

Bölüm 9

İNTRAOPERATİF NÖROMONİTORİZASYON VE MENİNGOMELOSELLİ HASTALARDA KULLANIMI

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Giriş

Geçmişten günümüze kadar insanoğlunun hayatında önemli bir yer tutan teknoloji, hayatın hemen hemen her alanında kullanılmakta ve gelişmeye devam etmektedir. Teknolojinin gelişmesi tıp alanında da etkisini göstermektedir. Oldukça riskli olan cerrahi girişimsel işlemlerin riskleri teknolojinin yardımıyla anlamlı olarak azalmaktadır. Bu durum cerraha konfor, hastaya daha iyi bir klinik sonuç sağlamakla beraber ağır hastalığın getireceği mali külfeti de azaltmaktadır.

Nöral tüp defektleri görülme sıklığı dünya genelinde her 1000 doğumda 1 ile 10 arasında değişmektedir. Meningomeloser, nöral tüp defektlerinin %90'ını oluşturmaktadır. Primer tedavisi, cerrahi girişimle defektin kapatılmasıdır (1). İntrooperatif nöromonitorizasyonun son dekatlarda kullanım sıklığı artmaktadır. Modern IONM'de Somatosensoryal Uyarılmış Potansiyel (SEP) ile başlayan modalite günümüzde Motor Uyarılmış Potansiyel (MEP), Free-Running Elektromyelografi (frEMG) ve stimulation EMG (sEMG) gibi modaliteler de kullanım alanlarına göre eklenerek multimodal olarak yapılmaktadır (2).

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KAYNAKLAR

1. Au KS, Ashley-Koch A, Northrup H. Epidemiologic and genetic aspects of spina bifida and other neural tube defects. *Dev Disabil Res Rev.* 2010;16(1):6-15.
2. Laratta JL, Ha A, Shillingford JN, et al. Neuromonitoring in Spinal Deformity Surgery: A Multimodality Approach. *Global Spine J.* 2018;8(1):68-77.
3. Song RB, Glass EN, Kent M. Spina Bifida, Meningomyelocele, and Meningocele. *Vet Clin North Am Small Anim Pract.* 2016;46(2):327-45.
4. Boulet SL, Yang Q, Mai C, et al. Trends in the postfortification prevalence of spina bifida and anencephaly in the United States. *Birth Defects Res A Clin Mol Teratol.* 2008;82(7):527-32.
5. Kshettry VR, Kelly ML, Rosenbaum BP, et al. Myelomeningocele: surgical trends and predictors of outcome in the United States, 1988-2010. *J Neurosurg Pediatr.* 2014;13(6):666-78.
6. Guille JT, Sarwark JF, Sherk HH, et al. Congenital and developmental deformities of the spine in children with myelomeningocele. *J Am Acad Orthop Surg.* 2006;14(5):294-302.
7. Boyles AL, Billups AV, Deak KL, et al. Neural tube defects and folate pathway genes: family-based association tests of gene-gene and gene-environment interactions. *Environ Health Perspect.* 2006;114(10):1547-52.
8. Greene ND, Stanier P, Copp AJ. Genetics of human neural tube defects. *Hum Mol Genet.* 2009;18(R2):R113-29.
9. Kellogg R, Lee P, Deibert CP, et al. Twenty years' experience with myelomeningocele management at a single institution: lessons learned. *J Neurosurg Pediatr.* 2018;22(4):439-43.
10. North T, Cheong A, Steinbok P, et al. Trends in incidence and long-term outcomes of myelomeningocele in British Columbia. *Childs Nerv Syst.* 2018;34(4):717-24.
11. Sahni M, Alsaleem M, Ohri A. Meningomyelocele. *StatPearls.* Treasure Island (FL)2020.
12. Flynn JM, Sakai DS. Improving safety in spinal deformity surgery: advances in navigation and neurologic monitoring. *Eur Spine J.* 2013;22 Suppl 2:S131-7.
13. Gertsch JH, Moreira JJ, Lee GR, et al. Practice guidelines for the supervising professional: intraoperative neurophysiological monitoring. *J Clin Monit Comput.* 2019;33(2):175-83.
14. Takata Y, Sakai T, Higashino K, et al. State of the art: Intraoperative neuromonitoring in spinal deformity surgery. *J Med Invest.* 2015;62(3-4):103-8.
15. Katharina Ritzl E. Is intraoperative neuromonitoring a good idea in my practice? *Neurol Clin Pract.* 2012;2(2):146-50.
16. Lee JM, Kim DH, Kim HS, et al. The Applicability of Intraoperative Neuromonitoring in Patients with Preoperative Motor Weakness during Spine Surgery. *Korean J Spine.* 2016;13(1):9-12.
17. Dawson GD. A summation technique for detecting small signals in a large irregular background. *J Physiol.* 1951;115(1):2p-3p. Epub 1951/09/01. PubMed PMID: 14889435.
18. Nash CL, Jr., Lorig RA, Schatzinger LA, et al. Spinal cord monitoring during operative treatment of the spine. *Clin Orthop Relat Res.* 1977(126):100-5.
19. Kundnani VK, Zhu L, Tak H, et al. Multimodal intraoperative neuromonitoring in corrective surgery for adolescent idiopathic scoliosis: Evaluation of 354 consecutive cases. *Indian J Orthop.* 2010;44(1):64-72.
20. Banoub M, Tetzlaff JE, Schubert A. Pharmacologic and physiologic influences affecting sensory evoked potentials: implications for perioperative monitoring. *Anesthesiology.* 2003;99(3):716-37.

21. Seyal M, Mull B. Mechanisms of signal change during intraoperative somatosensory evoked potential monitoring of the spinal cord. *J Clin Neurophysiol.* 2002;19(5):409-15.
22. Merton PA, Morton HB. Stimulation of the cerebral cortex in the intact human subject. *Nature.* 1980;285(5762):227.
23. Patton HD, Amassian VE. Single and multiple-unit analysis of cortical stage of pyramidal tract activation. *J Neurophysiol.* 1954;17(4):345-63.
24. Szelenyi A, Kothbauer KF, Deletis V. Transcranial electric stimulation for intraoperative motor evoked potential monitoring: Stimulation parameters and electrode montages. *Clin Neurophysiol.* 2007;118(7):1586-95.
25. Sala F, Palandri G, Basso E, et al. Motor evoked potential monitoring improves outcome after surgery for intramedullary spinal cord tumors: a historical control study. *Neurosurgery.* 2006;58(6):1129-43; discussion -43.
26. MacDonald DB. Overview on Criteria for MEP Monitoring. *J Clin Neurophysiol.* 2017;34(1):4-11.
27. Pajewski TN, Arlet V, Phillips LH. Current approach on spinal cord monitoring: the point of view of the neurologist, the anesthesiologist and the spine surgeon. *Eur Spine J.* 2007;16 Suppl 2:S115-29.
28. Holland NR. Intraoperative electromyography. *J Clin Neurophysiol.* 2002;19(5):444-53.
29. Schirmer CM, Shils JL, Arle JE, et al. Heuristic map of myotomal innervation in humans using direct intraoperative nerve root stimulation. *J Neurosurg Spine.* 2011;15(1):64-70.
30. Cabrera JP, Vigueras S, Munoz R, et al. Double neurophysiological certification of the filum terminale during sectioning surgery in pediatric population. *Surg Neurol Int.* 2020;11:229.
31. Nichols GS, Manafov E. Utility of electromyography for nerve root monitoring during spinal surgery. *J Clin Neurophysiol.* 2012;29(2):140-8.