

Sedasyonda Monitörizasyon

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Monitör kelimesi, Latince “**hatırlatmak**” anlamına gelen “**monere**” sözcüğünden gelmektedir. Günümüzde “vücudun işlevini yakından ve sürekli olarak gözlemlerek ve değerlendirmek ya da “**anestezi uygunlanmış bir hastada ya da cerrahi veya herhangi bir girişim geçiren hasta-da, solunum, kalp atım hızı (KAH), kalp ritmi, kan basıncı gibi fizyolojik verileri otomatik olarak kaydeden bir aygit**” anlamında kullanılmaktadır. Bir terim olarak “**monitörizasyon**” hastaya bağlanan teknolojik cihazlar ile fizyolojik parametrelerin zamana bağlı olarak ölçülmesi demektir (1). Kavram olarak ise gözlemci ile hastanın fizyolojisi, müdahalelere ne şekilde cevap verdiği arasındaki bağlantıyı anlatan daha geniş bir anlama sahiptir. Bu kavramda izlemenin bir süreç olduğu ve gözlemcinin hastanın mevcut iyi durumunun sürdürülmesinde veya değişikliklerinde uyarılma işlevini yerine getirdiği açıklar. Buna ek olarak, izleme sürecinin verimliliği, kullanılan monitörün tipine, işlev kabiliyetine ve gözlemcinin monitörün sağladığı bilgileri yorumlama ve bunlara göre hareket etme yeteneğine bağlı olacaktır. Bu nedenle tek başına monitörün kullanılması ile değil, monitörden elde edilen verilerin etkin yorumlanması ile izleme süreci amacına ulaşacaktır.

Hastaların fizyolojik durumlarının çok hızlı değişimleri GA ve sedasyon uygulamaları sırasında bu fonksiyonların monitörize edilerek izlenmesi sorunların erken saptanmasına ve hızla düzeltici faaliyetlerin yapılabilmesine olanak tanır. Bu amaçla kullanılan mekanik ve elektronik monitörler iyi birer kaynaktır ve hayatı organların bütünlüğünü, dokuların uygun perfüzyonunu ve oksijenlenmesini gözlemede yararlı bilgiler sağlayabilir (2). Monitörizasyonun, perioperatif dönemde tüm olumsuz olayları veya kazaları önlemede değilse de, hataların sonuçlarını tespit ederek ve hastanın durumunun kötüleştiğine dair erken uyarı vererek hasta güvenliğini artırdığına dair kanıtlar vardır (3, 4). İzleme süreci, temel olarak “**veri toplama**”, hastanın belirti ve bulgularının dikkatle **gözlemlenmesi** ve moni-

Kaynaklar

1. Watts J: Safe Sedation for All Practitioners. A Practical Guide. Radcliffe Publishing, CRC Press Taylor & Francis Group, New York, 2008.
2. Merchant R, Chartrand D, Dain S, Dobson G, Kurrek MM, et al. Canadian Anesthesiologists' Society: Guidelines to the practice of anesthesia-revised edition 2015. *Can J Anaesth.* 2015;62(1):54-67.
3. Watkinson PJ, Barber VS, Price JD, Hann A, Tarassenko L, et al. A randomised controlled trial of the effect of continuous electronic physiological monitoring on the adverse event rate in high risk medical and surgical patients. *Anaesthesia.* 2006;61(11):1031-1039.
4. Hagan KB, Thirumurthi S, Gottumukkala R, Vargo J. Sedation in the Endoscopy Suite. *Curr Treat Options Gastroenterol.* 2016;14(2):194-209.
5. Association of Anaesthetists of Great Britain and Ireland. Recommendations for Standards of Monitoring During Anaesthesia and Recovery, 4th Edn. London: AAGBI, 2007. www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf
6. Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018: A Report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. *Anesthesiology.* 2018;128(3):437-479.
7. Erika GP, Maria AA, Sergio DB. Patient monitoring, equipment, and intravenous fluids. In: Moderate and Deep Sedation in Clinical Practice. Richard DU, Alan DK., eds., Cambridge University Press, New York, pp 57-76, 2012.
8. Webster A, Brady W, Morris F. Recognising signs of danger: ECG changes resulting from an abnormal serum potassium concentration. *Emerg Med J.* 2002;19:74-77.
9. Hillel Z, and Thys DM. Electrocardiography. In: *Anesthesia.* Miller RD., ed., Churchill Livingston, Philadelphia, PA, pp 1231-1254, 2000.
10. Tremper KK. Patient Monitoring During Sedation. In: *Sedation and analgesia for diagnostic and therapeutic procedures.* Malviya S, Naughton NN, Tremper KK., eds., Humana Press Inc., Totowa, New Jersey, pp 191-218, 2003.
11. London MJ, Hollenberg M, Wong MG, Levenson L, Tubau JF, et al. Intraoperative myocardial ischemia: localization by continuous 12-lead electrocardiography. *Anesthesiology.* 1988;69(2):232-241.
12. Knill RL, Gelb AW. Peripheral chemoreceptors during anesthesia: are the watchdogs sleeping? *Anesthesiology.* 1982;57(3):151-152.
13. Sharma VK, Nguyen CC, Crowell MD, Lieberman DA, de Garmo P, et al. A national study of cardiopulmonary unplanned events after GI endoscopy. *Gastrointest Endosc.* 2007;66(1):27-34.
14. Agostoni M, Fanti L, Gemma M, Pascullo N, Beretta L, et al. Adverse events during monitored anesthesia care for GI endoscopy: an 8-year experience. *Gastrointest Endosc.* 2011;74(2):266-275.
15. Ludbrook GL, Russell WJ, Webb RK, Klepper ID, Currie M. The Australian Incident Monitoring Study. The electrocardiograph: applications and limitations—an analysis of 2000 incident reports. *Anaesth Intensive Care.* 1993;21(5):558-564.

