

Bölüm 14

OPTİK SİNİR KILIF ÇAPI ÖLÇÜMÜNÜN ANESTEZİDE KULLANIM ALANLARI

Ahmet BEŞİR¹
Ali AKDOĞAN²

GİRİŞ

İntrakraniyal hipertansiyon, klinik semptomlar, görüntüleme yöntemleri ve oftalmolojik bulgular kullanılarak tespit edilebilen acil bir durumdur. İntrakraniyal hipertansiyonu tespitinde altın standart, intrakranial basıncın (İKB) invaziv yöntemlerle ölçülmesi olarak kabul edilir. İnvaziv yöntemlerle yapılan yöntemlerde özellikle kanama veya enfeksiyon gibi hayatı tehdit edici komplikasyonlar görülebilmektedir. Bu nedenle son yıllarda İKB'nin tespitinde transkraniyal doppler sonografi, manyetik rezonans (MR), beyin tomografisi (BT) ve ultrasonografi (USG) eşliğinde optik sinir kılıf çapı (OSKÇ) ölçümleri gibi invazif olmayan yöntemler geliştirilmiştir. OSKÇ ölçümleri sıklıkla hastanede yatan veya yoğun bakımdaki hastalarda artmış İKB'nin tespitinde invazif olmayan, güvenilir bir yöntem olarak kullanılmıştır. Son yıllarda intraoperatif dönemde seri OSKÇ ölçümleri ile postoperatif dönemde morbiditenin azaltılabileceği de gösterilmiştir.

Bu bölümde, son yıllarda İKB'nin tespitinde yaygın olarak kullanılan ONSD ölçüm tekniğini ve anestezideki yeni klinik uygulamalarını sunuyoruz.

OPTİK SİNİR KILIFI ÇAPI ÖLÇÜM TEKNİĞİ

Optik sinir, beynin ventriküler sistemine bağlı olan beyin omirilik sıvısı (BOS) ile çevrilidir. Optik sinirin kılıfı, subaraknoid boşlukta BOS'u sınırlayan dura, araknoid ve pia materden oluşur. Bu nedenle, artan İKB'nin bu boşluklara basıncı ilemesine bağlı olarak OSKÇ'da da bir artış meydana gelmektedir. Özellikle, azalmış İKB'de azalmış ONSD ölçümleri ise bu düşüncenin tersi yönünde bir korelasyona bağlı olarak beklenen bir sonuçtur¹⁻³.

