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Parkinsonism Associated with Brain Tumor : A Case Report of Meningioma

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Abstract **A 65-year-old female presented with parkinsonism was investigated at Thammasat University Hospital. Computed tomography showed a 6.4×4.3×6-cm tumor at right frontoparietal region. A right fronto-temporo-parietal craniotomy was done and the tumor was completely removed. The pathological findings confirmed as a meningioma. Two months later, parkinsonism disappeared complete. This outcome supports the notion that local compression due to edema may cause a functional disorder in the basal ganglia producing reversible contralateral parkinsonism.**

Index Words: **Pakinsonism, Meningiomas, Brain Tumor**

Parkinson's disease is a common progressive movement disorder that results from degeneration of neurons in a region of the basal ganglia that controls movement. This degeneration creates a shortage of the brain-signaling neurotransmitter known as dopamine, causing impaired movement. The major symptoms of Parkinson's disease include tremor, slow movement (bradykinesia), an inability to move (akinesia), and a shuffling gait. Parkinson-like symptoms, called parkinsonism, may associate with many conditions such as drugs, encephalitis, repetitive trauma, cerebral anoxia, toxins, or cerebrovascular disease.

Reports on parkinsonism cases associated with brain tumor were reviewed.[1] Although parkinsonism can develop in association with any types of brain tumor, it develops more frequently in association with meningiomas located at the sphenoid ridge or frontal area. This condition is quite unusual in any parts of the world. In the report, the author presents a Thai patient with parkinsonism associated with a meningioma.

Case Report

A 65-year-old woman presented at Thammasat University Hospital, Pathumthani, Thailand, in December 1999 with a 24-month history of headache and tremor of the left hand, particularly at rest. The neurological examination revealed slight left-sided hemiparesis with facial palsy and symmetrical hyper-reflexia, bradykinesia in combination with ipsilateral cogwheel rigidity and resting tremor of the left hand. There was no other abnormal neurologic manifestation.

Pre- and post-contrast enhanced CT of the brain showed a large hyperdense mass with few small

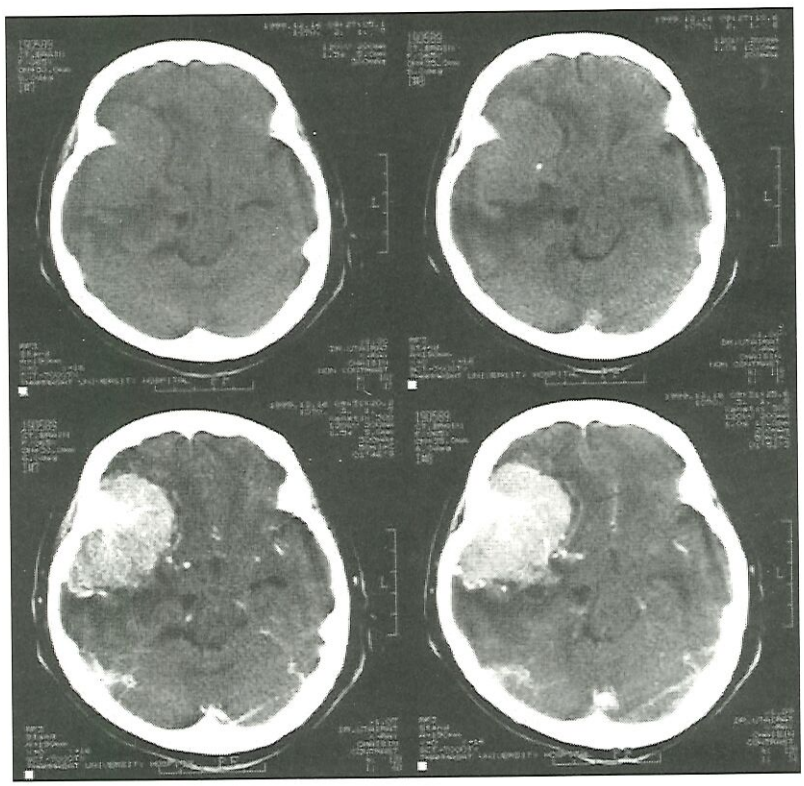

Fig. 1 Pre- and post-contrast enhanced CT showed a large hyperdense mass with few small calcifications and intense homogenous contrast enhancement at right frontoparietal (sphenoid wing) region. Compression of right lateral ventricle was noted with subfalcine herniation.

