Demonstration of Choroidal Nodules by Near Infrared Reflectance Imaging in Patient with Neurofibromatosis Type-1

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ABSTRACT

Choroidal nodules are common in neurofibromatosis. Choroidal nodules, which are suggested to be a diagnostic criterion for neurofibromatosis, can be monitored by near-infrared imaging. Near-infrared imaging is a fast and non-invasive method. This presentation aims to describe choroidal nodules by near-infrared reflectance imaging in a patient with neurofibromatosis type 1 who presented for routine ophthalmology examination.

Keywords: Choroidal nodules, Near-infrared reflectance, Neurofibromatosis.

INTRODUCTION

Neurofibromatosis type 1 was first described by von Recklinghausen[1]. It is one of the most common autosomal dominant disorders.[2] Diagnostic criteria was established in National Institute of Health Consensus Conference in 1988.[3]

In neurofibromatosis ocular findings include iris nodule (Lisch nodule), melanocytic hamartoma arising from embryonic neural crest, glaucoma, palpebral café-au-lait spot, palpebral, conjunctival, and orbital neurofibroma, thickening of ciliary and corneal nerves, melanocytic and neuronal hamartoma in trabecular network and uvea, posterior subcapsular cataract and epiretinal membrane. Less common findings include optic disc meningioma, papilledema and exotropia. Retinal effects are vascular astrocytic hamartoma, retinal pigment epithelium hamartoma, peripheral retinoschisis, sectoral retinitis pigmentosa and retinal capillary hemangioma. Previously, it was thought that choroidal nodules are rare findings of neurofibromatosis .[4] Currently, it is proposed that choroidal nodules are common finding that should be incorporated into diagnostic criteria.[5-7] We aimed to demonstrate choroidal nodules in our patient with neurofibromatosis type 1 using near-infrared reflectance (NIR) imaging.

CASE REPORT

A 29-year-old man presented to our clinic for routine ocular examination. In his history, it was found that he had neurofibromatosis type 1. The patient had no active complaint. In ophthalmological examination, best-corrected visual acuity was 1.0 by -1.00 axis in right eye and 0.7 by -2.50 axis in the left eye. In biomicroscopic examination, Lisch nodules were present in both eyes. In dilated fundus examination, no abnormal finding was detected (Figure 1). Spectral domain (SD)-OCT image by Heidelberg Spectralis device (Heidelberg Engineering, Heidelberg, Germany) was found to be normal while hyper-reflectance at posterior pole with patchy areas was observed by infra-red reflectance confocal scanning laser ophthalmoscope of same device (Figure 2). No abnormal finding was observed on fundus fluorescein angiography (Figure 3).

The decreased visual acuity in the left eye was considered as anisometropic amblyopia. On OCT sections, hyper-reflective areas on choroid were observed in the region

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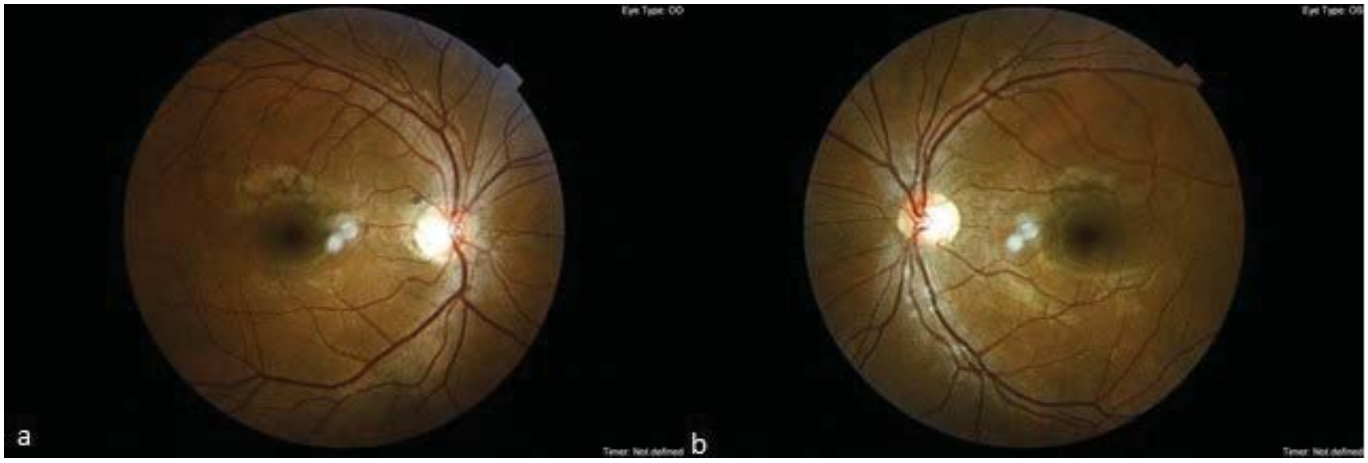

