ELECTRONIC CLINICAL CASE

Calciphylaxis and bilateral optic neuropathy

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Optic neuropathy; Calciphylaxis; Chronic renal failure; Temporal artery biopsy; Optic disc edema

Summary
A 51-year-old woman on hemodialysis for chronic renal failure complained of visual loss in her right eye. Right optic disc edema was observed on fundus examination. An arteritic optic neuropathy was suspected. However, a first biopsy did not reveal any inflammatory cells. Two months later, the patient experienced sudden visual loss in her left eye and presented with necrotic cutaneous lesions at the distal phalanges of several fingers of the right hand. Necrotic lesions also appeared on the inner aspect of the thighs. Biopsy of the cutaneous lesions revealed calcification in the wall of a small artery. A new biopsy of the temporal artery showed large calcium deposits in the artery's tunica media. The diagnosis of optic neuropathy secondary to calciphylaxis was made. A temporal artery biopsy should be repeated if the first one is inconclusive. An early diagnosis leading to appropriate treatment may help to prevent an irreversible loss of vision in these patients.
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MOTS CLÉS
Neuropathie optique; Calciphylaxis; Insuffisance rénale chronique;

Résumé
Une femme âgée de 51 ans, en traitement avec hémodialyse pour insuffisance rénale chronique, a présenté un épisode de perte de vision à l’œil droit, associé à un œdème de papille. On a suspecté une neuropathie optique, si bien qu’une première biopsie a été réalisée mais aucune cellule inflammatoire n’a été trouvée. Quinze jours après, la patiente a perdu la vision à l’œil gauche. Cinq mois après, elle a présenté des lésions nécrotiques sur les phalanges distales des doigts de la main droite. Ces lésions nécrotiques se sont présentées également sur
Introduction

Different conditions may contribute to the development of an optic neuropathy, with chronic renal failure being one of them. In these patients, arterial hypertension, hypotension secondary to dialysis, anemia, and some drugs employed in their treatment such as desferrioxamine, ethambutol or cyclosporine may lead to this condition [1–5].

In chronic renal failure, bilateral optic neuropathy may occur as the presenting sign [6]. In the early phase, hemodialysis is useful to recover visual acuity [6]. Nevertheless, on chronic hemodialysis, patients may develop a massive vascular calcification called calciphylaxis, secondary to different factors related with mineral metabolism dysregulation [7,8]. Calciphylaxis is characterized by diffuse calcification of the medial tunica of small arterioles leading to ischemia and necrosis of the skin, subcutaneous tissues, and even the adjacent muscles [9]. Between 1% and 4% of patients undergoing hemodialysis develop calciphylaxis [7–10]. We present a case of bilateral optic neuropathy associated with calciphylaxis.

Case report

A 51-year-old woman with a history of stage 5 chronic renal failure secondary to sclerosis tuberose and bilateral nephrectomy underwent hemodialysis since 1994. In 2002, she developed severe secondary hyperparathyroidism. A subtotal parathyroidectomy and a partial graft of the parathyroid gland to the sternocleidomastoid muscle were performed. The graft was not functional and calcium carbonate and sevelamer were necessary to control serum phosphorous levels. In April 2003, she presented with decreased vision in her right eye. Best-corrected visual acuity was 20/400 and visual field examination showed a central scotoma in the right eye. Right optic disc edema was observed on fundus examination. Fluorescein angiography demonstrated hyperfluorescence in this optic disc without signs of vasculitis in retinal vessels. Arterial pressure was normal and there was no history of possible exposure to drugs. Magnetic resonance imaging (MRI) showed only calcified subependymal nodes. Cerebral angiography was unremarkable, and a focal temporal artery biopsy revealed no inflammatory cells.

