



## A Sudden Vision Loss Requiring Urgent Radiological Evaluation: Radiation-Induced Optic Neuropathy

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### Abstract

*An early radiological diagnosis of the Radiation-induced optic neuropathy (RION) and immediate appropriate treatment is crucial in recovery of vision loss. Contrast-enhanced magnetic resonance imaging (MRI) is the technique of choice because of its ability to detect some small lesions of the visual pathway before vision loss. Here is the report of a 63-year-old male with nasopharynx cancer whose early diagnosis of RION was made by contrast enhanced MRI. The man was treated with radiotherapy approximately three years ago and had vision loss of right eye in third years of treatment.*

**Keywords:** Radiation-induced optic neuropathy, vision loss, magnetic resonance imaging

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## Introduction

Radiation-induced optic neuropathy (RION) may be a late complication of radiotherapy of the anterior visual pathway [1]. It is thought to be a destructive clinical condition resulting from radiation necrosis of the anterior visual pathway and give rise to the acute and profound visual loss. Contrast-enhanced magnetic resonance imaging (MRI) is the technique of choice because of its ability to detect some small lesions of the visual pathway before vision loss, that are not detected with conventional MRI and computerized tomography (CT) [2,3]. This method is clinically highly relevant because the identification of these abnormalities before vision loss often helps in managing and preventing vision loss. Although the treatment with systemic corticosteroids, anticoagulation and hyperbaric oxygen has been unsuccessful and disappointing, rapid and accurate diagnosis and prompt treatment in first 72 hours of vision loss remain the essential elements in achieving successful outcome [4]. That is why RION is a radiological emergency. Early hyperbaric oxygen treatment is the key management to prevent visual loss. An early radiological diagnosis of the RION and prompt appropriate treatment is critical in terms of recovery of vision loss.

## Case

Contrast-enhanced MRI was obtained in a 63-year-old male with nasopharynx cancer who had sudden vision loss of right eye. He was treated with conformal radiotherapy with a total cumulative dose of 70 Gy (35 fractions of 200 cGy daily) and concomitant weekly chemotherapy with Cisplatin approximately three years ago. There was no recurrence and so there was no need for second line radiotherapy. He went under a complete ophthalmic examination. His vision was at p+p+ level, and intraocular pressure with applanation tonometer was 16 mmHg on his right eye. On his fundus examination, there was slight arterial sclerosis of retinal arteries, and optic disc was pale. Atrophic optic disc without cupping was noted. No significant cortical response was recorded on visual evoked potential suggesting disturbance of the optic nerve. Although there was no any abnormality on non-contrast T1 and T2 weighted images, on contrast enhanced T1 weighted images millimetric nodular contrast enhancement established on right optic nerve, adjacent to optic chiasm (Figure 1). Immediately hyperbaric oxygen (HBO) and corticosteroid therapy were started. After the

treatment, worthy decrease in vision loss was detected. On ophthalmic examination, +1.3 logMAR unit vision was detected.



**Figure 1.** Contrast enhanced coronal T1-weighted MRI, demonstrating enhancement of the right optic nerve in a patient with radiation induced optic neuropathy presenting with sudden loss of vision of right eye.

## Discussion

RION is a rare and late complication of radiotherapy. While it can be seen from 3 months to more than eight years after radiation exposure, most of the patients develop symptoms within three years with a peak incidence at 1 to 1.5 years [1]. The incidence of RION is dose-dependent, increasing with total doses over 50 Gy [3]. The diagnosis is usually based on clinical and radiological findings. MRI of the optic tract should study in detail, and this makes it a valuable tool in the diagnosis of RION in patients of radiation-induced disorders and also at the beginning of treatment. Although there are no specific imaging findings on CT and non-contrast MRI, contrast enhanced T1 weighted images show prominent enhancement throughout optic nerve [5]. This MRI finding of RION is non-specific. The differential diagnosis of contrast enhancement over optic tract includes optic neuritis, sarcoid optic neuropathies, optic glioma or other optic neuropathies [1]. Therefore, the most important

aspects in the diagnosis are a high index of suspicion and assessment of both clinical and radiological findings.

The treatment of RION consists of systemic corticosteroids, anticoagulation and hyperbaric oxygen which are unsuccessful and disappointing. It needs to be emphasized that initiation of hyperbaric oxygen therapy within 72 hours of onset of visual loss is very necessary for significant visual recovery as delayed treatment will lead to irreversible vision loss, especially in cases treated beyond two weeks [1,3,4]. The reported treatment protocol usually consisted of 14 daily 2-hours session at 2.8 atmospheres [1]. In our patient, the diagnosis of RION after complaining of sudden vision loss was made quickly, with appraisalment of both clinical and radiological findings. The hyperbaric oxygen therapy was started within first 24-48 hours of onset of symptom. He underwent 30 daily 2-hours session at 2.8 atmospheres. There was considerable recovery of vision loss after this treatment.

Consequently, early diagnosis and treatment of RION are of particular importance to prevent irreversible loss of vision. For that reason, suspicion of RION should be considered as a radiological emergency. In the case of diagnosing this disease, the patient must be directed towards prompt initiation of HBO therapy within 72 hours of onset of visual loss.

**Conflict of interest:** None declared.

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