

## Case Report

# Leber hereditary optic neuropathy in a boy with fibrous dysplasia of bone

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## Abstract

**Purpose:** To report a case of Leber hereditary optic neuropathy combined with fibrous dysplasia of bone.

**Methods:** Case report.

**Results:** A 16-year-old boy presented with painless vision loss in both eyes. He had a history of a right humerus fracture and right femoral fracture surgery just because of falling. On examination in our clinic, his visual acuity was counting fingers at 20cm OD and counting fingers at 40cm OS. Both pupils reacted sluggishly to light. The findings on slit-lamp examination and funduscopy after pupillary dilation were all unremarkable. Computed tomography scans demonstrated fibrous dysplasia involving the right frontal, temporal, parietal, and occipital bones but no stenosis of either optic canal. His serum alkaline phosphatase was 522 U/L (reference range: 40–150 U/L). His vision showed no improvement after intravenous methylprednisolone pulse therapy. Finally, a 11778 mitochondrial DNA mutation was detected. He still had no visual recovery after treatment with oral coenzyme Q10, vitamin B1, and citicoline.

**Conclusions:** Fibrous dysplasia of bone may act as a potential trigger for Leber hereditary optic neuropathy given that it increases local oxygen consumption. (*Eye Science* 2013; 28: –)

**Keywords:** Leber hereditary optic neuropathy; skeletal abnormality; fibrous dysplasia; associated feature; compressive optic neuropathy

## Introduction

Leber hereditary optic neuropathy (LHON) was first

described by the German ophthalmologist Theodore Leber in 1871 as a maternally inherited disease characterized by bilateral, usually sequential, acute or subacute visual loss<sup>1</sup>. Since then, a few associated abnormalities have been reported, including cardiac, familial skeletal and neurologic abnormalities<sup>1,2</sup>. These abnormalities tend to be ignored by ophthalmologists because few of them affect vision. Here, we present an unusual case of LHON associated with fibrous dysplasia of bone. The associated skeletal abnormality might contribute to visual loss in this case.

## Case report

A 16-year-old boy was referred to the Department of Ophthalmology, First Affiliated Hospital of Guangxi Medical University, in July 2010. He had painless vision loss in both eyes for two months before he presented at our clinic. The boy had a sequential vision loss according to his father, but which eye had a vision loss firstly and the interval involved were unclear. The patient had been previously diagnosed with bilateral retrobulbar optic neuritis and treated with corticosteroids in other hospitals, but had no improvement in vision. His father reported a history of right humerus fracture in 2005 and right femoral fracture surgery in February 2010, both due only to falling.

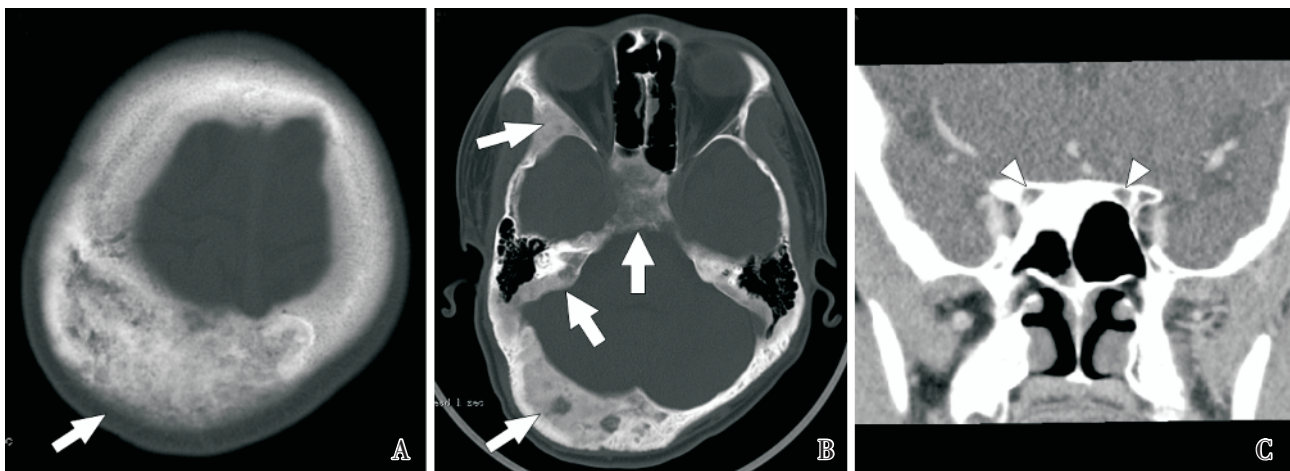
The two traumatic fractures were probably both due to fibrous dysplasia. The only marked family history was that his maternal male cousin also suffered visual loss, but the cousin had no history of fractures or fibrous dysplasia. On examination at our clinic, the visual acuity was counting fingers at 20 cm OD and counting fingers at 40 cm OS. Both pupils reacted sluggishly to light. The findings on

