woman with breast adenocarcinoma and diffuse skeletal metastases, had paresthesias and numbness of the left chin. The numbness covered a discrete area from the edge of the lower lip to the angle of the jaw, not quite extending to the midline.

On a general physical examination, she had a well-healed mastectomy scar and palpable, nontender soft tissue masses spread diffusely over the scalp, with no adenopathy. A neurologic examination revealed normal masseter strength and a decreased appreciation of pinprick over the left chin from the vermillion border of the lower lip to the angle of the mandible. Unfortunately, a sensory examination inside the oral cavity was not done.

Magnetic resonance imaging (MRI) with gadolinium administration showed a loss of the normally bright fatty marrow signal on the T2-weighted image (Figure 1) in the left ascending ramus of the mandible at the level of the mandibular foramen. Infiltrating tumor was presumably replacing the marrow, causing the loss of signal. Also noted were several metastases to the scalp without invasion of the calvarium.

The patient underwent whole-brain irradiation, including the scalp and the base of the skull. When seen in clinic after the radiation therapy, the paresthesias of the chin had resolved. She has remained asymptomatic for six months.

Discussion

Nonmalignant causes of mental neuropathy have been described, including sickle cell crisis,[4-6] trauma,[7] dental manipulation,[8] mandibular osteomyelitis, mandibular atrophy,[9] and local inflammatory processes.[10] Primary tumors of the mandible, benign or malignant, also can result in mental nerve palsy,[11] as can local invasion by primary malignancy of the oral or nasal cavities, such as nasopharyngeal carcinoma.[8]

Patients with mental neuropathy present with ipsilateral dysesthesias or numbness from the chin to the vermillion border of the lower lip extending to the midline; often anesthesia of the mucosal surface of the cheek, anterior gums, or lips is noted.[1] There may be a sensation of thickening of the lip.[12] This is more localized than neuropathy of the inferior alveolar nerve, though the literature makes no distinction between the two, grouping both neuropathies under the term mental neuropathy. Compression of the inferior alveolar nerve generally occurs at the mandibular foramen, in the ascending ramus of the mandible, the location of the lesion in patient 2. Symptoms in this instance also are noted in the teeth and gums of the posterior half of the mandible. More

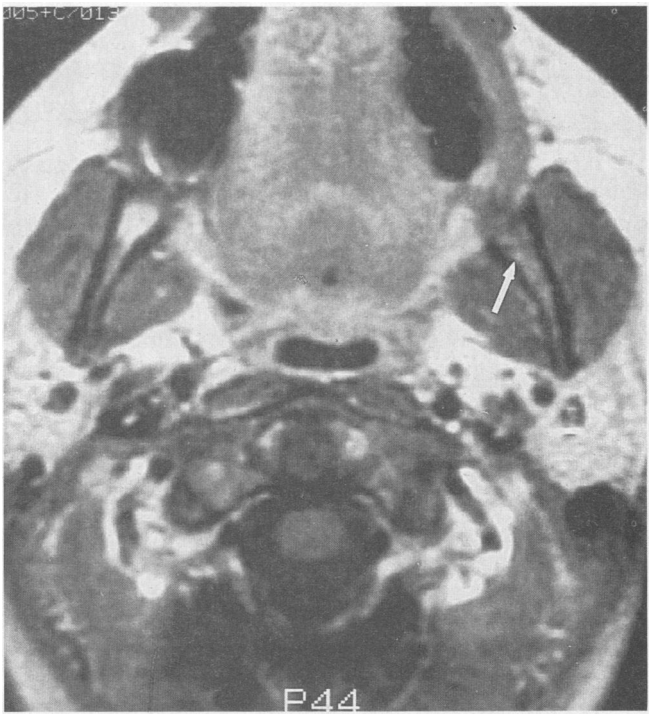

Figure 1.—Magnetic resonance imaging scan shows the T2-weighted image with gadolinium administration. Note the loss of the normally bright fatty marrow signal **(arrow)** in the left ascending ramus of the mandible, consistent with a bony metastasis.