Dyalysis parameters were correct and serum analysis did not indicate the presence of anemia. Measurements of albumin, vitamin B12, folic acid, immunoglobulins and cryoglobulins were all normal. Serologic tests for syphilis were negative. ANA, ANCA, and ACA assays were normal. Erythrocyte sedimentation rate was 70 mm/hour. According to these findings, an arteritic optic neuropathy was suspected. Two months later, the patient complained of sudden visual loss in her left eye. Best-corrected visual acuity dropped to 20/200. As the inflammation of the temporal artery may be present in scattered patches, an arteritic origin for this event was considered. Because of the clinical picture severity, treatment with intravenous methylprednisolone (1 g/day for 3 days) was initiated, followed by oral methylprednisolone (1 mg/kg/day for 2 months) with subsequent dose reduction. Despite corticosteroid therapy, an optic atrophy developed in the right eye, while visual acuity remained stable in the left eye. Five months later, the patient presented with necrotic lesions at the distal phalanges of the second, third and fourth fingers of the right hand. Necrotic skin lesions also appeared on the inner aspect of the thighs. A biopsy of the lesions was performed, showing calcification in the wall of a small artery. Likewise, a second, more extensive biopsy of the temporal artery revealed large deposits of calcium within the tunica media of the artery (Fig. 1). The diagnosis of optic neuropathy secondary to calciphylaxis was established. Prednisolone and calcium supplements were suspended. A hemodialysis frequency was implemented to lower the serum phosphorus concentration and the (calcium × phosphorus) product. The necrotic cutaneous lesions required hyperbaric oxygen therapy and early surgical debridement. Visual acuity in the left eye showed no improvement, remaining at 20/200 until her death last year.

Discussion

Medial arterial calcification (Monckeberg’s sclerosis), first described in diabetic patients, has been seen increasingly more often in patients with end-stage renal disease. It has been associated with calcific uremic arteriolopathy or calciphylaxis. Tunica media calcification occurs predominantly in muscular-type and visceral vessels, resulting in increased arterial stiffness. Most patients are asymptomatic but a progressive lumen obstruction contributes to the appearance of infarction signs. Myocardial infarction, necrotic subepithelial nodules in the extremities with amputations, and necrosis of the penis have been associated with this syndrome. The patient also suffers from cutaneous necrotic lesions caused by an obliteration of the small arteries’ lumen, leading to amputations of the distal phalanges. However, in the present case, the calciphylaxis presented as sudden visual loss in the form of bilateral optic neuropathy. Initially, several possible causes of optic neuropathy...
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Figure 1. A. Cellular subcutaneous tissue biopsy show extensive calcification in the medial tunica of the arterioles. Calcium deposits stained with Von Kossa (arrows). B. Temporal artery biopsy also shows extensive deposits of calcium in the artery’s tunica media (arrow) (Von Kossa staining).

were discarded. Although hypotensive ischemic optic neuropathy as a dystrophic process in chronic renal failure has been well documented [4] however, in this case the patient was not hypotensive. The diagnosis of temporal arteritis is confirmed by biopsy, showing panarteritis with mononuclear cell infiltrates penetrating all layers of the arterial wall.

Erythrocyte sedimentation rate was 70 mm/hour and the possibility of temporal arteritis was not initially rejected because the biopsy could have been taken from a zone without infiltration. Nevertheless, the sedimentation rate may also be increased in patients on hemodialysis. Focal vascular calcifications may also occur in temporal artery biopsy samples of patients with giant cell arteritis but only in 6% of cases [11]. Extensive medial arterial calcification without inflammation has only been reported in isolated cases [12,13]. The posterior ciliary arteries are small arteries, which may be likened to the small arterioles in the subcutaneous fat and dermis, and the terminal arteries of the fingers. In the reviewed literature, we have found three cases of optic neuropathy secondary to calciphylaxis, mimicking giant cell arteritis [12,13]. Two of the three cases developed unilateral vision loss and the other one bilateral blurred vision. They also did not respond to systemic corticosteroids. Other clinical signs such as headaches, dilated temporal artery, intermittent claudication, or myocardial infarction presented prior to the visual loss [12]. In comparison, in our case, systemic ischemic signs were absent. The condition presented in the form of bilateral optic ischemic neuropathy mimicking temporal arteritis. Sistemic calciphylaxis may also appear following renal transplantation and previous to the hemodialysis [14].

In conclusion, patients on hemodialysis may develop a bilateral optic neuropathy due to calciphylaxis. An early diagnosis leading to appropriate treatment may help to prevent an irreversible loss of vision. A temporal artery biopsy is mandatory even when no ischemic cutaneous lesions are present and should be repeated if the first one is inconclusive.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References