calcifications and intense homogenous contrast enhancement at right frontoparietal (sphenoid wing) region. It measured 6.4×4.3×6 cm in size. Hypodense area (vasogenic edema) was also noted in the area adjacent to the lesion. Compression of right lateral ventricle was observed with evidence of subfalcine herniation to the left for 16 mm. Reconstructed images showed the lesion was abutting the floor of right middle cranial fossa. Hyperostosis of sphenoid ridge was also noted (Fig. 1). All findings were considered characteristic of a meningioma.

The four-vessel digital subtraction angiography was performed for surgical planning. This showed right sphenoid wing meningioma with dense tumor stain and neovasculature. Cerebral angiography showed a typical sunburst tumor stain. Right internal carotid artery provided neovasculature and tumor stain seen at the anterior peripheral aspect of the mass from a meningeal branch of the ophthalmic artery. Right external carotid artery provided tumoral vessels to most part of the mass, except at its anterior portion (Fig. 2).

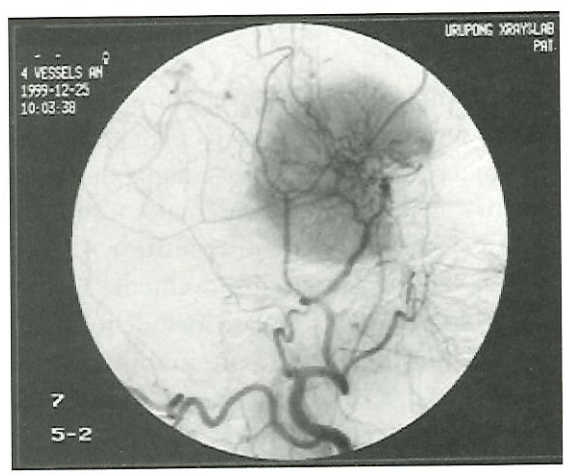

Fig. 2 Digital subtraction angiography showed a right sphenoid wing meningioma with "sunburst" tumor stain.

After one week, she was admitted for preoperative evaluation and dexamethasone injection was administered to decrease the vasogenic edema. A course of treatment with dexamethasone 20 mg/day was slightly useful to improve the extrapyramidal symptoms. Antiparkinson agents were not given to this patient.

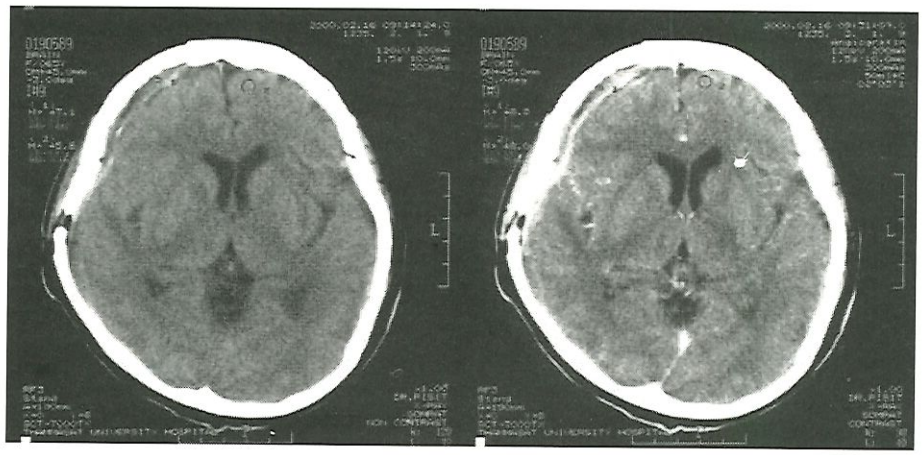

Fig. 3 Pre- and post-contrast CT scan demonstrated total removal of meningioma after rigth fronto-temporo-parietal approach (2 months after surgery).

