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*Společnost urgentní medicíny a medicíny
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VYUŽITÍ URGENTNÍ ULTRASONOGRAFIE V DIAGNOSTICE INTRAKRANIÁLNÍ HYPERTENZE

PATRIK CHRISTIAN CMOREJ

ZDRAVOTNICKÁ ZÁCHRANNÁ SLUŽBA ÚSTECKÉHO KRAJE

FAKULTA ZDRAVOTNICKÝCH STUDIÍ, UNIVERZITA JANA EVANGELISTY
PURKYNĚ

- Diagnostika intrakraniální hypertenze měřením ONSD se prakticky používá od roku 1990.
- Používá se u pacientů jak s traumatickým, tak netraumatickým postižením mozku.
- Dosud v PubMed databázi více než 200 publikací na uvedené téma.

ECHOGRAPHIC DIFFERENTIAL DIAGNOSIS OF OPTIC-NERVE LESIONS

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(Iowa City, Iowa, U.S.A.)

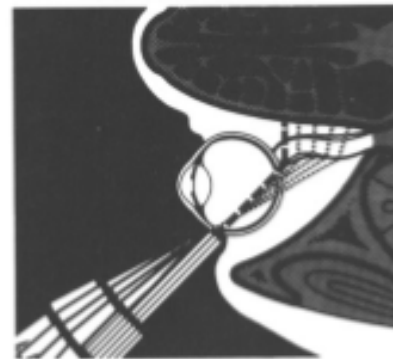
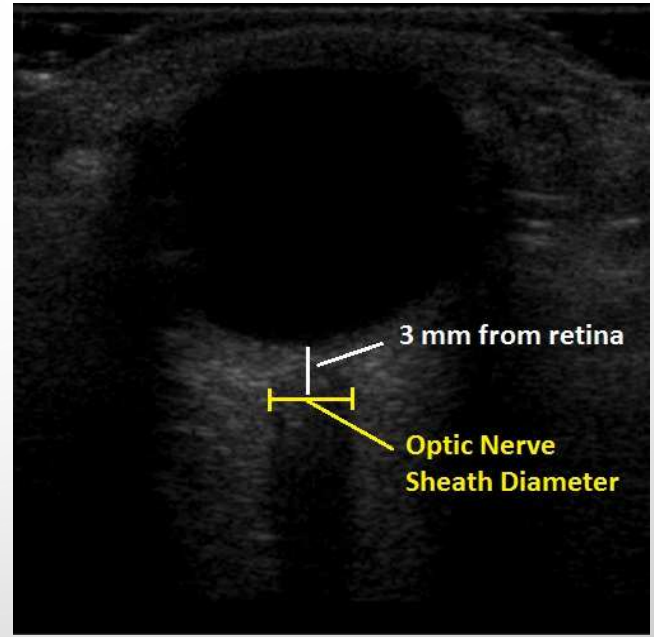
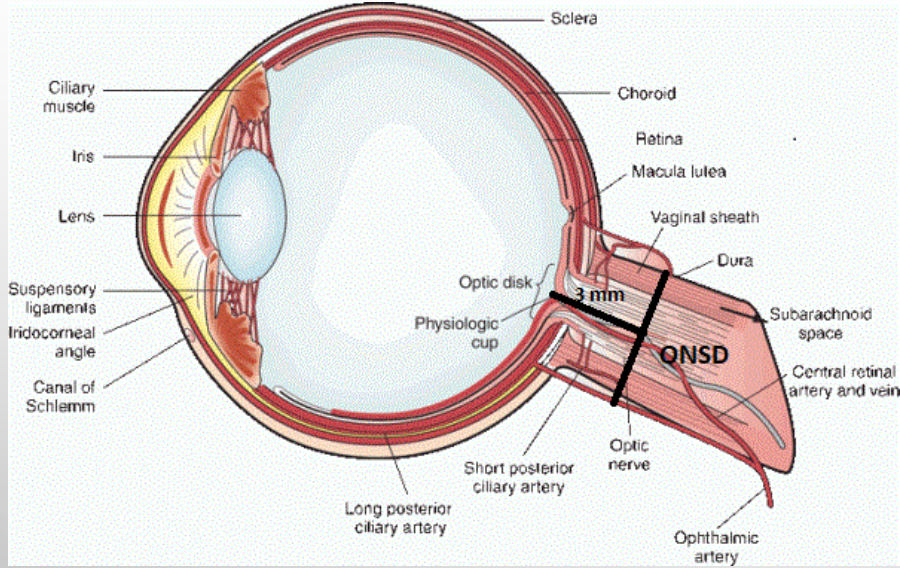


Fig. 1. Horizontal schematic section through eye and orbit illustrates dynamic scanning of optic nerve showing its maximal thickness along different sections behind the globe. Refraction of the sound beam toward the nerve surface allows the display of true acoustic cross sections. Note that sound propagation is just schematically drawn, which – between posterior ocular wall and optic nerve – may not correspond to real propagation (see text). Usually probe is placed at temporal ocular surface as shown in picture; occasionally, optic nerve winds behind globe in such a way that probe placement on nasal side is more effective.

