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Case Report / Olgu Sunumu

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A rare cranial disease: Prolactinoma-associated moyamoya syndrome

Nadir bir kraniyal hastalık: Prolaktinoma ilişkili moyamoya sendromu

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Abstract

Moyamoya disease is a rare chronic progressive cerebrovascular disease. The etiology of moyamoya disease has not been established yet. If an underlying cause is detected, moyamoya disease is called moyamoya syndrome. A 27-year-old right-handed male was admitted to an external medical center with recurrent severe headaches, vomiting, and seizures. He was diagnosed with prolactinoma as a result of cranial magnetic resonance imaging and blood tests. After three months, he presented again with headache and left-sided weakness affecting both his arm and leg. Head and neck computed tomography angiography showed critical stenosis in the right distal internal carotid artery (ICA), in the right supraclinoid ICA, in the left supraclinoid ICA, and occlusion in the right ICA and middle cerebral artery. Digital subtraction angiography was performed following a preliminary diagnosis of Behçet's disease due to HLA B51 positivity. However, the results did not support a diagnosis of neuro-Behçet's but were instead indicative of moyamoya disease. This is the third case in which prolactinoma and moyamoya disease occur together. Moyamoya disease is a very rare chronic disease that mostly affects the cranial vessels. Patients can apply with very different complaints that may mimic other diseases.

Keywords: Moyamoya, Behçet, prolactinoma, neuro-Behçet

Öz

Moyamoya hastalığı, nadir görülen kronik ilerleyici bir serebrovasküler hastalıktır. Moyamoya hastalığının etiyolojisi belirlenmemiştir. Altta yatan bir neden tespit edilirse moyamoya hastalığına moyamoya sendromu denir. Yirmi yedi yaşında sağ elini kullanan erkek hasta, tekrarlayan şiddetli baş ağrıları, kusma ve nöbetlerle dış merkeze başvurdu. Kraniyal manyetik rezonans ve kan testleri sonucunda prolaktinoma tanısı koyuldu. Üç ay sonra tekrar baş ağrısı ve sol üst-alt ekstremitede güçsüzlük şikayeti ile başvurdu. Baş-boyun bilgisayarlı tomografi anjiyografide sağ distal internal karotid arterde (ICA), sağ supraklinoid ICA'da, sol supraklinoid ICA'da kritik darlık; sağ ICA ve orta serebral arterde oklüzyon saptandı. HLA B51 pozitifliği sonucu tarafımıza Behçet hastalığı ön tanısı ile gönderilen hastaya yapılan dijital substraksiyon anjiyografi nöro-Behçet ile uyumlu değildi ve moyamoya hastalığı için oldukça tipikti. Bu olgu prolaktinoma ve moyamoya hastalığının bir arada görüldüğü üçüncü olgudur. Moyamoya hastalığı, çoğunlukla kraniyal damarları etkileyen çok nadir görülen kronik bir hastalıktır. Hastalar başka hastalıkları taklit edebilecek çok farklı şikayetlerle başvurabilirler.

Anahtar Kelimeler: Moyamoya, Behçet, prolaktinoma, nöro-Behçet

Introduction

Moyamoya disease is a rare chronic progressive cerebrovascular disease. The prevalence of moyamoya is 3.2 to 10.5 per 100,000 population.[1] This condition is marked by the unique pathology of bilateral terminal stenosis or occlusion of the internal carotid arteries (ICA), middle cerebral arteries (MCA), and anterior cerebral arteries, accompanied by the development of basal brain collaterals. The angiographic appearance of the vascular collateral network creates this hazy image.[2] The etiology of moyamoya disease has not been established. However, especially *RNF213* gene on chromosome 17q25.3 is an important susceptibility factor for moyamoya disease.[3] If an underlying cause is detected, moyamoya disease is called

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moyamoya syndrome. There are many diseases associated with moyamoya syndrome and one of these causes is brain tumors.[4-6] This case report discusses a patient who was initially suspected to have neuro-Behçet disease but was ultimately diagnosed with prolactinoma-associated moyamoya disease.

Case Report

A 27-year-old right-handed male was admitted to an external medical center with recurrent severe headaches, vomiting, and seizures. A pituitary lesion was detected in the cranial computed tomography (CT) of the patient, who had no known disease, drug use, or history of operation. Prolactin, one of the pituitary hormones, was found to be high in the patient whose pituitary macroadenoma was shown by cranial magnetic resonance imaging (Figure 1A, Figure 1B). Bromocriptine was started.

After 3 months, he presented again with headache and weakness in his left upper and lower extremities. Head and neck CT angiography showed critical stenosis in both the right distal and supraclinoid ICA, the left supraclinoid ICA, and occlusions in the right ICA and MCA. Transsphenoidal adenoma surgery was performed the next day on the patient who had sella expansion, defect at the base of the sella, and invasion of the sphenoid sinus. Romatoid factor, anti-cyclic citrullinated peptide, angiotensin converting enzyme, antinuclear antibody, anti-neutrophil cytoplasmic antibody, and extractable nuclear antigens profiles were found negative. HLA B51 positivity was found in the patient who was thought to have a preliminary diagnosis of vasculitis. CT scan of the chest, abdomen, and pelvis was unremarkable. The patient, who was thought to have Behçet's disease at an external center and was started on prednisolone, colchicine, and azathioprine, was admitted to our hospital for further investigation and treatment.

