BÖLÜM
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MULTİPL TRAVMALI HASTAYA YAKLAŞIM

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Travma; akut olarak mekanik, termal, elektrik veya kimyasal enerji nedeniyle oluşan yaralanma olarak tanımlanırken; en az iki major sistem (göğüs, kafa gibi) veya bir major iki mönör sistem (ekstremite kırıkları gibi) yaralanmaları ise multibl travma olarak tanımlanmaktadır. En sık nedenleri trafik kazaları, düşmeler, ateşli veya delici-kesici alet yaralanmaları, boğulmalar, yangın ve afetlerdir. Batı ülkelerinde trafik kazaları, düşmeler ve daha az sıklıkta saldırılardan kaynaklanan şiddetli künt travmalar yaygındır. ABD, Güney Afrika ülkerinde ise bıçaklama, ateşli veya delici-kesici alet yaralanmalarından kaynaklanan travmalarla karşılaşılmaktadır (1). Travma, kazaların ve şiddet olaylarının katkısıyla mortalite ve morbidite oranlarını arttıran önemli bir sağlık sorunudur. Olguların büyük kısmı, ağır veya multibl travmalarla yoğun bakıma alınmaktadır. Dünya sağlık örgütünün (DSÖ) 2015 yılı ölüm verilerine göre tüm dünyadaki ölümlerin %8.8'ini travma kaynaklı yaralanmalar oluşturmaktadır (2). Multitravmaya bağlı ölümlerin %34-76'sı olay yerinde yada hastaneye nakil sırasında gerçekleşmektedir. Kafa travması ve hemorajik şok acil ve erken travma kaynaklı ölümlerinin en önemli iki nedenidir (3).

Travmaya bağlı ölümler üç farklı dönemde artış göstermektedir. İlk artış hastane öncesi (kafa ve vasküler yaralanmalar) dönemde, ikinci artış dönemi acil servise ulaştıktan sonraki (major kafa, toraks ve abdominal yaralanmalar) dakikalar-saatler içerisinde ve üçüncü artış dönemi ise yoğun bakım ünitesinde (sistemik inflamatuar yanıt sendromu (SIRS), sepsis ve çoklu organ disfonksiyon sendromu (MODS)) gerçekleşen ölümlerdir. Bu dönemlerde artan ölümlerin önlenebilmesinde kanıta dayalı resüsitasyon uygulamalarının yapılması önerilmektedir (4). Travma hastalarında doğru triaj, hızlı ve doğru değerlendirme, doğru tanı ve zamanında müdahalenin yapılması ile mortalite ve morbidite oranında ciddi azalma sağlanabilir.

TRAVMA HASTALARINDA TRİAJ

Triaj akut hayati tehlikesi olan hastalardan hayati tehlikesi olmayan hastaları ayırmaktır. Birden fazla travma hastasının olduğu olaylarda triaj çok önemlidir. Hastanın değerlendirilmesi yaralanma yerinde ya da hastanede yapılabilir. Olay yerinde havayolu açık tutulmalı ve dışarıya olan kanamalar mümkün olduğunca kontrol altı-

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yen dönemlerde cerrahi sonrasında ölümcül üçlü olan asidoz, hipotermi ve koagülopatinin önlenmesi amacı ile yoğun bakımda da kullanılmaya devam edildi (73). Bu yaklaşım travma noktasından ameliyathane ve yoğun bakıma kadar devam etmektedir. HKS; hemoraji kontrolü, primisif hipotansiyon/hipovolemi ve travmatik koagülopatinin önlenmesi veya düzeltilmesi şeklinde üç bileşenden oluşmaktadır. HKS ile koagülopati riski olan hemorajik şok hastalarının tespiti, mümkün olan ez az sıvı resüsitasyonu ile permisif hipotansiyon sağlanırken hemodilüsyondan kaçınılması, endotelyumu korumak, oksijen taşıma kapasitesini devam ettirmek, hızlı cerrahi kontrolün sağlanması, masif transfüzyon planlanan hastalara 1:1:1 oranında ES, TDP ve TS verilmesi, hipotermi, asidoz ve koagülapatinin kontrol altına alınması, rFVIIa ve fibrinojen içeren üürnlerin uygun şekilde verilmesi esas alınmaktadır (74-77). Yapılan bir çalışmada laparotomi uygulanan 390 travma hastasında HKS stratejisi uygulananlarda yoğun bakıma nakledildiklerinde asidoz, hipotermi ve koagülopatinin görülme sıklığının daha az olduğu, 24 saat ve 30 günlük sağkalım oranlarının daha yüksek olduğu gösterilmiştir (77).