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OPTIC NERVE SHEATH DIAMETER



POCUS v PNP lineární sonda +
nastavení modu měkké tkáně
POCUS v UM lineární sonda 7 - 13
MHz



Studies evaluating ONSD in healthy subjects.

Study	n	Range of ONSD values (mm)	Mean ONSD (mm)	Change in standard protocol
Anas, Nigeria [10]	400	3.36–5.1	4.18	
Ballantyne et al., UK [11]	50	2.5–4.1	–	
Chan and Mok, Hong Kong [12]	100	3.7–4.7	4.05	
Hansen et al., Germany [13]	20	2.9–4.3	3.6	
Garcia et al., USA [14]	32	3.9–5.9	4.8	
Maude et al., Bangladesh [15]	136	4.24–4.83	4.41 (median)	3-dimensional ultrasound C-scan imaging technique 15 MHz ultrasound probe, 12.5% subjects were aged ≤ 16
Soldatos et al., Greece [5]	26	2.2–4.9	3.6	
Shirodkar et al., India [16]	41	–	4.6 (females) 4.8 (males)	10 MHz linear array probe used
Chen et al., China [17]	519	4.7–5.4	5.1 (median)	12–3 MHz linear array probe used
Present study, India Paediatric population	16	2.9–4.1	3.4	
Ballantyne et al., UK [18]	102	2.1–4.3	3.08	
Newman et al., UK [3]	102	2.1–4.3	3.1	
Malayeri et al., Iran [19]	78	2–4.35	3.3	
Helmke et al., Germany [20]	39	2.7–4.0	–	
Beare et al., Malawi [21]	30	2.8–4.4	3.6	

Studies giving cutoff value for ONSD to diagnose raised ICP.

Study	Country	Type of study	n	Cutoff value for ONSD to diagnose raised ICP	Sensitivity and specificity (in %)
Kimberley et al., 2008 [8]	USA	Prospective observational study	15	5 mm	Sensitivity – 88 Specificity – 93
Geeraerts et al., 2007 [1]	France	Observational study	31	5.7 mm	Sensitivity – 100 Specificity – 68
Karakitsos et al., 2006 [2]	Greece	Case control study	54	5.9 mm	Sensitivity – 65 Specificity – 74
Blaivas et al., 2003 [22]	USA	Observational study	35	5 mm	Sensitivity – 100 Specificity – 95
Sahoo and Agrawal, 2013 [23]	India	Prospective observational	20	6.3 mm	Sensitivity – 100 Specificity – 72.7
Rajjee et al., 2011 [4]	USA	Prospective blinded observational study	65	4.8 mm	Sensitivity – 96 Specificity – 94
Soldatos et al., 2008 [5]	Greece	Prospective case control study	50	5.7 mm	Sensitivity – 74.1 Specificity – 100
Qayyum and Ramlakhan, 2013 [24]	UK	Prospective observational study	24	5 mm	Sensitivity – 100 Specificity – 75
Major et al., 2011 [25]	UK	Prospective observational study	26	5 mm	Sensitivity – 86 Specificity – 100
Mehrpour et al., 2015 [26]	Iran	Cross-sectional study	32	Right – 5.95 Left – 5.86	Sensitivity – 100 Specificity – 83
Tayal et al., 2007 [27]	USA	Observational study	59	5.0 mm	Sensitivity – 100 Specificity – 63
Beare et al., 2008 [21]	Malawi	Prospective case control study	14	4.2 mm	Sensitivity – 100 Specificity – 86
Amini et al., 2013 [28]	Iran	Descriptive prospective study	50	5.5 mm	Sensitivity – 100 Specificity – 100
Goel et al., 2008 [29]	India	Prospective, blinded, observational study	100	5 mm	Sensitivity – 98.6 Specificity – 92.8
Paediatric population Newman et al., 2002 [3]	UK	Case control study	23	4.0 mm (< 1 year) 4.5 mm (> 1 year)	–
Le et al., 2009 [30]	USA	Prospective case study	64	4.0 mm (< 1 year) 4.5 mm (older children)	Sensitivity – 83 Specificity – 38

ONSD: optical nerve sheath diameter; ICP: intracranial pressure.