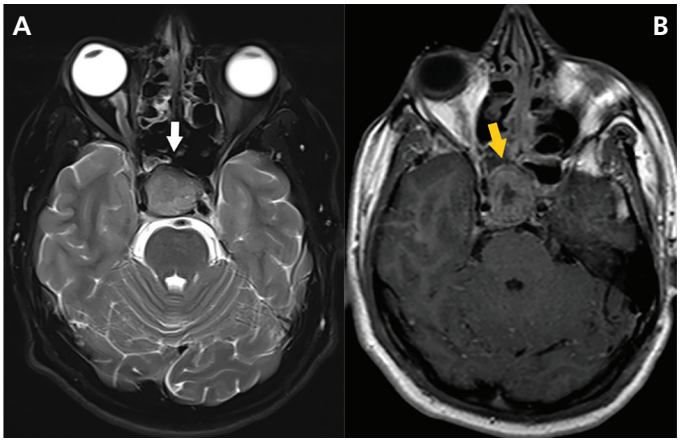

Figure 1A. A hyperintense macroadenoma on the axial T2-weighted image, **B.** A heterogeneously enhanced macroadenoma on the post-contrast image

In the detailed examination, oral aphthae, genital ulcer-scar, uveitis, and skin lesions were not detected. Although it is not correct to perform the pathergy test under immunosuppressive treatment, the result was negative. Even if it was positive, it would not be sufficient for the diagnosis. Cranial imaging did not reveal any findings consistent with Behçet's disease, leading to its exclusion from the differential diagnosis. On the other hand, Factor V Leiden (FV Leiden) and prothrombin (FII) were found to be negative in the patient, who was also investigated for the tendency to thrombophilia. Anti-beta-2 glycoprotein 1immunoglobulin G (IgG)- immunoglobulin M, anticardiolipin antibody IgG, and lupus anticoagulant were also negative. Notably, despite previously elevated prolactin levels, the patient's current prolactin level was recorded at 15 (n=4-15.2).

The decision to perform cerebral digital subtraction angiography (DSA) was made during a multidisciplinary council involving the departments of radiology, neurology, and rheumatology. As a pre-diagnosis, primary central nervous system vasculitis and moyamoya disease were considered. The DSA revealed significant findings; occlusions were noted in the bilateral ICA terminal segments (Figure 2A), M1 and A1 segments of the bilateral middle and anterior cerebral arteries (Figure 2B, 2C), P1 and P2 segments of the right posterior cerebral artery (Figure 2D). Widespread collaterals were starting from proximal and going to distal areas and basal ganglia. There were also

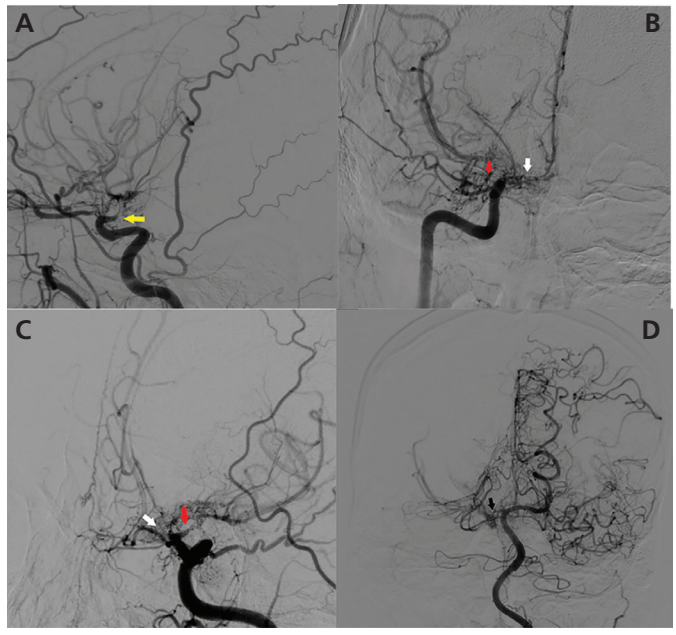

Figure 2A. The occluded ICA terminal segment is indicated by a yellow arrow, **B, C.** The occluded M1 segments of the bilateral middle cerebral arteries shown with a red arrow, and the occluded A1 segments of the anterior cerebral arteries shown with a white arrow, **D.** The occluded P1 and P2 segments of the right posterior cerebral artery indicated by a black arrow
ICA: Internal carotid artery

