Correspondence and Clinical Notes

Clinical Notes

Breast Cancer Metastasis Involving Pterygopalatine Fossa: A Cause of Trigeminal Neuralgia

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We present a case of metastatic breast cancer to pterygopalatine fossa (PPF) with a severe trigeminal neuralgia located in the V2 division of the trigeminal nerve area, which was diagnosed by computed tomography (CT) and magnetic resonance imaging (MRI). In 2002, a 62-year-old woman had a 6-month history of lancinating pain and hyphestesia on the right side of the face. The type of pain of this patient is a severe characteristic trigeminal neuralgia that causes episodes of intense, stabbing, electric shock-like pain in the areas of the face where the V2 branch of the trigeminal nerve is distributed. Carbamazepine and other medications did not provide pain relief. Therefore, she has undergone maxillary nerve blocks whenever the pain worsened. She was operated for breast cancer on the right side in 2000. There were no findings of recurrence at the original site during her follow-up period. One year after the operation, CT examination of the lungs revealed a mass on the upper lobe of the right lung. She had undergone surgery for this mass and pathology revealed breast cancer metastasis. Neurological examination disclosed hypesthesia on the V2 branch of the right trigeminal nerve without other neurological deficits. There were no other cranial nerve abnormalities. Neurological examination was otherwise normal. CT examination revealed bony lyses of posterior wall of the right maxillary sinus (Figure 1A). MRI showed an enhancing soft tissue mass within the right pterygopalatine fossa and posterior portion of the maxillary sinus. Pre- and postcontrast T1-weighted images showed a right-sided soft tissue mass obliterating the fatty tissue of PPF (Figure 1B). Tumoral involvement was not detected in the right Meckel cave, cisternal portion of the trigeminal nerve or brain stem. We did not detect any vessel encroaching on the trigeminal nerve as it exists in the pons. Biopsy of PPF was advised to our patient, however the patient refused. Since the patient had biopsy-proven lung metastases, the mass causing trigeminal neuralgia and located in the PPF was accepted as a breast-cancer metastasis, in spite of the absence of histopathological information.

The metastatic pathways through which malignant tumors can involve the trigeminal nerve or ganglion can be divided into three groups: subarachnoid dissemination, homogenous dissemination from an extracranial malignancy (including metastases to the adjacent dura or bone), and direct retrograde intracranial extension from nasopharyngeal tumors.[1,2] Horton et al[3] have reported 15 patients with breast cancer who complained of numbness of the chin. These cases comprised 4% of the patients with breast cancer at their institute. Some 9 of these 15 patients manifested a trigeminal neuralgia as the initial cranial nerve sign. The explanation as to how metastatic breast cancer could cause numbness of the chin was that there needed to be dural involvement by the metastatic tumor.[4] This was demonstrated in five of the six patients who underwent autopsy. Before CT and MRI were developed, most of these cases were diagnosed by autopsy and rarely cisternography.[4] There are only a few published reports of trigeminal neuralgia caused by brain metastases in which CT or MRI was performed.[1,4] Hiroto et al also reported a case of metastatic breast cancer with a painful trigeminal neuralgia as the first sign of brain metastases, which was diagnosed by CT and MRI preoperatively.[4] They concluded after histopathological examination that the cause of trigeminal neuralgia was direct metastasis to the cisternal portion of the trigeminal nerve or ganglion from breast cancer.

