

Faruk DANIŞ<sup>1</sup>  
Bülent ERBİL<sup>2</sup>

## GİRİŞ

Hedefe yönelik yatak başı ultrasonografinin (YBUS) avantajı özellikle hızlı bilginin esas olduğu kritik hastalarda görülmektedir. YBUS kalp yetmezliği, akut miyokard iskemisi, masif pulmoner emboli ve kardiyak tamponad dahil olmak üzere birçok şok nedeninin ve tipinin hızlı teşhisini kolaylaştırabilir. Benzer şekilde bu kullanım alanlarının birçoğu kardiyak arrest hastada da uygulanabilir, arrestin geri dönüşümlü nedenlerini tespit edebilir, organize kardiyak aktiviteyi görselleştirebilir ve arrest hastasının yönetimine yardımcı olabilir (1). Kardiyak arrest hastalarının resüsitasyonu esnasında YBUS'un kullanılması birçok kılavuz ve çalışmalarda önerilmektedir (2-4). YBUS resüsitasyonun yönetimine rehberlik eder, nedene yönelik tedavileri yönlendirir ve hastaların acil servise girdikleri andan taburcu olana kadar izlenmesine yardımcı olur (5).

Kardiyak arrest sonrası sağ kalım ile ilişkili faktörlerin, erken defibrilasyon ve etkin KPR ile şoklanabilir bir ritmin varlığına bağlı olduğu kanıtlanmıştır. 2020 Amerikan Kalp Derneği (AHA) İleri Kardiyak Yaşam Desteği (İKYD) Kılavuzu önerilerinde geri döndürülebilir nedenlere yö-

nelik müdahalelerin sağ kalımı iyileştirdiği vurgulanmaktadır (6). Nabızlı bir ritim ile başvuran hastalar için hayatta kalma oranı %40 iken, nabızsız elektriksel aktivite (NEA) ile başvuranlarda prognoz çok daha kötüdür ve bu oran %1,3-2.4 arasındadır (7, 8). NEA veya asistoli durumunda geri dönüşümlü bir neden tespit edildiğinde bu oran önemli ölçüde artar. Kardiyak tamponadlı hastada perikardiyosentez sonrasında hayatta kalma oranı %15,5'e çıkar. Yine masif pulmoner emboli hastalarında tedavi ile hayatta kalma oranı %6,7'ye yükselir (8).

## KARDİYAK ULTRASONOGRAFİ İLE TESPİT EDİLEBİLECEK GERİ DÖNDÜRÜLEBİLİR NEDENLER

İKYD kılavuzlarında arrest hastalarda altta yatan nedeni belirlemek ve tedavi etmek üzerine de odaklanılmıştır (9, 10). Kardiyak arrestin geri döndürülebilir nedenleri arasında hipoksi, hipovolemi, asidoz, hipo-hiperkalemi, hipotermi, tansiyon pnömotoraks, perikardiyal tamponad, akut miyokard enfarktüsü, pulmoner emboli ve toksinler bulunur. Kardiyak arrestte resüsitasyon sürecini aksatmadan İKYD protokolüyle birlikte

<sup>1</sup> Uzm. Dr. Faruk DANIŞ, Hacettepe Üniversitesi Tıp Fakültesi Acil Tıp AD., farukdanis@gmail.com

<sup>2</sup> Doç. Dr. Bülent ERBİL, Hacettepe Üniversitesi Tıp Fakültesi Acil Tıp AD., gantoerbil@gmail.com

prosedürün risk-fayda oranı olumludur. Bununla birlikte, muayene öncesinde hastanın kontrendikasyonları olmadığından emin olmak önemlidir.

