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Case of Bilateral Retinal Ischemia and Internal Carotid Artery Stenosis Associated With Graves' Disease

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Some cases of hyperthyroidism affecting "intracranial" vascular stenosis causing cerebral infarction have been reported (1); however, internal carotid artery (ICA) stenosis with Graves' disease is extremely rare (2,3). We describe the case of a young woman who presented with Graves' disease–related bilateral ICA stenosis and retinal ischemia in both eyes.

A 29-year-old woman presented at local hospital with complaints of repeated transient weakness in both extremities for 1–2 months. MRA and MRI were performed at the Department of Neurosurgery, which led to the provisional diagnosis of bilateral ICA stenosis. She was transferred to our hospital. Her blood pressure was 134/89 mm Hg, and her heart rate was 116 beats/min. On initial examination, stenosis of the bilateral ICAs and the middle cerebral arteries were detected (Fig. 1A, B). Physical examination revealed thyroid enlargement, but she had neither diplopia nor exophthalmos. Hematological examination revealed a free T4 of >7.77 ng/dL, a free T3 of 30.54 pg/mL, a thyroid-stimulating hormone receptor antibody (TSAb) of 37.5 IU/L, indicating hyperthyroidism. In other laboratory tests, antithrombin III, protein S, and protein C levels were normal, but fibrinogen was high (560 mg/dL). She was administered intravenous fluid replacement and prescribed antithyroid and antiplatelet medications. On the third day of admission, she had a transient ischemic attack (TIA) with visual disturbance and aphasia. Cerebral infarction of the left posterior parietal artery area was noted (Fig. 1C). She also experienced visual blurring and was referred to the Department of Ophthalmology 6 days after admission. Her visual acuity was 20/20 in both eyes, but cotton wool spots (CWS) were pronounced in both fundi (Fig. 2A). Her intraocular pressure was 16 mm Hg in her right eye and 19 mm Hg in her left eye. Fluorescein angiography demonstrated delayed filling of the retinal arteries. After strict management of body fluid and treatments for her thyroid function and TIA, her Graves' disease–related bilateral ICA stenosis and retinal ischemia improved. Stenosis in both ICAs was reversible, and CWS disappeared in both eyes in 1.5 months (Fig. 2B).

In patients with Graves' disease, not only ICAs but also coronary arteries may show stenosis (2). However, in our patient, no heart involvement was noticed, and she did not have any vascular risk factors. She did not have heart disease or vasculitis, such as antineutrophilic cytoplasmic antibody–associated vasculitis, giant cell arteritis, and Takayasu arteritis. In addition, she did not have proptosis or diplopia.

The pathogenesis of Graves' disease is not yet well understood. An autoimmune mechanism, sympathetic nerve stimulation, or genetic factors are involved, and Graves' disease can sometimes be complicated by thyroid crisis. In our patient, we did not perform cerebral angiography to avoid precipitating thyroid crisis. Her symptoms gradually resolved after receiving intravenous fluid replacement and antithyroid and antiplatelet medications, and CWS in both eyes disappeared. The perfusion pressure is also important for the retinal circulation in such cases. In this case, we have not measured the retinal venous pressure; however, her blood pressure was not high, and her IOPs were normal. Her thyroid function was normalized on the sixth day after admission. Unless spontaneously recovered, stenosed ICAs require immediate vascular reconstruction. Patients with hyperthyroidism may have an imbalance of autonomic nerve activity, which accelerates the vasospasm of ICA and coronary artery (2). However, this stenosis could be improved by administrating of antithyroid drugs (4,5). The pathogenesis of the vessel occlusion in this patient is not clear. An imbalance of the autonomic nervous system cannot explain the hypoxia in the retina because the retinal vessels have no autonomic innervation. In our patient, strict management of body fluid and treatments for abnormal thyroid function led to the resolution of her ICA stenosis and TIA without any surgery. Still, careful monitoring and further follow-ups are necessary.

In conclusion, we report the case of a young woman having Graves' disease–related bilateral ICA stenosis with

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The authors report no conflicts of interest.

