CASE REPORT

Use of optical coherence tomography for objective assessment of fundus torsion

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Accepted 10 February 2017

SUMMARY

Objective assessment of fundus torsion is currently performed with indirect ophthalmoscopy or fundus photography. Using the infrared image of the macular scan of the optical coherence tomography one can assess the presence and amount of fundus torsion. In addition, the line scan through the fovea can be used as a reference to confirm the position of the foveal pit in relation to the optic nerve head. Two cases are used to demonstrate how to assess fundus torsion with the use of the optical coherence tomography.

BACKGROUND

Objective assessment of fundus torsion is most commonly performed with either indirect ophthalmoscopy or fundus photography. In this paper, a new method is described to objectively and quantitatively assess fundus torsion with the use of the optical coherence tomography (OCT).

CASE PRESENTATION**Case 1**

A 50-year-old woman was referred to our strabismus clinic by a general ophthalmologist. She was diagnosed with decompensating right congenital superior oblique palsy. The patient was a teacher and wanted to drive back to work after the eye examination. In

addition, the referring ophthalmologist had recently examined the patient in our hospital, including dilating fundus examination, which was reported as normal, but no note of fundus torsion was made. Thus, we did not dilate the patient, but decided to try to assess the torsion with the infrared picture of the OCT. The iVue (Optovue, California, USA) was used, which proved to be a great instrument for the assessment of fundus torsion. A cross-line scan was obtained through the fovea. In this scan, the horizontal line shows the exact location of the fovea and the optic nerve head, and therefore a protractor can be used if needed for quantitative measurements of the torsion. **Figure 1** shows excyclotorsion of the right eye without any torsion in the left eye, which correlates with the diagnosis of right congenital superior oblique palsy. The option of 'OU report' is available in this OCT model, which displaces the scans of the right and left eye in the same page making it easy to compare between the two eyes. In this case, we did not use a protractor to measure the torsion so we used the estimation method (that grades torsion from 0 to 4+) and we graded the torsion in the right eye as 1+.

Case 2

A 60-year-old woman with a 20-year history of severe closed head trauma and symptom of vertical

Figure 1 Infrared image of the fundi of both eyes as presented by the 'OU report'. Infrared image of the right fundus shows excyclotorsion accompanied by the corresponding horizontal line scan through the fovea. Infrared image of the left eye shows no torsion and the corresponding line scan again confirms the exact position of the fovea.

To cite: Sophocleous S.
BMJ Case Rep Published
online: [please include Day
Month Year] doi:10.1136/
bcr-2016-216867

Figure 2 Infrared image of the right fundus shows severe exocyclotorsion of the right eye (top) accompanied by the corresponding horizontal line scan through the fovea. Infrared image of the left eye shows no torsion and the corresponding line scan again confirms the exact position of the fovea (bottom).

and torsional diplopia was seen in the clinic. Examination revealed right superior oblique palsy. OCT scan was performed to assess fundus torsion and it revealed severe right exocyclotorsion, without any significant torsion of the left eye as can be seen in [figure 2](#). This is a case of extreme torsion estimated as 4+.

DISCUSSION

The iVue is one of the smallest OCT models in the market with a fundus view area of $21^{\circ} \times 21^{\circ}$, so the foveal target has to be moved temporally, by clicking temporal on the infrared fundus image screen. This way the optic nerve head comes in the picture. This simple manoeuvre is not necessary when using an

OCT model with larger area of scanning. An important detail, which is true for every method we use to assess fundus torsion, is to keep in mind that the position of the patient's head is critical as the torsion can vary with head tilting. Therefore, we need to make sure that the patient's head is always straight when we are measuring torsion.

There are multiple advantages in using the OCT for objective assessment of torsion. It is quick and easy and can be quantitative with the use of a protractor or with the addition of torsion measuring software by the manufacturer. With a simple and quick OCT macular line scan a horizontal line that goes through the fovea is seen in the IR picture. This line, that is, shown in green on the IR picture should run through the lower

one-third of the optic disc. The lower this line is compared with the normal, the more exocyclotorsion is present. Furthermore, pupil dilation is not necessary at the time of assessment of fundus torsion and it is exceptionally accurate as the macular cross-section scan confirms the exact position of the fovea in

relation to the optic nerve head. Other methods that have been described so far for the quantitative measurement of fundus torsion, including fundus pictures in combination with computer software¹ and use of binocular indirect ophthalmoscope with protractor,² are more time consuming and subject to human error, respectively. This novel method of fundus torsion assessment will add to our armamentarium of methods that we use for assessing strabismus.

Learning points

- ▶ The optical coherence topography (OCT) can be used for the assessment of fundus torsion.
- ▶ When the OCT is used for the assessment of fundus torsion pupillary dilation is not required.
- ▶ Using the OCT for the assessment of fundus torsion is an exceptionally accurate method as the macular cross-section scan confirms the exact position of the fovea in relation to the optic disc.

Contributors SS is the sole author.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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