TABLE 1.—*Reported Cases of Mental Neuropathy Due to Malignancy*

Source	Primary	Stage of Cancer With Diagnosis of Mental Palsy
Adair and Herrmann, 1946[14]	Breast	Before metastatic disease (BMD)*
	Breast	Metastatic disease present (MDP)*
Sterling et al, 1954[15]	Lung	Before metastatic disease*
Jurgens, 1954[16]	Lung	No cancer diagnosis (NCD)
Bruce and McDonald, 1954[17]	Colon	Before metastatic disease*
Castigliano and Rominger, 1954[12]	Breast	Before metastatic disease*
Blackwood, 1956[18]	Breast	Metastatic disease present
Calverley and Mohnac, 1963[7]	Lung	No cancer diagnosis
	Breast (3 cases)	Metastatic disease present
	Hodgkin's	Before metastatic disease*
Clausen and Poulsen, 1963[19]	Breast	Before metastatic disease*
	Lung	Before metastatic disease*
Nobler, 1969[1]	Multiple myeloma	Metastatic disease present
	Lymphosarcoma (5 cases)	NCD (1), BMD (1),* MDP (3)
	Hodgkin's	Metastatic disease present
	Reticulum cell sarcoma	Metastatic disease present
Horton et al, 1973[20]	Breast (4 cases)	Metastatic disease present
	Reticulum cell sarcoma	Metastatic disease present
Roistacher, 1973[21]	Breast	Before metastatic disease*
Rowe et al, 1974[22]	Reticulum cell sarcoma	Before metastatic disease*
Rohrer and Colyer, 1981[23]	Unknown primary	No cancer diagnosis
Massey et al, 1981[24]	Lymphoma (6 cases)	NCD (3), BMD (3)*
	Prostate	Before metastatic disease*
	Breast (3 cases)	Before metastatic disease*
	Unknown primary	No cancer diagnosis
	Lung	No cancer diagnosis
	Rhabdomyosarcoma	No cancer diagnosis
	Melanoma	No cancer diagnosis
	Liposarcoma	Before metastatic disease*
	Multiple myeloma	No cancer diagnosis
Banerjee and Gottschalk, 1984[25]	Squamous cell lip	Before metastatic disease*
Rotstein et al, 1988[26]	Lymphoma	Metastatic disease present
	Breast	Metastatic disease present
This report		
Patient 1	Prostate	Before metastatic disease*
Patient 2	Breast	Metastatic disease present

*Only local or regional malignancy was known at the presentation of mental neuropathy.

diffuse dysesthesias occur with lesions of the mandibular branch of the trigeminal nerve, where numbness extends beyond the above borders to the preauricular area, including the tragus.[13(p224)]

Although not recognized as such, mental neuropathy from metastatic disease was first reported by Adair and Herrmann in 1946.[14] Since then, 51 cases have been reported in the English-language literature, including the current report (Table 1).[1,12,14-26] This compilation of cases does not include chin numbness from mandibular division compression by meningeal carcinomatosis, primary jaw tumors,[24] or malignant disease arising from the bone marrow of the mandible, such as leukemia[21,24] or Waldenström's macroglobulinemia.[27]

The two most frequently described metastatic causes of neuropathy of the mental nerve are compression at the mental foramen by regional lymphadenopathy[1] and that by metastases to the lower mandibular ramus. Metastases to the skeletal system by carcinomas are common, but involvement of the upper and lower jaws is infrequently recognized.[28] It has been thought that the infrequency of observed metastasis to the jaws is due to a lack of symptoms, a failure to include the mandible and maxilla in skeletal surveys, and an inability to examine the jaws fully at autopsy.[23]

Various authors have emphasized that jaw metastases are often the first signs of malignancy.[12,19,23] In a 1963 study by Clausen and Poulsen,[19] 97 cases of carcinoma metastatic to the jaw were examined: the most common primary sites included breast (31%), lung (18%), kidney (15%), thyroid (6%), prostate (6%), and colon (6%), and melanoma (5%). Other primary tumors metastasizing to the jaws less frequently include ovary, testis, salivary gland, and gastric adenocarcinoma and sarcoma.[12]

