CASE REPORT

Three-dimensional spectral domain optical coherence tomography imaging of the retina in choroidal tuberculoma

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SUMMARY

Introduction To study retinal imaging in choroidal tuberculoma by three-dimensional spectral domain optical coherence tomography (SD-OCT) for the first time.

Methods QuantiFERON-TB GOLD test, colour Doppler imaging, fluorescein angiography and SD-OCT were performed in an 18-year-old immunocompetent female patient.

Results Three-dimensional imaging over the choroidal lesion revealed marked retinal elevation. Subfoveal neurosensory detachment along with serous retinal detachment resulted from effusion of fluid from the underlying choroidal lesion. Granularity of the outer photoreceptor layer and proliferating retinal pigment epithelium cells indicated chronicity of the underlying choroidal lesion abutting the retina. Antitubercular therapy, after 2 weeks, resulted in a resolution of the subfoveal neurosensory detachment, reduction in the serous retinal detachment and a decrease in retinal elevation.

Conclusions Three-dimensional SD-OCT allows a spatial visualisation and documentation of retinal elevation. It also allows a detailed visualisation of the secondary retinal pigment epithelial and intraretinal changes and is helpful in monitoring the response to medication.

The study, for the first time, reports three-dimensional spectral domain optical coherence tomography (SD-OCT) retinal imaging in choroidal tuberculoma in an immunocompetent young patient.

CASE PRESENTATION

The authors confirm adherence to the tenets of the Declaration of Helsinki. A written informed voluntary consent was obtained. An 18-year-old woman presented at our tertiary care centre with complaints of low grade fever, coughing and diminution of vision of the left eye since 1 week. At the time of presentation, she was not on any medication. A detailed history revealed that the patient was treated as a case of acute respiratory distress syndrome 2 months back, elsewhere. Chest x-ray revealed homogeneous opacity involving the left lower zone, suggestive of pleural effusion (figure 1). She was given oxygen support, antibiotics, steroids and nebulisation for the same. After 7 days of treatment, she got relieved apparently and was discharged from the hospital.

On examination, she was having mild grade fever of 99.6° F. On ocular examination, the best corrected visual acuity was 20/20 in the right eye and 20/80 in the left eye. Right eye examination was unremarkable. On examination of the left eye, the anterior segment examination was unremarkable. Fundus

BACKGROUND

Tuberculosis can have a variety of ocular manifestations, and consequently may mimic a number of ocular inflammatory diseases.¹ A high index of suspicion, therefore, is required. Moreover, the absence of pulmonary tuberculosis does not rule out the diagnosis of ocular tuberculosis (TB).² The true prevalence of tubercular uveitis remains a major concern, especially in TB-endemic areas and because of the lack of definitive diagnostic criteria. A definitive diagnosis of ocular TB is established by the combination of clinical signs consistent with known patterns of ocular TB and a demonstration of the mycobacterium by means of culture or DNA amplification from ocular samples. Presumptive diagnosis can be established by the combination of clinical signs consistent with known patterns of ocular TB with confirmatory ancillary testing, such as Mantoux test,^{1 3} radiographic findings and non-ocular cultures, or a positive response to a week of therapeutic trial of antitubercular therapy.¹ Optical coherence tomography (OCT) scans through areas of suspected granuloma can be helpful in differentiating choroidal granulomas from other non-inflammatory conditions.⁴

Figure 1 Chest x-ray posteroanterior view shows obliteration of the left costophrenic angle.

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Figure 2 Fundus photo of the left eye shows a yellowish-white subretinal lesion at the macula (large white arrow) with surrounding subretinal fluid (black arrows). Three similar lesions (small white arrows) are observed around the main lesion.

examination revealed a yellowish-white elevated subretinal lesion with indistinct borders measuring $2\frac{1}{2}$ disc diameter, associated with pigmentary changes. There was associated serous retinal detachment. There were three small similar lesions superior, nasal and inferior to the main lesion, ranging from $\frac{1}{3}$ to $\frac{1}{2}$ disc diameter in size (figure 2). The optic nerve head examination was unremarkable. Fluorescein angiography revealed hyperfluorescence in the early arteriovenous phase with progressive staining of the lesion in the late phase. B-scan ultrasonography showed a small hypoechoic nodule in the posterior coats of the eyeball, elevating the retina in that region. On colour Doppler imaging, vascularity was observed in layers containing the lesion while no internal vascularity was noted (figure 3).

SD-OCT (Cirrus high definition OCT (Carl Zeiss Meditec Inc.), California, USA) over the lesion revealed a dome-shaped retinal elevation with hyper-reflective retinal pigment epithelium (RPE). Subfoveal neurosensory detachment was observed as hyporeflective areas. In the area of neurosensory detachment, the outer photoreceptor layer (OPL) showed the presence of granularity and proliferating RPE cells. Optical shadowing was observed beyond the RPE. Serous retinal detachment was also observed on either side of the subfoveal neurosensory

Figure 3 Colour Doppler imaging of the left eye shows a hypoechoic subretinal lesion (white arrow) elevating the retina with vascularity in the layers of the lesion with no internal vascularity.