KAYNAKLAR

1. Trunkey DD. Trauma. Sci Am. 1983;249:20–7.
2. World Health Organization. Global healthestimates (GHE). 2015;2:68-74.
3. Keel M, and Trentz O. "Pathophysiology of polytrauma." Injury. 2005;36:691-709.
4. Cameron P, Knapp BJ. Trauma in adults. In: tintinalli JE, Ma OJ, Yealy DM, Merkler GD, Cline DM, eds. Tintinalli's Emergency Medicine A comprehensive Study Guide. 8 th Ed. New York: Mc Graw Hill Education. 2016:1681-8.
5. Oktay C. Multiple Travmalı hastaya yaklaşım ve son gelişmeler. Acil tıp dergisi. 2000;1:73-95.
6. Cairo SB, Fisher M, Clemency B, Cipparone C, Quist E, Bass KD. Prehospital education in triage for pediatric and pregnant patients in aregional trauma system without collacated pediatric and adult trauma centers. Journal of Pediatric Surgery. 2018;53:1037-41.
7. Committee on Trauma, American College of Surgeons. Advanced Trauma Life Support (ATLS) Program for Doctors: Student Course Manual. 8th ed. Chicago: American College of Surgeons, 2008;1:10.
8. Glick DB, Cooper RM, Ovassapian A, editors. The difficultairway: an atlas oftools and techniques for clinical management. New York: Springer Science. 2013:21-23.
9. Salvino, CK, Dries, D, Gamelli, R, Murphy-Macabobby, M, Marshall, W. Emergency cricothyroidotomy in trauma victims. J Trauma. 1993;34:503–5.
10. Janjua KJ, Sugrue M, Deane SA. Prospective evaluation of early missed injuries and the role of tertiary trauma survey. J Trauma. 1998;44:1000–6.
11. Munoz-Sanchez MA, Murillo-Cabezas F, Cayuela-Domínguez A, et al. Skull fracture, with or without clinical signs, in mTBI is an independent risk marker for neurosurgically relevant intracranial lesion: a cohort study. Brain Inj. 2009;23 (1):39-44.
12. Özbudak E, Arıkan AA, Yavuz S. Toraks travmalarında vasküler yaralanmalara genel bakış. Yücel O, (editör). Ankara : Derman Tıbbi Yayıncılık, 2013:186-203.
13. Karamanoğlu İS. Toraks Travmasında Anestezi. Yücel O, editör. Toraks Travmaları ve Tedavisi. Ankara: Derman Tıbbi Yayıncılık, 2013:33-43.
14. Coleman J, Zarzaur BL. Surgecal managment of abdominal trauma. hollow viscus Injury. Surg Clin A Am. 2017;97:1107-17.
15. Sharma P, Agarwal A, Patel AH, Shah JK, Champaneri HA. Management of Cases of Blunt Trauma Abdomen at the Peripheral Health Care Facility Level—A Suggested Protocol.Journal of Health Management. 2016;18:182-7.
16. Poole GV, Ward EF. Causes of mortality in patients with pelvic fractures. Orthopedics. 1994;17(8):691-6
17. Dente CJ, Feliciano DV, Rozycki GS, Wyrzykowski AD, Nicholas JM, Salomone JP, et al. The outcome of open pelvic fractures in the modern era. Am J Surg. 2005;190(6):830-5.
18. Demetriades D, Karaiskakis M, Velmahos GC, Alo K, Murray J, Chan L. Pelvic fractures in pediatric and trauma patients: are they different injuries? J Trauma. 2003;54(6):1146-51.
19. Dechert TA, Duane TM, Frykberg BP, Aboutanos MD, Malhotra AK, Ivatury RR. Elderly patients with pelvic fracture: interventions and outcomes. Am Sung. 2009;75(4):291-5.
20. Cothren CCP, Moore EE, Morgan SJ, Johnson JL, Smith WR. Preperitoneal pelvic packing for he-