Autoři	Typ studie	Cutoff > 20 mm Hg
Cardim et al., 2018	prosp-interv	5,95
Çanakçı et al., 2018	prosp-observ	5,5
Liu et al., 2017	prosp-observ	5,6
Komut et al., 2016	prosp-observ	5,3
Munawar et al., 2019	prosp-observ	5,8
Kim et al., 2018	meta-analýza	5



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Original Contribution

The quantitative evaluation of intracranial pressure by optic nerve sheath diameter/eye diameter CT measurement☆☆☆

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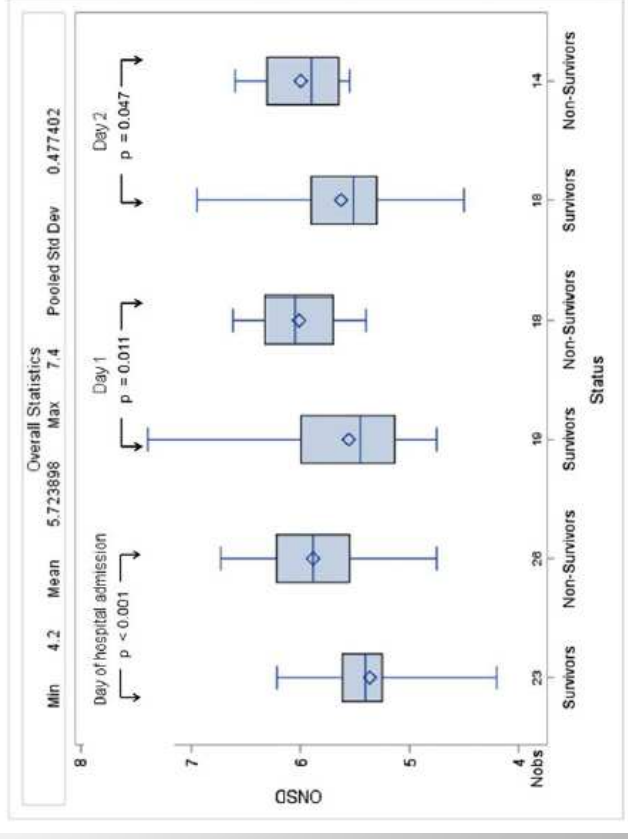
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The most accurate readings are obtained for the group with ICP readings in the range 15 to 30 mm Hg with strong ONSD/ICP correlation and linear regression. Greater than 30 to 32 mm Hg, the regression become nonlinear most probably because the elasticity and extensibility of the dura mater introduce limitations that slow down the further enlargement of the ONSD. We suggest using a coefficient of 1.3 for 30 to