A right fronto-temporo-parietal craniotomy was performed and an attached sphenoid wing tumor was completely removed. The brain was not invaded by the tumor. The tumor was globular, lobulated and attached to the dura. It was soft and very vascular. The dura was thickened at the edges of the globular lesion with presence of smaller satellite tumors (en plaque meningioma). The bone and dura, attached with the tumor were resected and duraplasty was performed. Pathological examination of the tumor specimen indicated that the tumor was a meningioma.

Postoperatively, the patient made an uneventful recovery. After two weeks, her left-sided palsy and parkinsonism had disappeared. She was comfortable and appeared much improved in her thinking and speaking. Two months later there was no abnormalities on neurological and neuropsychological examination. The postoperative CT of the brain in February 2000 showed minimal enhancing dura at the site of tumor excision. Right lateral ventricle expanded to the normal anatomical site. The vasogenic edema and the midline shift were no longer seen in the CT images (Fig. 3).

Discussion

Sphenoid wing meningiomas account for about 12 to 23 per cent of all meningioma sites in surgical series.[2] It is useful to modify Cushing's classification[3] of these meningiomas and divide them into three groups, lateral (hyperostosing meningioma-enplaque), middle third and medial, because of various clinical features and operative approaches associated with each type of lesion. This case was categorized in the lateral group that involved a large portion of right sphenoid wing. In case of lateral sphenoid wing meningioma, there is usually a history of a slowly progressive, painless, unilateral exophthalmos. However, this patient presented with only parkinsonism which is an uncommon feature. There had been a few cases of parkinsonism with meningioma reported during 1975-1993.[4-9]

Husag et al (1975)[4] reported 2 cases of sphenoid ridge meningiomas with symptoms of parkinsonism, one of them contralaterally, the second bilaterally. The extrapyramidal symptoms disappeared in both cases promptly after removal of the tumor.

Wakai and Naramura et al. (1984)[5] reported a case of a meningioma in the anterior third ventricle, which presented with parkinsonism without any sign of increased intracranial pressure.

Barbosa et al. (1991),[6] Portugese, noted a case of a large, left fronto-temporal meningioma with parkinsonism. Two months postoperatively, their case showed no abnormalities on neurological examination.

Lu and Chang (1992)[7] reported on a case of right frontal meningioma with parkinsonism which completely disappeared after surgical removal of the tumor.

About cerebral functional study, Leender et al. (1986)[8] used positron emission tomography (PET) scans to study cerebral function before and after surgery

for tumor-induced parkinsonism. A specific pattern of functional changes was found to return to normal postoperatively. The data suggested the increase in local tissue pressure due to edema, causing a functional disorder in the basal ganglia that gave rise to reversible contralateral parkinsonism.

Miyaki et al. (1993)[9] studied a patient with falx meningioma in the right supplementary motor area and a left-sided hemiparkinsonism that resolved after the tumor was removed. They studied with PET scans that showed regional cerebral glucose metabolism was decreased in the basal ganglia on the side of the lesion, although dopamine metabolism was still normal.

Functional abnormality in the basal ganglia due to chronic mechanical compression of brain tumor seems to contribute to the pathogenesis of parkinsonism which would disappear completely after surgical excision of the tumor. The surgical outcome supports the assumption that local compression due to vasogenic edema may cause a functional deficit in the basal ganglia thalamocortical circuit producing reversible contralateral parkinsonism.[4-14]

Conclusion

A 65-year-old female presented with parkinsonism and headache for 24 months underwent investigation at Thammasat University Hospital. Computed tomography of the brain showed a 6.4 × 4.3 × 6 cm tumor at right frontoparietal (sphenoid wing) region. A right fronto-temporo-parietal craniotomy was performed and the tumor was completely removed. The pathological findings confirmed as a meningioma. Two months later, parkinsonism disappeared completely. This outcome supports the notion that local compression due to edema may cause a functional disorder in the basal ganglia producing reversible contralateral parkinsonism. In the literature, although extrapyramidal symptoms in the parkinsonism associated with meningioma are similar to those seen in Parkinson's disease in the early stages, atypical symptoms such as motor weakness, visual field defects or pyramidal signs may be detectable. Imaging of the brain by computed tomography or magnetic resonance imaging may be mandatory for evaluation of movement disorders, especially if the presentation is atypical, unilateral and/or accompanied by long tract signs.

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