A Unique Model for Ultrasound Assessment of Optic Nerve Sheath Diameter

Frederick A Zeiler BSc MD¹ (umzeiler@cc.umanitoba.ca)

Bertram Unger MD B. Eng BSc (Med) PhD ³,⁴ (bertram.j.unger@gmail.com)

Andreas H Kramer MD MSc FRCPC⁷,⁸ (Andreas.Kramer@albertahealthservices.ca)

Andrew W Kirkpatrick MD MHSc FRCSC⁵,⁶,⁷ (Andrew.Kirkpatrick@albertahealthservices.ca)

Lawrence M Gillman MD MMedEd FRCSC²,³ (gillmanlm@yahoo.ca)

Section of Neurosurgery, Department of Surgery, University of Manitoba, Winnipeg, Manitoba¹;

Section of General Surgery, Department of Surgery, University of Manitoba, Winnipeg, Manitoba²;

Section of Critical Care Medicine, Department of Internal Medicine, University of Manitoba, Winnipeg, Manitoba³;

Department of Medical Education, University of Manitoba, Winnipeg, Manitoba⁴

Section of General Surgery, Department of Surgery³, Regional Trauma Services⁶, Critical Care⁷, University of Calgary, Calgary, Alberta;

Department of Clinical Neurosciences, University of Calgary, Calgary, Alberta⁸

Background: Ultrasonic assessment of optic nerve sheath diameter (ONSD) as a non-invasive measure of intracranial pressure (ICP) has been evaluated in the literature as a potential valid technique for rapid ICP estimation in the absence of invasive intracranial monitoring. The technique can be challenging to perform and little literature exists surrounding intra-operator variability.

Objectives: In this study we describe the creation of a novel model of ONSD to be utilized in ultrasound training of this technique. We demonstrate the realistic ultrasonographic images created utilizing this novel model.

Methods: We designed ocular models composed of gelatin spheres and variable three dimensional printed cylinders, which simulate the globe of the eye and variable ONSD’s respectively. These models will then be suspended in a gelatin background and ultrasound of the ONSD will be conducted using standard technique described in the literature.

Results: This model produces clear and accurate representation of ONSD that closely mimics in vivo images. It is affordable and easy to produce in large quantities, portending its use in an educational environment.

Conclusions: Utilizing the standard linear array ultrasound probe for ONSD measurements in our model provided realistic images comparable to in vivo. This provides an affordable and exciting means to test
intra and inter operator variability in a standardized environment. Knowing this, we can further apply this novel model of ONSD to ultrasound teaching and training courses with confidence in its ability and the techniques ability to produce consistent results.

Running Title: Novel Model for Ultrasound of ONSD

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