AJNR

REPLY:

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AJNR Am J Neuroradiol published online 12 April 2018
http://www.ajnr.org/content/early/2018/04/12/ajnr.A5647

Published April 12, 2018 as 10.3174/ajnr.A5647

REPLY:

We would like to thank Drs Lecler, Savatovsky, and Lamirel for taking the time to read and comment on our article and propose valuable suggestions.

As noted by Drs Lecler, Savatovsky, and Lamirel, the volumetric method is the technique expected to yield the most accurate measurements with a high reproducibility, should the same software be used. However, although made more accessible with automated techniques, 3D measurements remain time-consuming and require specific software; they are thus not commonly obtained in everyday clinical practice. Despite being less accurate, 2D measurements have the advantages of being more widely used in clinical practice and easily performed, and thus are of higher clinical relevance than 3D ones, which are more likely to be reserved for research purposes.

Our study, therefore, tried to find a balance of accuracy, reproducibility, and practicality in a clinical setting. We do agree that a prospective study taking into account all the commenters' suggestions with additional 3D sequences of the orbit would be very valuable because 3D measurements of the optic nerve (ON) have not been reported yet, to our knowledge. It would be interesting to examine volumetric measurements of the optic nerve and correlate them with the more accessible 2D measurements in a future study. The only article that performed volumetric measurements that was cited in the comment letter did not measure the ON proper but rather the ON sheath in idiopathic intracranial hypertension, which would further increase the gap between the ON diameter and the ON sheath diameter.[1]

Dr Lecler and colleagues also highlighted an important point to consider with respect to the flexibility of the optic nerve structures and how the intraorbital portion length may vary, especially in orbital/optic nerve diseases. Being aware of such variability and given that our study aimed at providing normative data of the ON in the pediatric age group, we included only orbital MRIs with normal findings and excluded patients with diseased optic pathways, systemic diseases, and tumors.

Our main study objective was to provide normative data of pediatric ON measurements that would be easily reproducible in a clinical setting. We therefore excluded measurements considered difficult to reproduce, mainly cases with tortuous or oblique ONs; this feature explains the different number of measurements reported for each cut in Table 2. Measurements were performed similarly in all patients in the axial and coronal planes obtained perpendicular to the long axis of the nerve and thus were considered reproducible. Furthermore, the reproducibility of the measurements was documented by the results of the interrater correlation. The ON measurements were obtained by 2 raters with different levels of expertise, yet still yielded good agreement, with a high interrater correlation coefficient of 0.842.

We used STIR or T1 inversion recovery sequences to conduct our measurements. These sequences are excellent in differentiating the ON from the surrounding CSF, and we therefore found no difficulty defining the edge of the ON. On the other hand, the FLAIR sequence mentioned by Dr Lecler and colleagues is useful in assessing ON abnormal signal in optic neuropathy, but it seems less useful for detecting ON atrophy as concluded by Boegel et al.[2]

The suggestion to fixate the eyes during scanning to avoid eye movements seems valid for our older study group; however, eye fixation could not be controlled in the younger population in which MR imaging was mostly performed under sedation. We do believe that our reported 2D normative ON measurements in the pediatric age group would be a valuable aid to the neuroradiologist, neuro-ophthalmologist, and pediatric ophthalmologist in an everyday clinical setting.

http://dx.doi.org/10.3174/ajnr.A5647

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