Retinal Morphologic Features in Shaken Baby Syndrome Evaluated by Optical Coherence Tomography

EDITOR:
WE ENJOYED READING THE STUDY IN WHICH SCOTT AND associates performed retinal imaging in 2 patients with Shaken Baby syndrome (SBS) using a hand-held spectral-domain optical coherence tomography (OCT) device. They presented a full-thickness macular hole (MH) with full-thickness retinal scarring and epiretinal membrane (ERM) formation as the sequelae of SBS.

The purpose of this letter is not to criticize this excellent study, but to discuss related aspects and to provide additional findings. The underlying pathophysiology of MH formation in infants seems to be multifactorial and complex. Mechanical forces resulting from the shaking itself lead to a structurally weakened retina. Other factors such as necrosis and mechanical pressure are related to retinal hemorrhages and may contribute to the cause.

However, vitreoretinal traction may play a key role in the pathologic features of SBS-related retinal findings such as perimacular folds, traumatic retinoschisis, ERM, and MH formation. As shown by the authors, partial posterior hyaloid separation was associated with a lamellar MH in 1 eye. Vitreomacular traction resulting from incomplete posterior vitreous detachment has been attributed to cause MHs. Furthermore, OCT demonstrated extensive vitreoretinal traction in 3 patients with SBS that was partially not seen in ophthalmoscopy. Recently, our group performed a 2-year follow-up examination of a child with SBS. OCT revealed ERM formation in the macular area. However, in this case the fovea was not directly affected.

In the study of Scott and associates, the other child sustained a double-layered ERM. As the authors pointed out, the persisting second reflective preretinal layer can be explained as a partially detached internal limiting membrane (ILM). Because of the strong adherence of the vitreous body to the ILM in children, the shaking may induce a severe vitreoretinal traction force leading to separation of the ILM from the neurosensory retina. In the study of Scott and associates, severe foveal deformation was seen at the site of persisting vitreous attachment. Interestingly, in this patient only mild retinal hemorrhages were present. This may support the hypothesis that vitreoretinal traction in fact may be more important for MH formation in SBS compared with other factors such as necrosis and mechanical pressure that are related to retinal hemorrhages.

In addition, the authors noted the potential diagnostic meaning of perimacular folds and traumatic retinoschisis, but were unable to show according OCT images. Such findings previously were demonstrated with time-domain OCT. However, in our patient group, no MHs were observed.

In conclusion, OCT can identify additional retinal findings which easily can be missed by biomicroscopy alone. Morphologic features seen by OCT may elucidate further the pathophysiologic features of SBS. OCT seems to be a suitable tool in diagnosis and follow-up of children with suspected SBS.

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REFERENCES

REPLY
WE APPRECIATE THE INSIGHTFUL ARTICLE BY STURM AND associates regarding their application of optical coherence tomography (OCT) and discussion of vitreomacular traction in Shaken Baby syndrome (SBS). They document a sharp white-fold on color photograph of their first patient, and on time-domain OCT show deformation of the retina at a site of vitreous attachment to an epiretinal membrane (ERM) with small, round hyporeflective sites in the inner retina. We agree that vitreoretinal traction may play a key role in the pathologic characteristics of SBS; however, as
the authors point out, the processes producing such pathologic features are multifactorial.

The authors misinterpreted our report of Case 1; this was not mild hemorrhage. We reported “bilateral vitreous and subhyaloid hemorrhages” at the time of original evaluation for SBS and this blood had cleared by the time of spectral-domain (SD) OCT examination 8 months later.²

The authors also thought we were “unable to show SD-OCT images of perimacular fold.” We note that the location of each SD-OCT scan and the morphologic changes were mapped to a specific site on the summed voxel projection (retinal image), in contrast to OCT, where the examiner estimates the location of the scan.³

We showed several sites of SD-OCT imaging across the perimacular fold seen on color photographs.² In Figure 4, although the Top right SD-OCT scan ends before the site of the fold (white arrow) on fundus examination, the dense ERM (Middle right scan) ends at the site of the fold without vitreous attachment or retinal deformation. In Figure 5 (Top and Bottom right), the site of the arcuate perimacular fold on color photography corresponds to the margin of the reflective band suspended over the retina (Top) and to the attachment of the reflective band to the retina (Bottom) without retinal folds.² Thus in 2 eyes, we document no deformation of the retina on SD-OCT at the sites of perimacular folds on color imaging. Although SD-OCT² or OCT¹ may show vitreomacular traction and deformation or full-thickness fold of the retina at sites of perimacular folds seen on color fundus photos, these are not always present. It may be appropriate to reconsider the term perimacular fold on color photographs of SBS, because this may be associated with vitreoretinal attachment or the border of an ERM without any retinal fold or distortion. Evolving OCT technology has enhanced our capacity to visualize vitreoretinal structures, improving our ability to manage these complex cases.

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The Role of Retinal Nerve Fiber Layer in Predicting Recovery of Vision Following Surgery for Pituitary Adenomas

EDITOR:
WE PREVIOUSLY REPORTED THAT IN VIVO RETINAL NERVE fiber layer (RNFL) measured by optical coherence tomography (OCT) predicts visual recovery after surgery for parachiasmal tumors.¹ Jacob and associates² have recently reported findings that essentially confirm these initial observations in a group of 19 patients with pituitary adenomas who underwent either surgery or medical treatment and had been monitored for 3 months following treatment.

We can clarify a few issues in relation to the design of our study. In contrast to that stated by Jacob and associates, our controls were appropriately matched to patients by age as described in our METHODS. In addition to the provision of age-adjusted RNFL measurements, a further advantage of our use of controls from the Zeiss database is its involvement of a large cohort of participants with prior extensive ophthalmologic assessments that have excluded relevant pathology. It is not clear whether the referents used by Jacob and associates enjoyed such advantages, as the controls in that study were described as 23 nonrandomly selected medical staff or volunteers in whom underlying ophthalmic pathology (eg, glaucoma, other retinal abnormality, undiagnosed compressive lesions) that could distort RNFL measurements may not have been specifically excluded. The Results, Table, and the Supplemental Table in the report did not contain any visual function information or reproducibility data for the control group.

We agree with Jacob and associates that successful decompression of the chiasm could influence the correlation between RNFL thickness and visual recovery and that incomplete resection could provide an explanation for residual visual field defects. The value of magnetic resonance imaging (MRI) in the early postoperative stage, however, is uncertain attributable to difficulties in interpretation arising from postoperative edema, hemorrhage, and implanted fat material.³ To help determine the extent of tumor clearance, patients in the study conducted by Jacob and associates had MRI scans 3 months after surgery. It would additionally be helpful to utilize clearly defined, prespecified MRI criteria and for those interpreting MRI scans to be masked to the visual outcome.⁴

As reinforced by Jacob and associates, in vivo thinning of RNFL measured by OCT places the patient at decreased chance of recovery. Further studies of this topic will require larger patient groups, more prolonged follow-up, and more rigorous use of postoperative imaging techniques.

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