1 Doç Dr, Karadeniz Teknik Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon AD, ahmetbesir61@gmail.com

2 Dr Öğr Üyesi, Karadeniz Teknik Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon AD, draliakdogan@yahoo.com

KAYNAKLAR

1. Rohr A, U Jensen, C Riedel, et al. MR imaging of the optic nerve sheath in patients with craniospinal hypotension. *AJNR Am J Neuroradiol.* 2010;31:1752–1757. <https://doi.org/10.3174/ajnr.2014;15:123–132>. <https://doi.org/10.1089/ham.2013.1151>
2. Wilson MH, Wright A, Imray CH. Intracranial pressure at altitude. *High Alt Med Biol.* 2018;19(3):195–199. doi: 10.29399/npa.22883. eCollection 2019 Sep.
3. Beşir A, Tertemiz OF, Akdoğan A, et al. The Importance of Optic Nerve Sheath Diameter in Post-dural Puncture Headache Diagnosis and Follow-up. *Noro Psikiyatr Ars.* 2018;20;56(3):195–199. doi: 10.29399/npa.22883. eCollection 2019 Sep.
4. Lochner P, Behnke S, Fassbender K, et al Simulation and experimental characterization of lateral imaging resolution of ultrasound systems and assessment of system suitability for acoustic optic nerve sheath diameter measurement. *J Neuroimaging.* 2019;29:34–41. <https://doi.org/10.1111/jon.12578>
5. Lochner P, Coppo L, Cantello R, et al. Intra- and interobserver reliability of transorbital sonographic assessment of the optic nerve sheath diameter and optic nerve diameter in healthy adults. *J Ultrasound.* (2016);19:41–45. <https://doi.org/10.1007/s40477-014-0144-z>.
6. Copetti R, Cattarossi L. Optic nerve ultrasound: artifacts and real images. *Intensive Care Med.* 2009;35:1488–1489; author reply 1490–1481. <https://doi.org/10.1007/s00134-009-1494-4>.
7. Helmke K, Hansen HC. Fundamentals of transorbital sonographic evaluation of optic nerve sheath expansion under intracranial hypertension II. Patient study. *Pediatr Radiol.* 1996;26(10):706–710. doi: 10.1007/BF01383384.
8. Ertl M, F Barinka, E Torika, et al. Ocular color-coded sonography—a promising tool for neurologists and intensive care physicians. *Ultraschall Med.* 2014;35:422–431. <https://doi.org/10.1055/s-0034-1366113>
9. Geeraerts T, Merceron S, Benhamou D, et al. Non-invasive assessment of intracranial pressure using ocular sonography in neurocritical care patients. *Intensive Care Med.* 2008;34(11):2062–2067.
10. Kimberly HH, Shah S, Marill K, et al. Correlation of optic nerve sheath diameter with direct measurement of intracranial pressure. *Acad Emerg Med.* 2008;15(2):201–204.
11. Geeraerts T, Launey Y, Martin L, et al. Ultrasonography of the optic nerve sheath may be useful for detecting raised intracranial pressure after severe brain injury. *Intensive Care Med.* 2007;33(10):1704–1711.
12. Moretti R, Pizzi B. Optic nerve ultrasound for detection of intracranial hypertension in intracranial hemorrhage patients: confirmation of previous findings in a different patient population. *J Neurosurg Anesthesiol.* 2009;21(1):16–20.
13. Gravendal J, Rosendahl K. Cerebral biometry at birth and 4 and 8 months of age. Aprospective study using US. *Pediatr. Radiol.* 2010;40:1651–1656.
14. D Amico D, Curone M, Ciasca P, et al. Headache prevalence and clinical features in patients with idiopathic intracranial hypertension (IIH). *Neurol Sci.* 2013;34(Suppl 1):S147–S149. <https://doi.org/10.1007/s10072-013-1388-7>
15. Friedman DI, Liu GT, Digre KB. Revised diagnostic criteria for the pseudotumor cerebri syndrome in adults and children. *Neurology.* 2013;81:1159–1165. <https://doi.org/10.1212/WNL.2013.81.1159>
16. Lochner P, Fassbender K, Knodel S, et al. B-mode transorbital ultrasonography for the diagnosis of idiopathic intracranial hypertension: a systematic review and meta-analysis. *Ultraschall Med.* 2019;40(2):247–252. doi: 10.1055/a-0719-4903.
17. Lochner P, Fassbender K, Lesmeister M, et al. Ocular ultrasound for monitoring pseudotumor cerebri syndrome. *J Neurol.* 2018;265:356–361. <https://doi.org/10.1007/s00415-017-8699-1>
18. Headache Classification Committee of the International Headache Society (IHS) The international classification of headache disorders, 3rd edition. *Cephalalgia.* (2018) 38:1–211. <https://doi.org/10.1177/0333102417738202>
19. Dubost C, Le Gouez A, Zetlaoui PJ, et al. Increase in optic nerve sheath diameter induced by epidural blood patch: a preliminary report. *Br J Anaesth.* 2011;107:627–630. <https://doi.org/10.1093/bja/aer186>

