CASE REPORTS

Too Young to Undergo Temporal Artery Biopsy? Calciphylaxis-Related Anterior Ischemic Optic Neuropathy

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ABSTRACT

A 39-year-old male patient with end-stage renal failure presented with unexplained isolated unilateral anterior ischemic optic neuropathy, high sedimentation rate, and high CRP. Despite the relatively young age of the patient, an ipsilateral temporal artery biopsy was performed, disclosing calciphylaxis, a highly morbid condition associated with end-stage renal failure, which requires urgent, specific management.

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A 39-year-old Chinese man was referred for evaluation of sudden, painless, profound loss of vision in his left eye. His past medical history was significant for glomerulonephritis 20 years earlier, leading to end-stage renal failure, currently on haemodialysis. The patient had no associated vascular risk factors, such as diabetes, hypercholesterolemia, hypertension, or tobacco consumption. No recent episodes of hypotension during haemodialysis were recorded. The patient had no history of recent weight loss, fever, scalp pain, or jaw claudication.

The patient was emmetropic and his visual acuity was 6/6 in the right eye and “hand movements” in the left eye. On Ishihara testing, the patient could identify only the control plate with his left eye; colour vision was normal with the right eye. There was no pain on eye movements, no headache, or other systemic complaints. The temporal arteries were clinically unremarkable. A dense relative afferent pupillary defect was detected on the left side. Funduscopy disclosed a pale swollen left optic disc the right disc was normal, with a small c/d ratio of 0.1, considered “at risk”. (Figure 1) Goldmann visual fields showed severe global depression on the left side, and normal features on the right side (Figure 2). The remainder of the ophthalmic and general examinations were unremarkable.

No cutaneous lesions were present. The erythrocyte sedimentation rate (ESR) was 120 mm at the first hour, and C-reactive protein was 74.1 mg/dL (range 0.2–9.1 mg/dL). The blood cell count, coagulation parameters were within normal limits; an extensive work-up for systemic vasculitis was negative. Other investigations showed raised serum phosphate (1.72 mmol/l, normal = 0.94–1.50 mmol/l) and low total calcium (1.55 mmol/l, normal = 2.09–2.46 mmol/l) and normal PTH (2.1 pmol/l, normal = 0.9–6.2 pmol/l).

An extensive work-up, including neuro-imaging, ruled out compressive inflammatory or infiltrative causes and a diagnosis of left anterior ischemic optic neuropathy (AION) was made. In the context of end-stage renal failure on haemodialysis and high ESR and CRP, an ipsilateral left temporal artery biopsy was performed. Histology showed calcification of the media and severe luminal occlusion, but no associated inflammatory features, nor giant cells, allowing diagnosis of calciphylaxis (Figure 3). A short treatment with oral steroids was initially started (40 mg/day), with no effect, and rapidly tapered. The patient was started on intravenous sodium thiosulphate during each haemodialysis, with little effect on his vision. At the last follow-up visit, 2 years after the initial presentation, the patient’s vision was normal in the right eye and 6/60 on the affected eye with severe optic

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Figure 1. Fundus appearance, showing severe swelling of the left optic disc.

Figure 2. Goldmann visual fields at the acute phase, showing severe depression in the left affected eye.

nerve atrophy. The patient had no further manifestations of calciphylaxis.

Discussion

AION occurs most commonly in patients aged 50 and older.¹ At younger ages, AION is often associated with other conditions, such as hypercholesterolemia,² systemic vasculitis, coagulopathies or end-stage renal failure.¹ In this latter setting, AION may be due to various underlying mechanisms,³ such as toxic effect of metabolites, accelerated atherosclerosis, hypotension, anaemia, or, very rarely, calciphylaxis.⁴ Calciphylaxis is a rare and highly morbid condition causing systemic arteriopathy, affecting predominantly patients with end-stage renal failure treated by haemodialysis. Calciphylaxis is a metastatic calcification-induced microvascular occlusion syndrome of mural calcification and intimal proliferation,

fibrosis, and thrombosis, leading to target organ hypoperfusion.⁵ Definitive diagnosis of calciphylaxis is typically based on skin biopsy, disclosing extensive calcifications, microthrombosis, and fibrointimal dysplasia.⁶ The typical clinical presentation of calciphylaxis includes painful, chronic skin lesions, frequently affecting the lower limbs, and leading to further complications. For an unknown reason, other isolated systemic manifestations due to vascular lesions in calciphylaxis are very rare.⁶ Several predisposing factors for calciphylaxis include female gender, obesity, diabetes mellitus, low serum albumin levels, and warfarin therapy. Rarely, calciphylaxis may occur in patients who do not have renal failure, in association with malignancy, chemotherapy, liver disease, and infection.⁷ Calciphylaxis is typically treated by avoiding administration of excess calcium and excess active vitamin D, reducing phosphate levels with non-calcium-based phosphate binders;

Figure 3. Temporal artery biopsy, disclosing circumferential calcification of the media (Top image, Haematoxylin and eosin stain, 10x, asterisk,*) and severe luminal occlusion, seen throughout the length of the artery. Note the lack of inflammatory cells (neutrophils, histiocytes, lymphocytes or plasma cells), and giant cells in the intima and media excluding an active vasculitis or giant cell arteritis. Luminal recanalization is seen as fibrous connective tissue with small blood vessels (plus, +). An intact internal elastic lamina, highlighted by the blue arrows (Lower image, Elastic van Gieson stain, 40x) was not in favour of temporal arteritis.

sodium thiosulphate decreases the effects of reactive oxygen species and may result in the improved clinical outcomes.

Rarely, calciphylaxis can be associated in elderly patients with AION⁸⁻¹⁰ or with retinal ischaemia,⁹ thus mimicking giant cell arteritis^{8,9,11,12} and leading to diagnostic temporal artery biopsy. Pathology features in temporal artery calciphylaxis include calcifications of the tunica media and internal elastic media, narrowing of the lumen, but no inflammation nor multinuclear giant cells.^{11,12}

There are less than a dozen described patients with AION due to calciphylaxis.⁷⁻¹² The majority of described patients were old, with end-stage renal disease, arterial hypertension, and high inflammatory markers, justifying temporal artery biopsy and leading to the correct diagnosis. Unlike all these cases, our patient was young (age 39) and had no systemic, cutaneous symptoms.

In summary, temporal artery biopsy may be diagnostic for calciphylaxis in young patients with unexplained AION in the context of end-stage renal failure, even in the absence of systemic symptoms of the disease.

Conflict of interest

The authors have no conflict of interest.

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