Signs and symptoms of jaw metastases other than mental neuropathy include pain, swelling, the loosening of teeth, and pathologic fracture.[23]

In an analysis of the 51 cases of mental neuropathy reported, 70% were presumed to be from metastases to the mandible, 10% were due to regional lymphadenopathy, and in 18% of cases, the cause was not clear. An additional case showed metastases to the gingiva with no bony changes.[15]

Many of the cases were not proved either radiologically or pathologically but were presumed metastatic in the presence of known metastatic disease. Massey and co-workers considered a response to radiotherapy to the mandible presumptive evidence of metastatic tumor.[24]

Plain radiographs of the mandible showed metastatic tumor in only 46% of the cases; in the other cases, the radiographs were not done or were normal. Computed tomography or MRI of the mandible was not reported in these cases before this report.

Of the 51 cases of mental neuropathy summarized here, the primary malignant neoplasms were breast (35%), lymphoma (20%), lymphosarcoma (16%), lung (10%), myeloma

(4%), prostate (4%), and carcinoma of unknown primary (4%). The other primary sites were present in only single cases.

Metastasis to the jaw and neuropathy of the mental nerve have previously been noted to be symptoms of rapidly progressive and soon fatal disease.[1,19] Our review confirms this observation: the average survival after mental neuropathy was diagnosed was only 5.4 months, the range being from 2 weeks to 28 months; information was not available for ten patients.

The most important aspect of the diagnosis of mental neuropathy is the number of cases in which it is the presenting symptom of an undiagnosed underlying cancer. In 12 of the patients (24%), there was no recognized malignant process before the "numb chin." In 20 patients (39%), malignant tumor was either regional or in remission when the mental neuropathy appeared. This has important implications for the treatment of the malignant disease; our first patient underwent further therapy based on the knowledge that his prostate carcinoma, previously in remission, was now widely metastatic.

Considering this aspect, patients presenting with a neuropathy of the mental nerve with no history of cancer should have plain radiographs of the mandible and a skeletal survey or bone scan to evaluate for other osseous lesions. If these studies are normal, MRI with gadolinium administration appears to be a sensitive method for diagnosis.

Also required is a search for a primary neoplasm encompassing the most common sites of breast, lung, tumors of the lymphoreticular system, myeloma, and prostate carcinomas.

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Massive Splenic Infarction in Doubly Abnormal Heterozygous Sickling Disorders

A New Complication of Acute Splenic Sequestration Syndrome

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ACUTE SPLENIC SEQUESTRATION syndrome and acute splenic infarction are sequelae of sickle hemoglobin disorders and occur in children with sickle cell disease (hemoglobin [Hb] SS) and adults with Hb SC disease or hemoglobin S-β-thalassemia. Exposure to high altitude while mountain traveling or flying in an unpressurized plane are well-known precipitating events. Prompt transfusion is essential for the management of acute splenic sequestration syndrome; symptomatic treatment is usually effective in the management of acute splenic infarction.

Acute, massive, and complete splenic infarction is rare in adults and when diagnosed is usually seen in association with doubly heterozygous sickling disorders. We have recently seen two patients with complete splenic infarction and have identified two other cases from the literature. The patients had doubly abnormal heterozygous sickling disorders and no exposure to high altitude. In three patients, massive splenic infarction was preceded by well-documented acute splenic sequestration syndrome. In the fourth case, acute splenic sequestration syndrome likely preceded complete splenic infarction. All patients required splenectomy.

Reports of Cases

Patient 1

The patient, a 22-year-old African-American man with hemoglobin S-β-thalassemia, was admitted with lower extremity discomfort and ill-defined lower abdominal pain typical of hi previous painful crises. His leukocyte count was 8.7×10^9 per liter (8,700 per μl), and his spleen was not palpable. On day 3 he suddenly became obtunded and was

(Berry RA, Odumakinde EA, Lewis JP: Massive splenic infarction in doubly abnormal heterozygous sickling disorders—A new complication of acute splenic sequestration syndrome. West J Med 1991 Nov; 155:531-532)

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