The PPF is a pyramidal space located inferior to the orbital apex and posterior to the maxillary sinus. It contains the maxillary nerve (second division of the trigeminal nerve and its branches), the pterygopalatine ganglion, and

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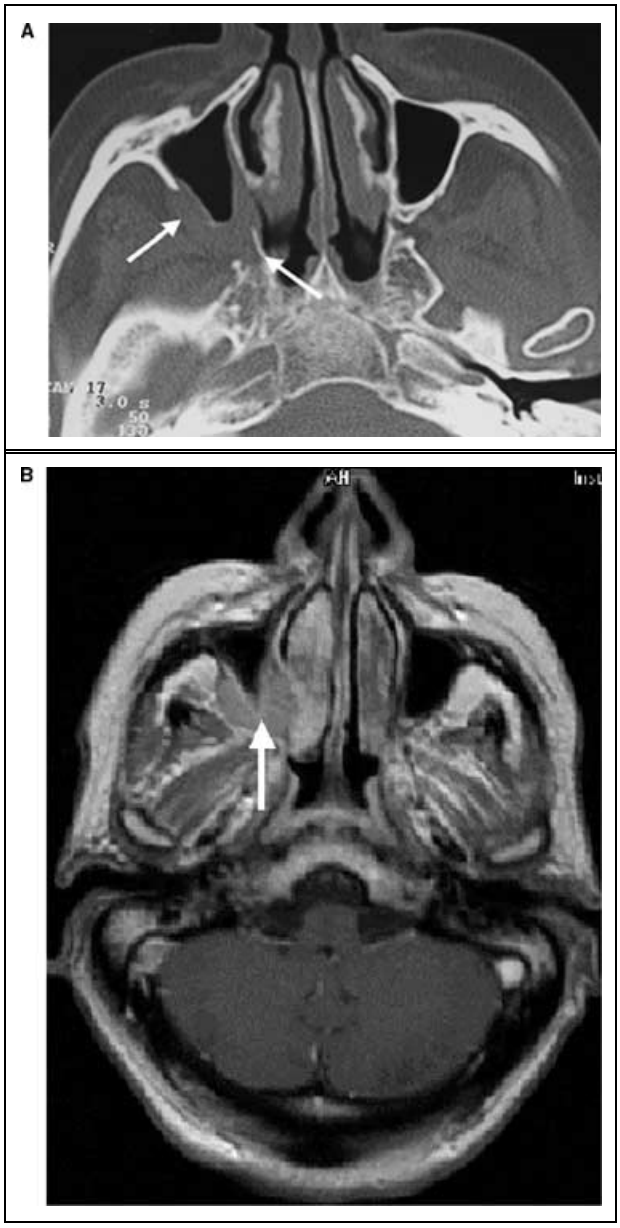

Fig 1.—Images from the case of a 62 year-old-woman who presented with severe right facial pain. Axial bone algorithm CT scan shows erosions of the posterior wall of the right maxillary sinus and a soft tissue lesion (arrow) located in the right pterygopalatine fossa (A). T1-weighted contrast enhanced MR reveals moderate contrast enhancement (arrow) in the mass (B).

terminal branches of the internal maxillary artery.[5,6] The pterygoid plates bind it posteriorly, medially by the palatine bone, and anteriorly by the maxillary bone. Laterally, it communicates with the infratemporal fossa via the pterygomaxillary fissure. It also connects with the nasal cavity medially via the sphenopalatine foramen, the orbit via the inferior orbital fissure, and the intracranial space via the foramen rotundum.

The differential diagnosis of a PPF mass typically includes perineural extension of tumors along the second division of the trigeminal nerve, nerve sheath tumors (schwannomas, neurofibromas), angiofibromas, lymphoma, hemangiomas, and, rarely, ectopic lesions of minor salivary glands.[5,6]

We have not seen any, but report that there is a breast cancer metastasis, which is diagnosed by CT or MRI, involving PPF and causing trigeminal neuralgia in the literature. In our case, CT examination revealed bony lysis of posterior wall of the right maxillary sinus and MR imaging showed an enhancing soft tissue mass within the right PPF and posterior portion of the maxillary sinus. Pre- and postcontrast T1-weighted images showed that the mass centered in PPF obliterated the fatty tissue. Tumoral involvement was not detected in the right Meckel cave. According to our interpretation, this lesion originated as a metastatic focus from the patient's breast cancer and involved primarily PPF and/or posterior wall of the right maxillary sinus. Some one might ask how one can exactly be sure that this lesion is a metastasis without histopathological verification. However, we assume this idea is correct, since our patient had histopatholically verified lung metastasis.