## KAYNAKLAR

- Herbst MK, O'Rourke MC. Cardiac Ultrasound. StatPearls. Treasure Island (FL): StatPearls Publishing LLC.; 2020.
- Perera P, Mailhot T, Riley D, Mandavia D. The RUSH exam: Rapid Ultrasound in SHock in the evaluation of the critically ill. *Emerg Med Clin North Am.* 2010;28(1):29-56, vii.
- Atkinson PR, McAuley DJ, Kendall RJ, Abeyakoon O, Reid CG, Connolly J, et al. Abdominal and Cardiac Evaluation with Sonography in Shock (ACES): an approach by emergency physicians for the use of ultrasound in patients with undifferentiated hypotension. *Emerg Med J.* 2009;26(2):87-91.
- Blanco P, Martínez Buendía C. Point-of-care ultrasound in cardiopulmonary resuscitation: a concise review. *Journal of Ultrasound.* 2017;20(3):193-8.
- Ultrasound Guidelines: Emergency, Point-of-Care and Clinical Ultrasound Guidelines in Medicine. *Ann Emerg Med.* 2017;69(5):e27-e54.
- Panchal AR, Bartos JA, Cabañas JG, Donnino MW, Drennan IR, Hirsch KG, et al. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation.* 2020;142(16\_Suppl\_2):S366-S468.
- Gardner KF, Clattenburg EJ, Wroe P, Singh A, Mantuani D, Nagdev A. The Cardiac Arrest Sonographic Assessment (CASA) exam - A standardized approach to the use of ultrasound in PEA. *Am J Emerg Med.* 2018;36(4):729-31.
- Gaspari R, Weekes A, Adhikari S, Noble VE, Nomura JT, Theodoro D, et al. Emergency department point-of-care ultrasound in out-of-hospital and in-ED cardiac arrest. *Resuscitation.* 2016;109:33-9.
- Hernandez C, Shuler K, Hannan H, Sonyika C, Likourezos A, Marshall J. C.A.U.S.E.: Cardiac arrest ultrasound exam--a better approach to managing patients in primary non-arrhythmogenic cardiac arrest. *Resuscitation.* 2008;76(2):198-206.
- Breitkreutz R, Walcher F, Seeger FH. Focused echocardiographic evaluation in resuscitation management: concept of an advanced life support-conformed algorithm. *Crit Care Med.* 2007;35(5\_Suppl):S150-61.
- Long B, Alerhand S, Maliel K, Koyfman A. Echocardiography in cardiac arrest: An emergency medicine review. *Am J Emerg Med.* 2018;36(3):488-93.
- Bolvardi E, Pouryaghobi SM, Farzane R, Chokan NMJ, Ahmadi K, Reihani H. The Prognostic Value of Using Ultrasonography in Cardiac Resuscitation of Patients with Cardiac Arrest. *Int J Biomed Sci.* 2016;12(3):110-4.
- Blaivas M. Transesophageal echocardiography during cardiopulmonary arrest in the emergency department. *Resuscitation.* 2008;78(2):135-40.
- Blyth L, Atkinson P, Gadd K, Lang E. Bedside Focused Echocardiography as Predictor of Survival in Cardiac Arrest Patients: A Systematic Review. *Academic Emergency Medicine.* 2012;19(10):1119-26.
- Tsou P-Y, Kurbedin J, Chen Y-S, Chou EH, Lee M-TG, Lee MC-H, et al. Accuracy of point-of-care focused echocardiography in predicting outcome of resuscitation in cardiac arrest patients: A systematic review and meta-analysis. *Resuscitation.* 2017;114:92-9.
- Testa A, Cibinel GA, Portale G, Forte P, Giannuzzi R, Pignataro G, et al. The proposal of an integrated ultrasonographic approach into the ALS algorithm for cardiac arrest: the PEA protocol. *Eur Rev Med Pharmacol Sci.* 2010;14(2):77-88.
- Atkinson P, Bowra J, Milne J, Lewis D, Lambert M, Jarman B, et al. International Federation for Emergency Medicine Consensus Statement: Sonography in hypotension and cardiac arrest (SHoC): An international consensus on the use of point of care ultrasound for undifferentiated hypotension and during cardiac arrest. *Cjem.* 2017;19(6):459-70.
- Damjanovic D, Schroder T, Breitkreutz R. The acronym of resuscitation ultrasound: RCC - Resume chest compressions! *Resuscitation.* 2018;127:A1-a3.
- Breitkreutz R, Price S, Steiger HV, Seeger FH, Ilper H, Ackermann H, et al. Focused echocardiographic evaluation in life support and peri-resuscitation of emergency patients: A prospective trial. *Resuscitation.* 2010;81(11):1527-33.
- Lichtenstein DA. How can the use of lung ultrasound in cardiac arrest make ultrasound a holistic discipline. The example of the SESAME-protocol. *Med Ultrason.* 2014;16(3):252-5.
- Lichtenstein D, Malbrain ML. Critical care ultrasound in cardiac arrest. Technological requirements for performing the SESAME-protocol--a holistic approach. *Anaesthesiol Intensive Ther.* 2015;47(5):471-81.
- Clattenburg EJ, Wroe P, Brown S, Gardner K, Losonczy L, Singh A, et al. Point-of-care ultrasound use in patients with cardiac arrest is associated prolonged cardiopulmonary resuscitation pauses: A prospective cohort study. *Resuscitation.* 2018;122:65-8.
- Huis In 't Veld MA, Allison MG, Bostick DS, Fisher KR, Goloubeva OG, Witting MD, et al. Ultrasound use during cardiopulmonary resuscitation is associated with delays in chest compressions. *Resuscitation.* 2017;119:95-8.
- O'Rourke MC, Mendenhall BR. Transesophageal Echocardiogram (TEE). StatPearls. Treasure Island (FL): StatPearls Publishing StatPearls Publishing LLC.; 2020.
- Sengupta PP, Khandheria BK. Transoesophageal echocardiography. *Heart.* 2005;91(4):541-7.
- Practice guidelines for perioperative transesophageal echocardiography. An updated report by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Transesophageal Echocardiography. *Anesthesiology.* 2010;112(5):1084-96.
- Hahn RT, Abraham T, Adams MS, Bruce CJ, Glas KE, Lang RM, et al. Guidelines for performing a comprehensive transesophageal echocardiographic examination:

- recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists. *J Am Soc Echocardiogr.* 2013;26(9):921-64.
28. Memtsoudis SG, Rosenberger P, Loffler M, Eltzschig HK, Mizuguchi A, Shernan SK, et al. The usefulness of transesophageal echocardiography during intraoperative cardiac arrest in noncardiac surgery. *Anesth Analg.* 2006;102(6):1653-7.
  29. Arntfield R, Pace J, Hewak M, Thompson D. Focused Transesophageal Echocardiography by Emergency Physicians is Feasible and Clinically Influential: Observational Results from a Novel Ultrasound Program. *J Emerg Med.* 2016;50(2):286-94.
  30. Hwang SO, Zhao PG, Choi HJ, Park KH, Cha KC, Park SM, et al. Compression of the left ventricular outflow tract during cardiopulmonary resuscitation. *Acad Emerg Med.* 2009;16(10):928-33.
  31. Fair J, Tonna J, Ockerse P, Galovic B, Youngquist S, McKellar SH, et al. Emergency physician-performed transesophageal echocardiography for extracorporeal life support vascular cannula placement. *Am J Emerg Med.* 2016;34(8):1637-9.
  32. Arntfield R, Pace J, McLeod S, Granton J, Hegazy A, Lingard L. Focused transesophageal echocardiography for emergency physicians-description and results from simulation training of a structured four-view examination. *Crit Ultrasound J.* 2015;7(1):27.
  33. Byars DV, Tozer J, Joyce JM, Vitto MJ, Taylor L, Kayagil T, et al. Emergency Physician-performed Transesophageal Echocardiography in Simulated Cardiac Arrest. *West J Emerg Med.* 2017;18(5):830-4.
  34. Guidelines for the Use of Transesophageal Echocardiography (TEE) in the ED for Cardiac Arrest. *Ann Emerg Med.* 2017;70(3):442-5.
  35. Fair J, Mallin M, Mallema H, Zimmerman J, Arntfield R, Kessler R, et al. Transesophageal Echocardiography: Guidelines for Point-of-Care Applications in Cardiac Arrest Resuscitation. *Ann Emerg Med.* 2018;71(2):201-7.
  36. Prabhu M, Raju D, Pauli H. Transesophageal echocardiography: instrumentation and system controls. *Ann Card Anaesth.* 2012;15(2):144-55.