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The Utility of Ocular Ultrasonography to Evaluate the Influence of Tourniquet Application on Intracranial Pressure

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Dear Editor,

Ocular ultrasonography has acquired considerable importance in anesthesiology and critical care, especially for the detection of potential early intracranial hypertension after surgical procedures.

For this reason, we would like to congratulate Besir and Tugcugil [1] for their original and interesting paper on the assessment of optic nerve sheath diameter (ONSD) ultrasound to evaluate the potential correlation between tourniquet time or pressure and raised intracranial pressure after tourniquet application. We would like to comment on some aspects of appraisal of ONSD by ultrasound.

For their evaluation, the authors used the ultrasound B-scan technique, which has been employed for more than 50 years to diagnose several ocular and orbital diseases. However, it has been demonstrated to be quite unreliable for the measurement of small structures, such as ONSD, because of the blooming effect [2]. This is related to the absence of a standard sensitivity setting in performing this ultrasound examination; this means that, decreasing the gain, the ONSD will show larger measurements compared to the ones obtained with higher gain. This effect could be ignored when large lesions need to be assessed, but it should be taken into consideration in case of lesions smaller than 0.5 mm, where even a few microns could be significant as for appraisal of ONSD.

To circumvent the above-mentioned drawbacks, we recommend the use of the standardized A-scan, a blooming effect-free

ultrasound technique which shows easily visible hyperreflective spikes from the interface between arachnoid and subarachnoid fluids, making these measurements objective and precise. Indeed, with this technique, the problem of placing the caliper with certainty on ONSD is overcome, but adequate training and skills are required [3].

Moreover, we would like to point out the possibility of performing the “30-degree test” with A-scan examination. This test permits us to discriminate between an increase in ONSD caused by raised intracranial pressure related to increased subarachnoid fluid, and that associated with other diseases, such as optic neuritis or optic nerve meningioma. In healthy and cooperative patients, this maneuver is performed with the patient looking straight ahead and to the lateral side; in this way, intracranial hypertension caused by increased subarachnoid fluid, which causes distension of the ONSD, will be demonstrated if this test shows a decrease in the maximal diameter of at least 5%. In uncooperative patients, such as comatose or anesthetized patients, the same test could be performed using forceps to mobilize the eye globe [4, 5].

Disclosure Statement

The authors have no conflicts of interest to declare.

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