In conclusion, we would like to highlight that metastasis to Meckel cave; a rarely trigeminal nerve by itself and PPF (as in our case) should be kept in mind as a differential diagnosis when a patient with history of breast cancer presents a trigeminal neuralgia. Radiological examination, especially with CT and MRI are helpful in showing the actual source of trigeminal neuralgia in this condition, and CT and MRI must evaluate all parts of the trigeminal nerve, including brain stem, Meckel cave, and pterygopalatine fossa.

REFERENCES

1. Kapila A, Chakares DW, Blanco E. The Meckel cave. *Neuroradiology*. 1984;152:425-433.
2. Leggett CA. Metastases from carcinoma of the breast involving the central nervous system. *Aust N Z J Surg*. 1989;59:235-242.
3. Horton J, Means ED, Cunningham TJ, Olson KB. The numb chin in breast cancer. *J Neurol Neurosurg Psychiatry*. 1973;36:211-216.
4. Hirota N, Fujimoto T, Takahashi M, Fukushima Y. Isolated trigeminal nerve metastases from breast cancer: An unusual cause of trigeminal mononeuropathy. *Surg Neurol*. 1998;49:558-561.
5. Chan LL, Chong J, Gillenwater AM, Ginsberg LE. The pterygopalatine fossa: Postoperative MR imaging appearance. *AJNR Am J Neuroradiol*. 2000;21:1315-1319.
6. Daniels DL, Mark LP, Ulmer JL et al. Osseous anatomy of the pterygopalatine fossa. *AJNR Am J Neuroradiol*. 1998;19:1423-1432.

Headaches and Pineal Cyst: A (More Than) Coincidental Relationship?

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Pineal cysts are common findings in neuroimaging studies. The cysts are more frequent in women in their third decade of life. Pineal cysts can be symptomatic, headache is the most common symptom. The pineal gland has important physiological implications in humans, but little is known about the impact of pineal cysts in human physiology. We report 5 headache patients with pineal cyst, 4 women, 1 man, mean age 37.6, mean cyst diameter 10.1 mm. Two patients had migraine without aura, 1 migraine with aura, 1 chronic migraine, and 1 hemicrania continua. Three patients had strictly unilateral headaches. We hypothesize pineal cysts may be not incidental in headache patients, inducing an abnormal melatonin secretion.

Key words: melatonin, headaches, pineal cyst

Pineal cysts are thought to be common findings in neuroimaging studies, found in 1.3% to 2.6% of brain MRIs (magnetic resonance imaging). Sawamura et al examined brain MRIs of 6023 consecutive patients finding pineal cysts (>5 mm) in 1.3% of patients imaged.[1] The cysts predominantly occurred in females; 29 cysts in 3008 males (0.96%) and 50 cysts in 3015 females (1.65%). Young women aged between 21 and 30 years (the decade of life migraine increases its prevalence to three-fold) had the highest frequency (5.82%). All studies showing high prevalence of pineal cysts in brain MRI are biased in the recruitment criteria, usually not controlling for the reason (neurological signs or symptoms) that the exams were ordered. Only one study showed what should be the right incidence of pineal cysts analyzing 1000 asymptomatic volunteers, and incidental pineal cysts were found in brain MRI of only 2 patients (0.2%).[2]

Headache is the most common symptom of pineal region lesions (benign, malignant tumors, or cysts). Unilateral headaches have been reported in pinealectomized subjects.[3]

Mandera et al analyzed 24 pediatric patients (17 girls, mean age: 9; and 7 boys, mean age: 14) with pineal cysts.[4] Six patients were operated because of disease progression; in 2 patients, a pineocytoma was diagnosed; and the other 4 had simple cysts. Very high levels of melatonin were found in patients with pineocytomas, while those with pineal cysts showed normal or depressed melatonin secretion profile.