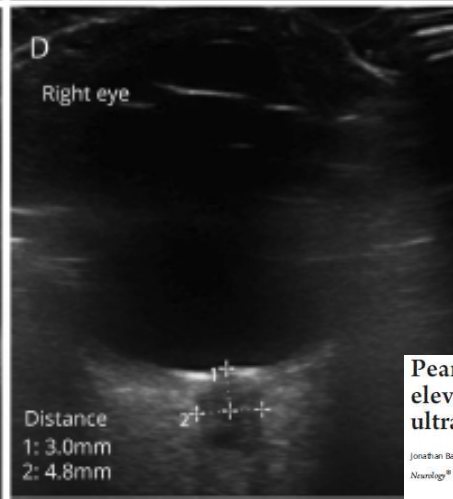
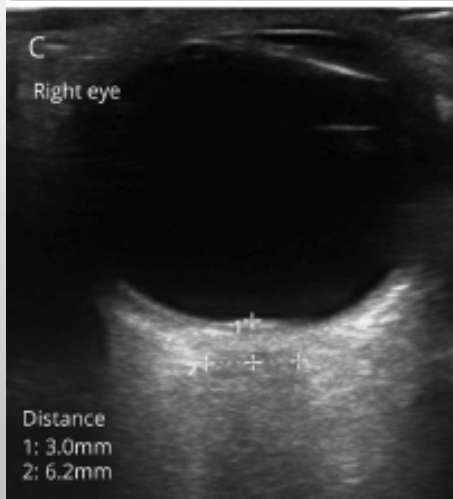
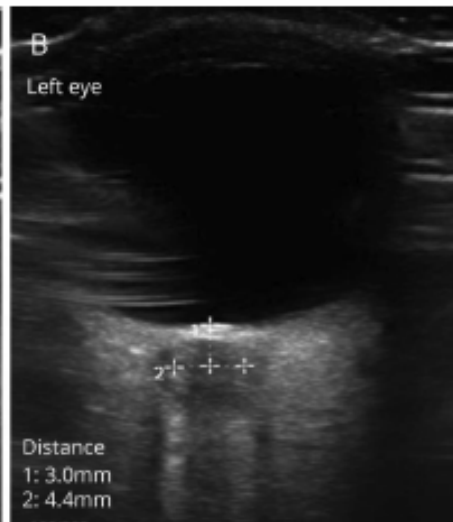
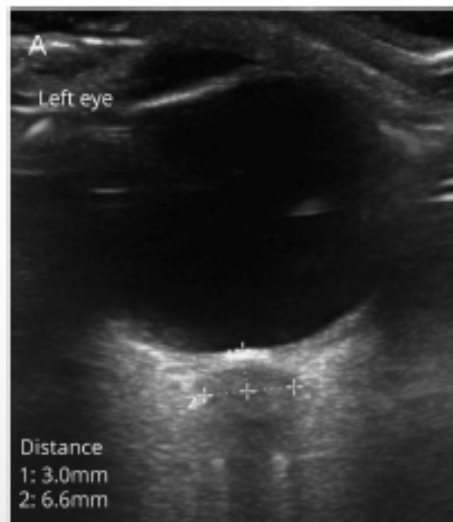
Transorbital Sonography for Early Prognostication of Hypoxic-Ischemic Encephalopathy After Cardiac Arrest

Michael Ertl, Sarah Weber, Gertrud Hammel, Christoph Schroeder, Christos Krogias

From the Clinic for Neurology and Neurophysiology, Klinikum Augsburg, Augsburg, Germany (ME, SW, CK); Chair and Institute of Environmental Medicine, UNIKA-T, Technical University of Munich and Helmholtz Zentrum München, Augsburg, Germany; CK-CARE, Christine Kühne - Center for Allergy and Research and Education, Davos, Switzerland (GH); and Department of Neurology, Medical Faculty, St. Josef-Hospital, Ruhr University Bochum, Bochum, Germany (CS).



MONITORACE EFEKTU HYPERTONICKÉHO ROZTOKU NaCl



Pearls & Oysters: Diagnosis and monitoring of elevated intracranial pressure through ultrasound of the optic nerve

Jonathan Bar, MD, Jon Rosenberg, MD, Wilma Chan, MD, and Nova Panebianco, MD
Neurology 2019;92:299-301. doi:10.1212/WNL.0000000000006888

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RESEARCH

Open Access




Military trainees can accurately measure optic nerve sheath diameter after a brief training session

Joseph Betcher^{1*}, Torben K. Becker², Peter Stoyanoff³, Jim Cranford⁴ and Nik Theyyanni⁵

Table 1 Comparison between subjects with repeat measurements

Group	Eye	Mean ± SD	95% Confidence Interval
Trainee	R	0.461 ± 0.014	0.433–0.490
	L	0.457 ± 0.012	0.432–0.482
Expert	R	0.465 ± 0.014	0.437–0.494
	L	0.465 ± 0.012	0.440–0.490

Quality And Feasibility of Sonographic Measurement of the Optic Nerve Sheath Diameter to Estimate the Risk of Raised Intracranial Pressure After Traumatic Brain Injury in Prehospital Setting

Charles-Henri Houzé-Cerfon , MD, Vincent Bounes , PhD, Johanna Guemon , MD, Thibault Le Gourrierec , MD & Thomas Geeraerts , PhD

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Prospektivně observační studie
Medián délky vyšetření 4 minuty

SHRNUTÍ

- SNADNÁ A NEINVAZIVNÍ METODA IDENTIFIKACE PACIENTA S INTRAKRANIÁLNÍ HYPERTENZÍ
- LZE JI PROVÁDĚT OPAKOVANĚ
- V KONTEXTU KLINICKÉHO STAVU PACIENTA JE JIŽ ROZMĚR ONSD ≥ 5 MM ASOCIOVÁN SE VZESTUPEM INTRAKRANIÁLNÍHO TLAKU NAD 20 MMHG
- KONTRAINDIKACÍ VYŠETŘENÍ JE PENETRUJÍCÍ PORANĚNÍ OČNÍHO BULBU



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Děkuji za pozornost



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