modynamically unstable pelvic fractures. J Trauma. 2007;62(4):843-9.
21. Salim A, Teixeira PG, Dubose J, Ottochian M, Inaba K, Margulies DR, et al. Predictors of possitive angiogrphy in pelvic fractures: aprospective study. J Am Coll Surg. 2008;207(5):656-62.
22. Committee on Trauma, American College of Surgeons. Advanced Trauma Life Support (ATLS) Program for Doctors: Student Course Manual. 9th ed. Chicago: American College of Surgeons. 2012;96-99.
23. American College of Surgeons. Advanced Trauma Life Support (ATLS). Advenced Trauma Life Support. 10th ed. Chicago: American College of Surgeons. 2018:138-144.
24. Oyar O, Gürsoy U. Politravmalı hastalara radyolojik yaklaşım. Sürekli tıp eğitim dergisi. 2002;2:67-8.
25. Branney SW, Moore EE, Cantrill SV, et al. Ultrasound based key clinical pathway reduces the use of hospital resources for the evaluation of blunt abdominal trauma. J Trauma. 1997;42:1086–90.
26. Nordenholz KE, Rubin MA, Gularte GG, et al. Ultrasound in the evaluation and management of blunt abdominal trauma. Ann Emerg Med. 1997;29:357–66.
27. Hicketheir T, Mammadov K, Lichtenstein t, Hinkelbein J, Smth L, Plum SP, et al. Wholebody computed tomography in trauma patients: optimization of the patient scanning position significantly shortnes examination time while maintaining diagnosstic image quality. Therapeutics and Clinical Risk Managment. 2018;14:849-59.
28. Thelin EP, Nelson DW, Vehvilainen J, Nystörm H, Kivisaari R, Silironen J. Evaluatiton of novel computerized tomography scoring systems in human traumatic brain injury: An observational, multicenter study. PLOS medicine. 2017;14(8).
29. Örgüç, Ş., Demirpolat, G., Alçin, F., Gürgan, U. Aort patolojilerinin değerlendirilmesinde helikal bilgisayarlı tomografi ve 3-D görüntüleme metotlarının tanıya katkısı. Türk Göğüs Kalp Damar Cerrahisi Dergisi. 1999;7:270-5.
30. Ng AK, Simons RK, Torreggiani WC, et al. Intraabdominal free fluid without solid organ injury in blunt abdominal trauma: an indication for laparotomy. J Trauma. 2002;52:1134–40.
31. Mayglothling J, Duana TM, Gibbs M, McCunn M, Legome E, Eastman AL. E mergency tracheal intubation immediately following traumatic injury: an Eastern Association fort he Surgery of Trauma practice management guideline. Journal of Trauma and Acute Care Surgery. 2012;73(5):333-40.
32. Hudson AJ, Strandenes G, Bjerkvig CK, Svaneik M, Glassberg E. Airway and ventilation management strategies for hemorrhagic shock. To tube, or not to tube, that is the question! Journal of trauma and Acute Care Surgery. 2018;84(6):77-82.
33. Kovacs G, Sowers N. Airway Management in Trauma. Emergency medicine clicine of North America. 2018;36(1):61-84.
34. Vincent, J.L. and D. De Backer, Circulatory shock. N Engl J Med, 2013. 369(18):1726-34.
35. De Backer, D., et al., Comparison of dopamine and norepinephrine in the treatment of shock. N Engl J Med. 2010;362(9):779-89.
36. Parrillo JE, Dellinger RP. Principles of Diagnosis and Management in the Adult. 4 ed. Philadelphia: Elsevier Inc. 2014:327-8.
37. Kalter, E.S., et al., Effects of methylprednisolone on P50, 2,3 diphosphoglycerate and arteriovenous oxygen difference in acute myocardial infarction. Circulation. 1980;62(5):970-974.
38. Gorgas LD, McgGrath JL. Vital Signs and Patient Monitoring Techniques. In:Roberts CT, Hedges JR. Clinical Procedures in Emergency Medicine. Phihadelphia: Elsevier Inc, 2010:1-21.
39. Hebert PC et al. Clinical consequence of anemia and red cell transfusion in the critically ill. Crit Care Clin. 2004;20:225-235.
40. Cecconi M, De Backer D, Antonelli M, Beale R, Bakker J, Hofer C et al. Consensus on circulatory shock and hemodynamic monitoring. Task force of the european socienty of intensive care Medicine. Intensive Care Med. 2014;40(12):1795-815.
41. Longo DL, Kasper DL, Jameson L, Fauci AS, Hauser SL, Loscalzo J. Harrison's Principles of Internal Medicine. 18th edition, New York: McGraw Hill Education Medical, 2012: 2222.
42. Longo DL, Kasper DL, Jameson L, Fauci AS, Hauser SL, Loscalzo J. Harrison's Principles of Internal Medicine. 18th edition, New York: McGraw Hill Education Medical, 2012:1612.
43. Kahl JE, Calvo RY, Sise MJ, Sise CB, Thorndike JF, Shackford SR. The changing nature of death on the trauma service. J Trauma Acute Care Surg. 2013; 75(2):195-201.
44. Turtay MD. Nörojenik Şok. 7th. Malatya: Europan Congress of Emergency Medicine, 2012:12.
45. Singer MD, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA 2016: 315(8):801-810.