Wober-Bingol et al found 2 patients with pineal cysts (2.1%), 7 to 8 mm, among 96 headache patients with MRI incidental findings: One patient with migraine without aura, and the other with chronic tension-type headache (CTTH).[5] Follow-up of 16 months in both patients revealed no change in headache frequency and pattern, suggesting a benign nature of the lesion.

We reported 5 headache patients with pineal cysts, 4 women, 1 man, mean age: 37.6, cysts ranging from 8 to 13.5 mm (mean 10.1 mm) (Figure); 2 patients had migraine without aura, 1 migraine with aura, 1 chronic migraine, and 1 hemicrania continua. Diagnosis were made according the International Headache Society (IHS) Classification (2nd edition) by experienced neurologists. Three patients had strictly unilateral headaches. All patients presented with a normal neurological exam, without signs of intracranial hypertension. Clinical history of patients did not suggest any typical secondary headache feature (red flags). Follow-up did not show cyst enlargement. Patients were responsive to typical medications, and they were not put on melatonin supplementation therapy.

The majority of our patients were female, corresponding with Sawamura et al's findings of cysts predominant in women.[1] Age ranged from 8 to 63 years, only 1 patient was in the third decade of life when pineal cysts are highest in frequency.

It is unlikely that pineal lesions played a role in the reported headache patients symptoms via a mechanism of mass effect or compression. Three patients curiously reported strictly unilateral headaches, which is not typical for a midline lesion. Pinealectomized patients with unilateral headaches have been reported.[3] One patient was diagnosed with hemicrania continua, responding to indomethacin as usual in this syndrome. One of the possible indomethacin mechanisms of action in headache disorders is due to the similar chemical structure of indomethacin and melatonin,[6] with the same indole ring in both compounds.

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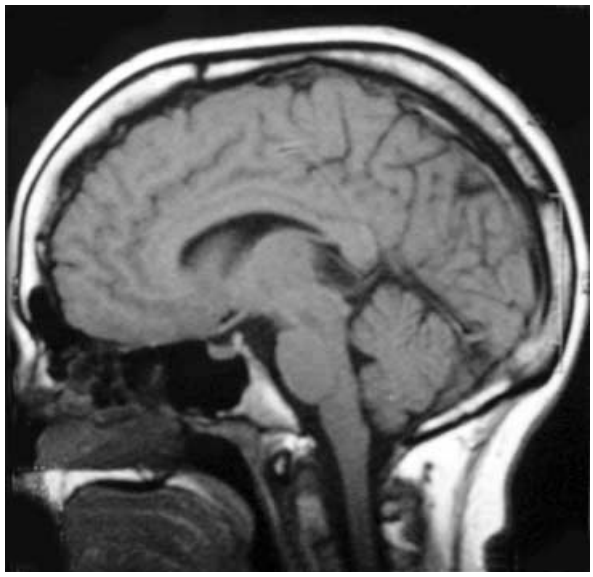

T1 MRI showing a pineal cyst.

Melatonin may play a role in headache pathophysiology via several mechanisms. Melatonin has been shown to possess anti-inflammatory effects, among a number of actions. It directly scavenges toxic-free radicals, and inhibits the activity of nitric oxide synthase. Its action in membrane stabilization, inhibition of dopamine release, modulation of the GABAergic system, neuroprotection from glutamate-induced toxicity, potentiation of opioid analgesia, all suggest melatonin may play an important protective role in headache occurrence. We hypothesize pineal cysts may be not incidental in headache patients, inducing an abnormal melatonin secretion.

Melatonin levels in headache patients with pineal cyst should clarify this hypothesis. The study of melatonin secretion in patients with pineal cysts with or without headache may also contribute to the understanding of pineal cyst physiology and its clinical implications.