16. Tobias JD. Caudal epidural block: test dosing and recognition of systemic injection in children. *Anesth Analg.* 2001;93(5):1156–1161.
17. Manavi MV. Lipid infusion as a treatment for local anesthetic toxicity: a literature review. *AANA J.* 2010;78(1):69–78.
18. Krauss B. Monitoring for Procedural Sedation. In: *Emergency Sedation and Pain Management*. Burton JH, Miner J, eds., Cambridge University Press, New York, pp 152-158, 2008.
19. De Silva A. Anesthetic monitoring. In: *Basics of Anesthesia*. Stoelting RK, Miller RD, eds., Churchill Livingstone, Philadelphia, pp 305–316, 2007.
20. Fleegler EW, Houck CS. Monitoring for Procedural Sedation. In: *Procedural Sedation for Infants, Children, and Adolescents*. Tobias JD, Cravero JP, eds., American Academy of Pediatrics, IL, USA, pp 43-60, 2016.
21. American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology* 2002;96:1004–1017.
22. Pickering TG. Principles and techniques of blood pressure measurement. *Cardiol Clin.* 2002;20:207–223.
23. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42:1206–1252.
24. Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, et al. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004-BHS IV. *J Hum Hypertens.* 2004;18:139–185.
25. Tobias JD, Leder M. Procedural sedation: a review of sedative agents, monitoring, and management of complications. *Saudi J Anaesth.* 2011;5(4):395–410.
26. Kako H, Corridore M, Rice J, Tobias JD. Accuracy of the CNAP™ monitor, a noninvasive continuous blood pressure device, in providing beat-to-beat blood pressure readings in pediatric patients weighing 20-40 kilograms. *Paediatr Anaesth.* 2013;23(11):989–993.
27. Wilkinson JN, Thanawala VU. Thoracic impedance monitoring of respiratory rate during sedation—is it safe? *Anaesthesia*. 2009;64(4):455–456.
28. Patino M, Redford DT, Quigley TW, Mahmoud M, Kurth CD, et al. Accuracy of acoustic respiration rate monitoring in pediatric patients. *Paediatr Anaesth.* 2013;23(12):1166–1173.
29. St John RE. End-tidal carbon dioxide monitoring. *Crit Care Nurse.* 2003;23:83–88.
30. Motas D, McDermott NB, VanSickle T, Friesen RH. Depth of consciousness and deep sedation attained in children as administered by nonanaesthesiologists in a children's hospital. *Paediatr Anaesth.* 2004;14(3):256–260.
31. Chernik DA, Gillings D, Laine H, Hendler J, Silver JM, et al. Validity and reliability of the Observer's Assessment of Alertness/Sedation Scale: study with intravenous midazolam. *J Clin Psychopharmacol.* 1990;10(4):244–251.
32. Macnab AJ, Levine M, Glick N, Susak L, Baker-Brown G. A research tool for measurement of recovery from sedation: the Vancouver Sedative Recovery Scale. *J Pediatr Surg.* 1991;26(11):1263–1267.
33. Malviya S, Voepel-Lewis T, Tait AR, Merkel S, Tremper K, et al. Depth of sedation in children undergoing computed tomography: validity and reliability of the University of Michigan Sedation Scale (UMSS). *Br J Anaesth.* 2002;88(2):241–245.

34. McDermott NB, VanSickle T, Motas D, Friesen RH. Validation of the bispectral index monitor during conscious and deep sedation in children. *Anesth Analg.* 2003;97(1):39–43.
35. Mason KP, Michna E, Zurakowski D, Burrows PE, Pirich MA, et al. Value of bispectral index monitor in differentiating between moderate and deep Ramsay Sedation Scores in children. *Paediatr Anaesth.* 2006;16(12):1226–1231.
36. Powers KS, Nazarian EB, Tapyrik SA, Kohli SM, Yin H, et al. Bispectral index as a guide for titration of propofol during procedural sedation among children. *Pediatrics.* 2005;115(6):1666–1674.
37. McDermott NB, VanSickle T, Motas D, Friesen RH. Validation of the bispectral index monitor during conscious and deep sedation in children. *Anesth Analg.* 2003;97(1):39–43.
38. Malviya S, Voepel-Lewis T, Ludomirsky A, Marshall J, Tait AR. Can we improve the assessment of discharge readiness? A comparative study of observational and objective measures of depth of sedation in children. *Anesthesiology.* 2004;100(2):218–224.
39. Gill M, Green SM, Krauss B. A study of the Bispectral Index Monitor during procedural sedation and analgesia in the emergency department. *Ann Emerg Med.* 2003;41(2):234–241.
40. Bower AL, Ripepi A, Dilger J, Boparai N, Brody FJ, et al. Bispectral index monitoring of sedation during endoscopy. *Gastrointest Endosc.* 2000;52:192–196.
41. Hrelec C, Puente E, Bergese S, Dzwonczyk R. SNAP II versus BIS VISTA monitor comparison during general anesthesia. *J Clin Monit Comput.* 2010;24:283–288.
42. Galvagno SM, Kodali B. Patient monitoring. In: *Anesthesia Outside of the Operating Room.* Urman R, Gross W, Philip BK, eds., Oxford University Press, Oxford, pp 20–27, 2011.
43. Basheim G, and Syrovy G. Burns associated with pulse oximetry during magnetic resonance imaging. *Anesthesiology.* 1991;75:382–383.
44. Shellock FG, and Shellock VJ. Cardiovascular catheters and accessories: ex vivo testing of ferromagnetism, heating, and artifacts associated with MRI. *J Magn Resonance Imaging.* 1998;8(6):1338–1342.