46. James MF. Volume therapy in trauma anda neurotrauma. Best Pract Res Clin Anaesthesiol. 2014;28(3):285-96.
47. Jacob M, Chappeli D. Reappraising Starling: the physiology of the microcirculation. Curr Opin Crit Care. 2013;19:282-9.
48. Chappell D, Brettner F, Doerfler N, Jacop M, Rehm M –Bruegger D, et al. Protection of glycocalyx decreases platelet adhesion after ischaemia/reperfusion: an animal study. European J Anaesth. 2014;31(9):474-81.
49. Hess JR, Brohi K, Dutton RP, Hauser CJ, Holcomb JB, Kluger Y, et al. The coagulopathy of trauma: A review of mechanismis. J Trauma. 2008;65:778-54.
50. Egea-Guerrero JJ, Freire-Aragon MD, Serrano-Lazaro A, Quintana-Diaz M; Grupo de Trabajo de Trauma y Neurointensivismo de SEMICYUC. Resuscitativa goal and new strategies in severe trauma patient resuscitation. Med Intensiva. 2014;38:502-12.
51. MacDonald RD. Articles That May Change Your Practice: Hypertonic Fluid Resuscitation in Trauma. Air Med J. 2018;37(1):18-9.
52. Sterm SA. Low-volume fluid resuscitation for preumed hemorrhagic shock: helpful or harmful? Curr Opin Crit Care. 2001;7:422-430.
53. ATLS Suncommittee; American College of Surgeons Commite on Trauma; Internanional ATLS working group. Advanced trauma life support (ATLS): the ninth edition. J Trauma Acute Care Surg. 2013;74(5):1363-6.
54. Catrambone JE, He W, Prestigiacoma CJ, Mclntosh TK, Carmel PW, Maniker A. The use of hypertonic saline in the tratment of posttraumatic cerebral edema: a review. Eur J Trauma Emerg Surg. 2008;34:397-409.
55. Hashiguchi N, Lum L, Romeril E, Chen Y, Yip L, Hoyt DB, et al. Hypertonic saline resuscitation: efficacy may require early treatment in severely injured patients. J Trauma. 2007;62:299-306.
56. Finfer S, Bellomo R, Boyce N, et al. A comparison of albumin and saline for fluid resuscitation in the intensive care unit. N Engl J Med. 2004;350:2247–56.
57. Pham HP, Shaz BH. Update on massive transfusion. Br J Anaesth. 2013;111(1):71-82.
58. Nunez TC, Voskresensky IV, Dossett LA, et al. Early prediction of massive transfusion in trauma: simple as ABC (assessment of blood consumption)?. J Trauma. 2009;66:346-52.
59. Hauser CJ, Boffard K, Dutton R, et al. Results of Control trial: efficacy and safety of recombinant activated factor VII in the management of refractory traumatic hemorrhage. J Trauma. 2010;69:489–500.
60. CRASH 2 Trial Collaborators. Effect of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant hemorrhage (CRASH-2): a randomised placebo-controlled trial, Lancet. 2011;376:23–32.
61. Shaz BH, Dente CJ, Nicholas J et all.Increased number of coagulation products in relationship to red blood cell products transfused improves mortality in trauma patients. Transfusion. 2010;50(2):493-500.
62. Prat NJ, Meyer AD, Ingalls NK et all. Rotational thromboelastometry significantly optimizes transfusion practices for damage control resuscitation in combat casualties. J Trauma Acute Care Surg. 2017: 83:373-380.
63. Holcomb JB, Tilley BC, Baraniuk S, et al."Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial." JAMA. 2015;313(5):471-482.
64. Rossaint r, Bouilion B, Cerny V, Coats TJ, Duranteau J, Fernandez-Mondejar E, et al. The European guideline on management of major bleeding and coagulopathy following trauma: fourty edition. Crit Care. 2016;12(20):100.
65. Maegele M, Leferinf R, Yucel N, Tjardes T, Rixen D, Paffrath T. et al. Early coagulapothy in multiple injury: an analysis from the German Truma Rsgistry on 8724 patients Injury. 2007;38(3):298-304.
66. Brohi K, Singh J, Heron M, Coats T. Acute traumatic coagulopathy. J Trauma. 2003;54(6):1127-30.
67. Cohen MJ, Call M, Nelson M, Calfee CS, Esmon CT, Brohi K, et al. Critical role of activated protein C in early coagulopathy and later organ failure, infection and deathin trauma patients. Ann Surg. 2012;255(2):379-85.
68. Morrison CA, Carrick MM, Norman MA, et al. Hypotensive resuscitation strategy reduces transfusion requirements and severe post operative coagulopathy in trauma patients with hemorrhagic shock: preliminary results of a randomized controlled trial. J Trauma. 2011;70:652–63.
69. Bickell WH, Wall MJ, Pepe PE, et al. Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries. N Engl J Med. 1994;331:1105–9.
70. Chestnut RM, Marshall LF, Klauber MR, et al. The role of secondary brain injury in determin-