REFERENCES

1. Sawamura Y, Ikeda J, Ozawa M, Minoshima Y, Saito H, Abe H. Magnetic resonance images reveal a high incidence of asymptomatic pineal cysts in young women. *Neurosurgery*. 1995;37:11-15.
2. Katzman GL, Dagher AP, Patronas NJ. Incidental findings on brain magnetic resonance imaging from 1000 asymptomatic volunteers. *JAMA*. 1999;282:36-39.
3. Chazot G, Claustrat B, Broussolle E, Lapras C. Headache and depression: recurrent symptoms in adult pinealectomized patients. In: Nappi G, ed. Headache and Depression. New York, Raven Press; 1991:299-303.
4. Mandera M, Marcol W, Bierzynska-Macyszyn G, Kluczewska E. Pineal cysts in childhood. *Childs Nerv Syst*. 2003;19:750-755.
5. Wober-Bingol C, Wober C, Prayer D, et al. Magnetic resonance imaging for recurrent headache in childhood and adolescence. *Headache*. 1996;36:83-90.
6. Peres MF, Stiles MA, Oshinsky M, Rozen TD. Remitting form of hemicrania continua with seasonal pattern. *Headache*. 2001;41:592-594.

Carotid Artery Dissection in Ergotamine Abuse

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The case of a 65-year-old male migraine patient with spontaneous internal carotid artery dissection is presented. He had been abusing ergotamine compounds for several years on at least 15 days per month. A possible association between arterial dissection and ergotamine abuse is discussed.

Key words: migraine, arterial dissection, ergotamine

Abbreviations: MRI magnetic resonance imaging, ICA internal carotid artery, IHS International Headache Society

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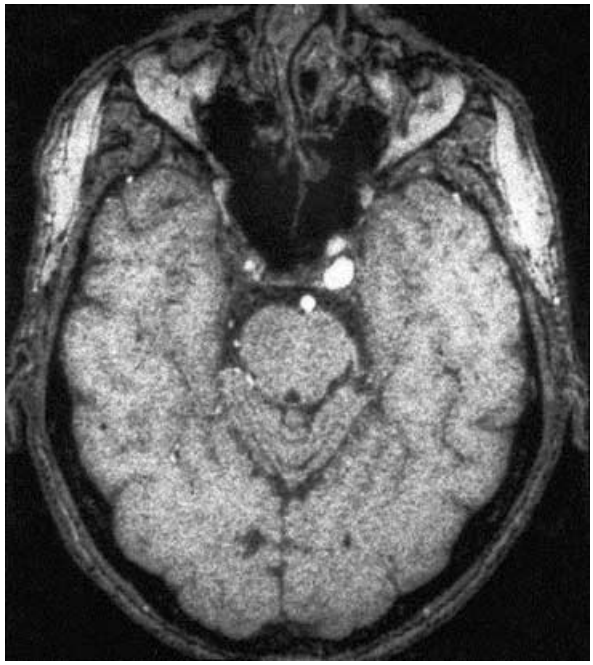
Previous studies suggested an association between cervical artery dissection and migraine.[1-3] However, possible pathophysiological mechanisms could not be identified. Ergotamine intake can induce vascular changes such as general and in particular coronary vasoconstriction with possible ischemic injury and anginal pain in patients with coronary artery disease and a long-lasting contractile effect leading to an increase of blood pressure. In addition, the capillary endothelium can be damaged. Vascular stasis, thrombosis, and gangrene can develop as a result of ergotamine poisoning.[4] There are two case reports on arterial dissections in patients with regular intake of ergotamine derivates and spontaneous dissection of cervicocephalic, renal, and hepatic arteries and of the descending aorta.[5,6] In a case series of 19 patients with severe stenoses or occlusions of the internal carotid artery, spontaneous or traumatic dissection and fibromuscular dysplasia as well as ergotism were identified as causes for the stenoses or occlusions.[7]