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slit-lamp examination and funduscopy after pupillary dilation were all unremarkable in both eyes, according to his medical records. No fundus photographs were available due to family financial reasons. His serum alkaline phosphatase was 522 U/L (reference range: 40–150 U/L), and serum total calcium 2.11 mmol/L (reference range: 2.08–2.60 mmol/L). Other blood biochemical examinations were unremarkable. A computed tomography (CT) scan of the head and orbits demonstrated fibrous dysplasia involving the right frontal, temporal, parietal, and occipital bones (Figure 1 A & B). Another CT scan of

the optic canals revealed no stenosis of either optic canal (Figure 1 C). The boy was treated with intravenous methylprednisolone 500 mg once daily for 6 days and 250 mg once daily for 3 days, and then tapered with oral prednisolone. Nevertheless, his vision continued to show no improvement. He was then referred to Zhongshan Ophthalmic Center, and a 11778 mitochondrial DNA mutation was detected. The boy was diagnosed as LHON combined with fibrous dysplasia of bone and treated with oral coenzyme Q10, vitamin B1, and citicoline, but still had no visual recovery during a two-year follow-up.



**Figure 1** Computed tomography scans of a 16-year-old boy with Leber hereditary optic neuropathy combined with fibrous dysplasia of bone. (A) & (B) axial view (bone window) showing fibrous dysplasia involving the right sphenoid, temporal, and occipital bones, and sella turcica (arrows); (C) coronal view (soft-tissue window) showing no stenosis of either optic canal (arrowheads).

## Discussion

LHON is a rare disease characterized by bilateral and usually sequential acute or subacute painless visual loss occurring before the third decade. Some associated systemic abnormalities have been reported, including cardiac conduction and neurologic abnormalities<sup>2</sup>. Rarely, LHON may be found in some multiple sclerosis patients, which is considered as not merely coincidental<sup>3</sup>. Corticosteroids have a good effect on visual recovery in patients with multiple sclerosis, but cannot improve visual acuity in LHON patients.<sup>4</sup> That was the main reason to exclude the diagnosis of optic neuritis in the present case.

To the best of our knowledge, our patient is the

first case of LHON combined with fibrous dysplasia. Fibrous dysplasia is a benign, slowly progressive, self-limited disorder of bone, where normal cancellous bone is replaced by fibrous tissue and immature woven bone.<sup>5</sup> It presents in childhood or early adolescence, and is not hereditary. The sphenoid bone involvement can result in optic canal narrowing and subsequent optic nerve compression, thereby leading to a decrease in visual acuity. As the sphenoid bone was involved in our case, an underlying lesion in the optic nerve might exist. However, no compression of the optic nerves was evident on CT scans. Furthermore, compressive optic neuropathy should only have occurred in the right optic nerve and should have improved with the use of corticosteroids.<sup>6</sup>

Only about 50% of males and 10% of females harboring a LHON mutation actually develop optic neuropathy. Yu-Wai-Man et al. believe that “additional genetic and/or environmental factors must modulate the phenotypic expression of LHON”<sup>1</sup>. Hashemi et al<sup>7</sup> reported a 67-year-old Caucasian man with thyroid eye disease having bilateral visual loss. Testing for LHON showed a 14484 mitochondrial DNA mutation. The bilateral optic nerves in their case were stretched straight, as demonstrated on CT, probably resulting in diminished blood supply. Kobayashi et al<sup>8</sup> documented a case of LHON in a 39-year-old woman with hyperthyroidism. A 11778 mitochondrial DNA mutation was found. They proposed that hyperthyroidism may be a trigger for the development of LHON because thyroid hormone increases oxygen consumption and regulates mitochondrial biogenesis. In the current case, serum alkaline phosphatase was surprisingly high, showing that our case is in an active growth stage of fibrous dysplasia of bone<sup>9</sup>. The areas of fibrous dysplasia undergo fibroblastic, osteoclastic, and osteoblastic turnover at this stage, resulting in an increase in local oxygen consumption<sup>10</sup>. We speculated that the factors of increased oxygen consumption may be the “tipping point” that leads to the onset of visual loss in LHON. Of course, it still might only be a coincidence that LHON and fibrous dysplasia were present in the same case, but this case contributes to our knowledge of the associated features of LHON.

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