ing outcome from severe head injury. J Trauma. 1993;34:216–92.
71. Wilden JN. Rapid resuscitation in severe head injury. Lancet. 1993;342:1378.
72. Brain Trauma Foundation, American Association of Neurological Surgeons, Congress of Neurological Surgeons, et al. Guidelines for the Management of Severe Traumatic Brain Injury. 3rd ed. New York: J Neurotrauma, 2007;(1):7-8.
73. Rotondo MF, Schwab CW, McGonigal MD, et al. 'Damage control': an approach for improved survival in exsanguinating penetrating abdominal injury. J Trauma. 1993;35:375–8.
74. Spinella PC, Holcomb JB. Resuscitation and transfusion principles for traumatic hemorrhagic shock. Blood Reviews. 2009;23(6):231-40.
75. Holcomb JB. Damage Control Resuscitation. The Journal of Trauma: Injury, Infection and Critical Care. 2007;62:36-7.
76. Guidry C, Gleeson E, Simms ER, et al. Initial assessment on the impact of crystalloids versus colloids during damage control resuscitation. Journal of Research. 2013;185(1):294-99.
77. Cotton BA, Reddy N, Hatch QM, et al. Damage Control Resuscitation Is Associated With a Reduction in Resuscitation Volumes and Improvement in Survival in 390 Damage Control Laparotomy Patients. Annals of Surgery. 2011;254(4):598-605.