A 65-year-old man was admitted to the Department of Neurology, University of Münster, with a sudden disturbance of swallowing and speech (dysphagia and dysarthria) for already 2 weeks. An MRI (magnetic resonance imaging) of the neck showed a soft tissue mass with a size of about 2 cm in the right hypopharynx occluding the pharynx and the right sinus piriformis. Neurologic examination showed mild palsy of the cranial nerves IX to XII with clinical symptoms such as dysphagia and dysphonia resulting in a Collet-Siccard syndrome. An MRI of the brain revealed an intramural hematoma of the right internal carotid artery (ICA) pathognomonic for dissection (Figure), which could also be verified in conventional angiography. The dissection of the right ICA was located at the base of the skull and compressed the right jugular vein. Cerebral infarction and fibromuscular dysplasia were excluded by MRI and angiography. There were no vascular risk factors such as hypertension, history of smoking, hypercholesterolemia, and obesity. However, a history of migraine without aura for more than 20 years was known with a regular intake of ergotamine tartrate on at least 15 days per month over several years. The frequent intake of ergotamine had even led to an ergotamine overuse headache according to the criteria of the International Headache Society (IHS).[8] After the diagnosis was made, anticoagulation was started. Within a few weeks, improvement of the clinical symptoms could be observed. After a period of 6 months, another MRI scan of the brain showed full restitution of the ICA. Vascular side effects are frequent in ergotamine users[4] especially due to a low receptor selectivity. The vascular consequences of an ergotamine overuse often consist of an acrocyanosis and intermittent claudication due to ergotamine toxicity. The case of our patient leads to the speculation whether there is an association between the regular intake of ergotamine for a long period and the occurrence of the dissection of the ICA. Two case reports describe a possible association between a regular intake of ergotamine and vascular side effects such as dissections of different arteries.[5,6] There are also three studies suggesting an association between migraine and dissections of cerebral arteries.[1-3] Considering the previously described studies and the pharmacological properties of ergotamine, we raise the hypothesis that dissections of cerebral arteries in migraine patients could be the consequence of a regular ergotamine intake. Certainly, there is yet no evidence for such a relationship; more migraine patients with ergotamine in cerebral artery dissection than in stroke due to other causes should be observed and such an epidemiological study is warranted. Nevertheless, this factor may be taken into account in those migraine patients with cerebrovascular events, who have treated their migraine attacks with ergotamine for several years and who do not present with other vascular risk factors.



MRI scan of the patient (T1 weighted) showing an intramural hematoma of the right internal carotid artery (left side of the figure).

REFERENCES

1. D'Anglejan-Chatillon J, Ribeiro V, Mas JL, Youl BD, Bousser MG. Migraine—A risk factor for dissection of cervical arteries. *Headache.* 1989;29:560-561.
2. Tzourio C, Benslamia L, Guillon B, et al. Migraine and the risk of cervical artery dissection: A case-control study. *Neurology.* 2002;59:435-437.
3. Granella F, Pezzini A, Zanferrari C, Del Zotto E, Bertolino C, Bazzoli E. Migraine without aura is a major risk factor for cervical artery dissection. A case-control study. *Cephalalgia.* 2003;23:571.
4. Tfelt-Hansen P, Saxena PR, Dahlöf C, et al. Ergotamine in the acute treatment of migraine. A review and European consensus. *Brain.* 2000;123:9-18.
5. Garnier P, Michel D, Barral FG, et al. Roles of arterial dysplasia, chronic ergotism and other factors in a case multiple spontaneous arterial dissections. *Rev Med Intern.* 2000;21:701-704.
6. Korkut AK, Wellens F, Foubert L, Goethals M. Successful treatment of acute dissection of the donor aorta after orthotopic heart transplantation. *J Heart Lung Transplant.* 2003;22:701-704.
7. Dannenmaier B, Eppinger B, von Reutern GM, Schumacher M. Spontaneous regression of significant stenoses and occlusions of the internal carotid artery. *Nervenarzt.* 1992;63:363-370.
8. Headache Classification Subcommittee. The international classification of headache disorders, 2nd edition. *Cephalalgia.* 2004;24(suppl 1):1-160.