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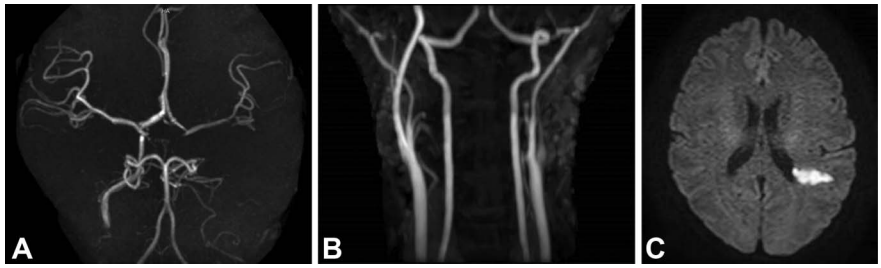

FIG. 1. MRA and MRI at the initial examination. **A**. MRA revealed stenosis of the middle cerebral arteries. **B**. MRA revealed stenosis of bilateral ICAs. **C**. MRI revealed cerebral infarction.

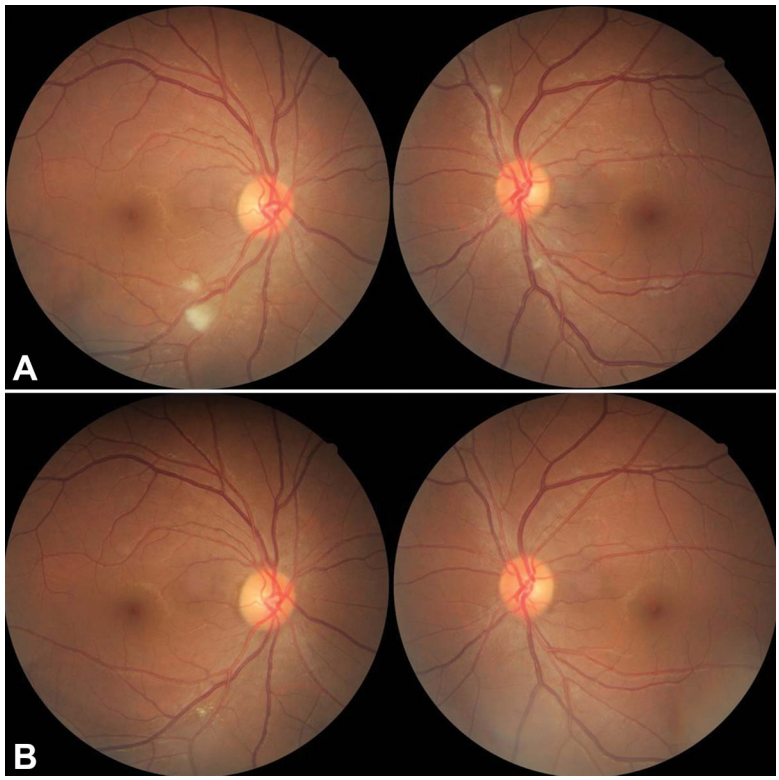

FIG. 2. Her fundus photographs before and after the treatment. **A**. Cotton wool spots were pronounced in both fundi. **B**. Cotton wool spots disappeared 1.5 months after the treatment. CWS, cotton wool spots.

retinal ischemia, which improved by conservative therapy. To the best of our knowledge, no reports have been published in the field of ophthalmology. This case is extremely rare, and it is essential that ophthalmologists be aware of the pathological condition even if no eye complications of hyperthyroidism, such as proptosis or diplopia, are present.

STATEMENT OF AUTHORSHIP
Category 1: a. Conception and design: T. Kida and H. Oku; b. Acquisition of data: R. Yagi and T. Shigekiyo; c. Analysis and interpretation of data: H. Oku. Category 2: a. Drafting the manuscript: T. Kida; b. Revising it for intellectual content: T. Kida and H. Oku. Category 3: a. Final approval of the completed manuscript: T. Ikeda and H. Oku.

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