20. Nabeta HW et al (2014) Accuracy of noninvasive intraocular pressure or optic nerve sheath diameter measurements for predicting elevated intracranial pressure in cryptococcal meningitis. *Open Forum Infect Dis.* 2014 Oct 11;1(3):ofu093. doi: 10.1093/ofid/ofu093. eCollection 2014 Dec.
21. Sangani SV, Parikh S. Can sonographic measurement of optic nerve sheath diameter be used to detect raised intracranial pressure in patients with tuberculous meningitis? A prospective observational study. *Indian J Radiol Imaging.* 2015;25:173–176. <https://doi.org/10.4103/0971-3026.155869>
22. Goldfrank LR. Mushrooms. In: Hoffman RS, Howland MA, Lewin NA, Nelson LS, Goldfrank LR, editors. *Goldfrank's Toxicologic Emergencies.* 9 ed. New York: McGraw-Hill; 2011. p.1522-36.
23. Gül F, Sayan I, Arıkan H. The Role of Transocular Ultrasound in the Assessment of Neurotoxicity-Related Encephalopathy in Mushroom Poisoning *Turk J Anaesthesiol Reanim.* 2020;48(1):62-67. doi: 10.5152/TJAR.2019.37891. Epub 2019 Oct 8.
24. Newman WD, Hollman AS, Dutton GN, et al. Measurement of optic nerve sheath diameter by ultrasound: a means of detecting acute raised intracranial pressure in hydrocephalus. *Br J Ophthalmol.* 2002;86:1109–1113
25. Block HS, Biller J. Neurology of pregnancy. *Handb Clin Neurol.* 2014;121:1595–1622. <https://doi.org/10.1016/B978-0-7020-4088-7.00105-X>
26. Brzan SG, Ambrozic J, Prokselj K, et al. M Ocular ultrasonography for diagnosing increased intracranial pressure in patients with severe preeclampsia. *Int J Obstet Anesth.* 2018;36:49–55. <https://doi.org/10.1016/j.ijoa.2018.06.005>
27. Chelly J, Deye N, Guichard JP, et al The optic nerve sheath diameter as a useful tool for early prediction of outcome after cardiac arrest: a prospective pilot study. *Resuscitation.* 2016;103:7–13. <https://doi.org/10.1016/j.resuscitation.2016.03.006>
28. Ueda T, Ishida E, Kojima Y, et al. Sonographic optic nerve sheath diameter: a simple and rapid tool to assess the neurologic prognosis after cardiac arrest. *J Neuroimaging.* 2015;25:927–930. <https://doi.org/10.1111/jon.12246>.
29. Ertl M, Weber S, Hammel G, et al. Transorbital sonography for early prognostication of hypoxic-ischemic encephalopathy after cardiac arrest. *J Neuroimaging.* 2018;28:542–548. <https://doi.org/10.1111/jon.12528>
30. Thompson DN, Harkness W, Jones B, et al. Subdural intracranial pressure monitoring in craniostomosis: its role in surgical management. *Childs Nerv Syst* 1995;11:269–275.
31. Bortcosh W, Shaahinfar A, Sojar S, et al. New directions in point-of-care ultra-sound at the crossroads of paediatric emergency and critical care. *Curr. Opin. Pediatr.* 2018;30:350–358.
32. Noordin S, McEwen JA, Kragh JF Jr, et al. Surgical tourniquets in orthopaedics. *J Bone Joint Surg Am.* 2009;91(12):2958–2967.
33. Sparling RJ, Murray AW, Choksey M. Raised intracranial pressure associated with hypercarbia after tourniquet release. *Br J Neurosurg.* 1993;7(1):75–77.
34. Hirst RP, Slee TA, Lam AM. Changes in cerebral blood flow velocity after release of intraoperative tourniquets in humans: a transcranial Doppler study. *Anesth Analg.* 1990;71(5):503–510.
35. Besir A, Tugcugil E. Does Tourniquet Time or Pressure Contribute to Intracranial Pressure Increase following Tourniquet Application? *Med Princ Pract.* 2019;28(1):16-22. doi: 10.1159/000495110.
36. Beşir A, Tuğcugil E. Effects of tourniquet usage in lower extremity surgery on optic nerve sheath diameter. *Turk J Med Sci.* 2018;48(5):980-984. doi: 10.3906/sag-1803-132.
37. Cooke SJ, Paterson-Brown S. Association between laparoscopic abdominal surgery and postoperative symptoms of raised intracranial pressure. *Surg Endosc.* 2001;15:723–725.
38. Besir A, Tugcugil E. Comparison of different end-tidal carbon dioxide levels in preventing postoperative nausea and vomiting in gynaecological patients undergoing laparoscopic surgery. *J Obstet Gynaecol.* 2020;12:1-8. doi: 10.1080/01443615.2020.1789961.

39. Kim MS, Bai SJ, Lee JR, et al. Increase in intracranial pressure during carbon dioxide pneumoperitoneum with steep trendelenburg positioning proven by ultrasonographic measurement of optic nerve sheath diameter. *J Endourol.* 2014;28:801–806. <https://doi.org/10.1089/end.2014.0019>
40. C Robba, D Cardim, J Donnelly, et al. Effects of pneumoperitoneum and Trendelenburg position on intracranial pressure assessed using different non-invasive methods. *Br J Anaesth.* 2016;117:783–791. <https://doi.org/10.1093/bja/aew356>