Figure 4 Spectral domain optical coherence tomography image of the left eye prior to initiation of therapy shows subfoveal neurosensory detachment and proliferating retinal pigment epithelial cells (small white arrow) with serous retinal detachment superiorly and inferiorly (large white arrows). Phagocytosed outer photoreceptor layer cells (small white arrow).

detachment. No vitreoretinal traction was noted (figure 4). Macular cube average thickness was $350\ \mu\text{m}$ with a cube volume of $12.6\ \text{mm}^3$. Three-dimensional (3D) SD-OCT provided spatial visualisation of a markedly elevated retina (figure 5).

These findings were suggestive of tubercular ocular involvement for which she underwent Mantoux test, showing a highly positive reaction of 18 mm on the very first day of the test. Further, the quantiFERON-TB Gold test was performed which showed positive results (ESAT-6 responsiveness detected), confirming the diagnosis of TB. She was HIV negative on ELISA,

Figure 5 Three-dimensional optical coherence tomography of the left eye shows a lesion causing a marked elevation of the retina.

Figure 6 Fundus photograph of the left eye of the same patient after 2 weeks of antitubercular therapy shows a reduction in size of the lesion at the macula (white arrow) with partial resolution of the surrounding subretinal fluid (black arrows).

testing for HIV-1 and HIV-2. The patient was prescribed antitubercular therapy (isoniazid, rifampicin, ethambutol and pyrazinamide) and oral prednisolone 1 mg/kg body weight/day. After 2 weeks of therapy, the best corrected visual acuity of the left eye improved to 20/40. The fundus examination revealed a significant decrease in the size of the lesion with partial resolution of the subretinal fluid (figure 6). SD-OCT showed the subsidence of the subfoveal neurosensory detachment. Serous retinal detachment superior and inferior to the macula also regressed significantly (figure 7). Macular cube average thickness decreased to 260 μm and cube volume to 9.4 mm^3 . Three-dimensional SD-OCT showed a marked regression of retinal elevation (figure 8). Presently, the patient is undergoing antitubercular therapy.

DISCUSSION

Intraocular involvement in TB, especially choroidal involvement, is believed to develop via a haematogenous spread from the lung in the vast majority of instances.⁵ The most common presenting manifestation of intraocular TB is reported to be choroidal tubercles and tuberculomas.⁶

Figure 7 Spectral domain optical coherence tomography image of the left eye after 2 weeks of initiation of therapy shows a resolution of the subfoveal neurosensory detachment (small white arrow) with residual serous retinal detachment superiorly and inferiorly (large white arrows).

Figure 8 Three-dimensional optical coherence tomography image of the left eye of the lesion after 2 weeks of antitubercular therapy shows a marked reduction in retinal elevation.

OCT features for choroidal TB have been reported.⁴ Attachment between the retinal pigment epithelial-choriocapillaris layer and the neurosensory retina over the granuloma was observed. This was associated with the surrounding subretinal fluid and inflammatory infiltrate in the deeper retinal layers. Loss of normal retinal architecture with intraretinal splitting within the neurosensory retina was also noted.

Three-dimensional SD-OCT imaging of choroidal tuberculoma, for the first time, documented the spatial visualisation of a markedly elevated retina. Hyperplastic RPE was also seen. Granularity of OPL, due to phagocytosed OPL cells, and proliferating RPE cells were observed as a novel finding. This resulted from chronicity of the underlying lesion abutting the retina. Subfoveal neurosensory detachment associated with serous retinal detachment in the surrounding areas was also observed, resulting from the effusion of fluid from the underlying choroidal lesion. Three-dimensional SD-OCT imaging exquisitely demonstrated the response to antitubercular therapy in the form of a decrease in retinal elevation and resolution of subfoveal neurosensory detachment.

Three-dimensional SD-OCT allows spatial visualisation and documentation of retinal elevation. It also allows detailed visualisation of the secondary retinal pigment epithelial and intraretinal changes due to choroidal tuberculoma and is helpful in monitoring the response to medication.

Learning points

- ▶ Three-dimensional optical coherence tomography allows spatial visualisation of the retinal changes due to the underlying choroidal tuberculoma and helps in monitoring the response to therapy.
- ▶ Granularity of the outer photoreceptor layer and proliferating retinal pigment epithelial cells indicate chronicity of the underlying choroidal lesion.
- ▶ Serous retinal detachment results from effusion of fluid from the underlying choroidal lesion.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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