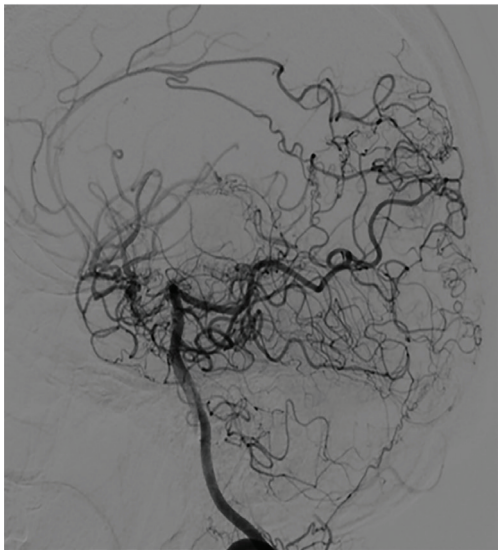

Figure 3. Retrograde collaterals from the right posterior communicating artery and left posterior cerebral artery to the right and left cerebral hemispheres, respectively

retrograde collaterals that running from the right posterior communican artery and left posterior cerebral artery to the right cerebral hemisphere, and left cerebral hemisphere, respectively (Figure 3). The images detected in DSA were incompatible with neuro-Behçet's and quite typical for moyamoya disease. Immunosuppressive treatments were stopped and aspirin was started for long-term use.

Discussion

In this case report, the patient who was admitted with the pre-diagnosis of Behçet disease was diagnosed with prolactinoma-associated moyamoya disease.

Most cases of moyamoya occurred in Japan and the Asian continent. The origin of the word "moyamoya" comes from Japan. The meaning of the word is the smoke dispersed in the air. Moyamoya disease has a bimodal age distribution, with one peak at approximately 10 years of age and a second peak at approximately 40 years of age.[7,8]

The pathogenesis of moyamoya disease involves an increase in angiogenesis-related factors, including endothelial colony-forming cells, vascular endothelial growth factor, and basic fibroblast growth factor.[9] There is no pathognomonic laboratory test for the diagnosis of Behçet's disease and moyamoya disease. For the diagnosis of Behçet's disease, the presence of aphthae in the mouth at least 3 times a year, as well as at least 2 other findings such as genital ulcer-scar, eye lesions, skin lesions, and pathergy test positivity are required.[10] HLA B51 positivity is not included in the diagnostic criteria of Behçet disease. It is just a finding that indicates a predisposition to the disease.

Neuro-Behçet is divided into parenchymal and non-parenchymal disease. Parenchymal disease involves brainstem disease, multifocal disease, myelopathy, encephalopathy, hemiparesis, hemisensory loss, seizures, dysphagia, psychosis, and optic neuropathy. The non-parenchymal disease includes cerebral vein thrombosis, pseudotumor cerebri, acute meningeal syndrome, and stroke due to arterial thrombosis, dissection, or aneurysm. Our patient's imaging did not support a diagnosis of Behçet's disease.[11]

The curative treatment of moyamoya disease has not been found yet. Therefore, it is very critical to diagnose moyamoya. The clinical symptoms of moyamoya disease may overlap with other diseases. There are various treatment options, including immunosuppressive agents. It is important to clarify the diagnosis in order not to give unnecessary or incomplete treatment to patients.

Antiplatelet agents such as aspirin have been used in moyamoya disease. It has been used especially in people who are considered to be at high risk of surgery and in patients with asymptomatic or mild symptoms.[12] In the treatment of hemorrhagic moyamoya patients, revascularization may increase the risk of bleeding again. Transient ischemic injury, postoperative hemorrhage, seizures, and symptomatic hyperperfusion may occur. Therefore, surgical intervention remains controversial.[13,14]

This case represents a rare instance of concurrent moyamoya disease and brain tumor, specifically a prolactinoma. It is only the fourth documented case of such an association, with two previous cases also involving prolactinomas. However, while genetics and ethnicity are at the forefront of this disease, its association with brain tumors should not be ignored. Arita et al.[5] demonstrated two cases of moyamoya disease accompanied by prolactinoma. Kitano et al.[4] reported moyamoya disease associated with brain stem glioma, and Tsuji et al.[6] reported moyamoya disease associated with craniopharyngioma. Our case is the fourth case in which moyamoya disease and brain tumor occur together. This is the third case of moyamoya associated with prolactinoma.

Conclusion

Moyamoya disease is a very rare chronic disease that mostly affects the cranial vessels. Patients may present with a variety of symptoms that can mimic other diseases, making diagnosis challenging. The most important and helpful diagnostic tool for moyamoya is cranial imaging. Additionally, it is essential to exclude other conditions that could produce similar symptoms. Unfortunately, there is no curative treatment yet.

Ethics

Informed Consent: Written informed consent was obtained from the patient.

Authorship Contributions

Concept: A.B., İ.İ., E.S., M.C., Design: A.B., İ.İ., E.S., M.C., Data Collection or Processing: A.B., İ.İ., E.S., M.C., Analysis or Interpretation: A.B., İ.İ., E.S., M.C., Literature Search: A.B., İ.İ., E.S., M.C., Writing: A.B., İ.İ., E.S., M.C.

Conflict of Interest: No conflict of interest was declared by the authors.

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