Figure 1: *Fundus image of right eye (a) and left eye (b) in the patient.*

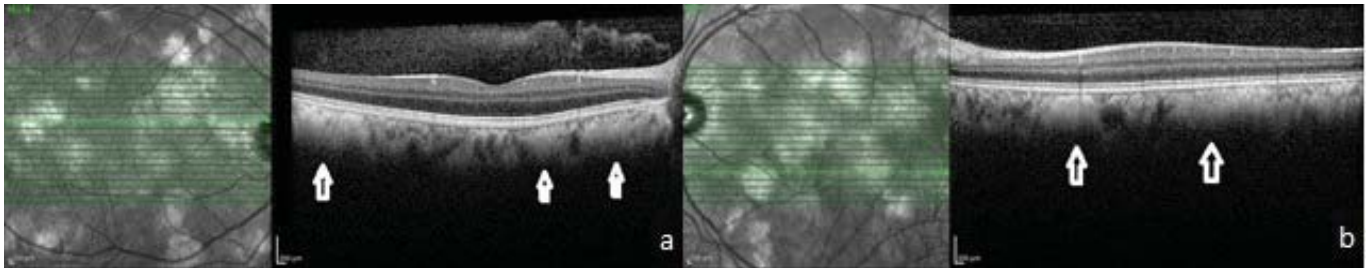

Figure 2: *Choroidal nodules in right eye (a) and left eye (b) OCT and NIR imaging (arrows).*

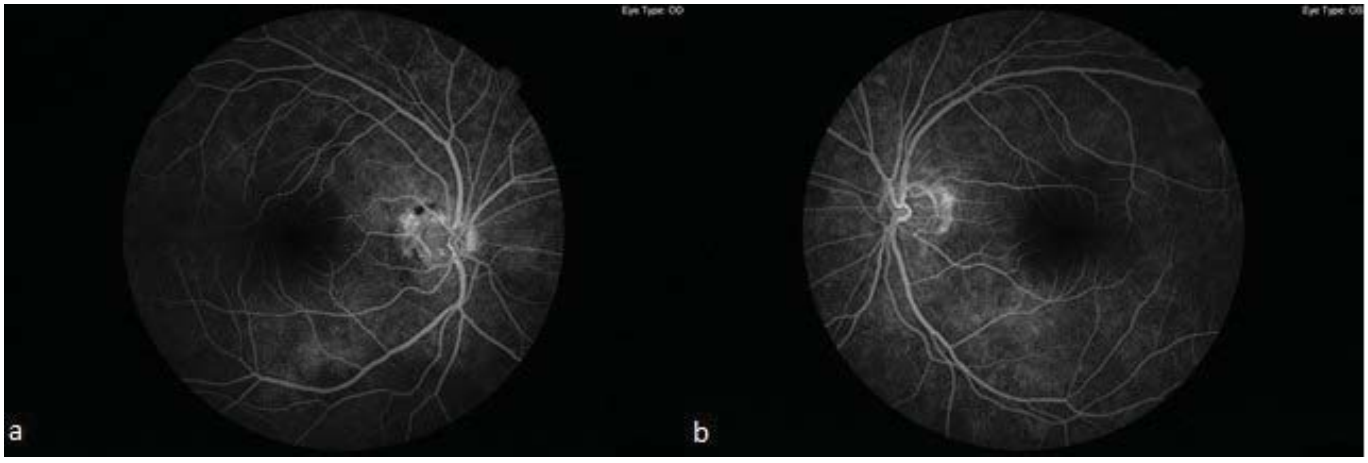

Figure 3: *Fundus fluorescein angiography images of right eye (a) and left eye (b).*

compatible with patchy hyper-reflectance areas on near-infrared image. These lesions were interpreted as choroidal nodules. Follow-up was recommended to the patient.

DISCUSSION

In neurofibromatosis, choroidal nodules are ovoid, and it was shown that these nodules are formed by Schwann cell encasing axon in postmortem electron microscopy.8 Currently, it is thought that choroidal nodules are more common in neurofibromatosis. Choroidal nodules are present in 90% of cases.5 In another study, it was found as 82%.[6] Göktaş et al.[9] reported as 78.9% in pediatric group.

As near-infrared illumination as high fundus penetration, it provides better data from subretinal deep layers. In near-infrared reflectance, images are obtained using wavelengths ≥820.[10]

Yasunari et al.[11] could able to demonstrate patchy appearance by infra-red scanning laser ophthalmoscopy and indocyanine green angiography although they failed to show using fundus fluorescein angiography. Failure to visualize the patchy appearance in conventional fundus

examination and fundus fluorescein angiography was linked to better penetration of infrared light to retinal pigment epithelium and choroid. They proposed that the patchy appearance resulted from the nodules in choroid. They advocated that choroid is one of the more commonly affected organs in neurofibromatosis by demonstration of nodules.[11] In our patient, patchy areas on near-infrared reflectance image was compatible with nodules in OCT sections. We think that patchy appearance results from choroidal nodules.

In a study by Viola et al.[6] choroid nodules were shown by near-infrared imaging. Choroid nodules were identified as hyper-reflective areas on OCT section. In our patient, choroidal hyper-reflective areas on OCT sections were compatible with patchy lesions in near-infrared reflectance image.

Choroidal nodules proposed to be diagnostic criteria can be visualized by near-infrared imaging.[6] Near-infrared imaging is fast and non-invasive modality.[10] The nodules can also be observed by indocyanine green angiography but it is an invasive technique.[4]

In conclusion, near-infrared imaging as a fast and non-invasive method can detect choroidal nodules in patients with neurofibromatosis. Detailed examination directing neurofibromatosis is warranted if hyper-reflective patchy lesions are present in near-infrared image despite lacking clinical finding.

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