

Bölüm 28

ÇOCUKLARDA SEPSİSTE BESLENME

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GİRİŞ

Nutrisyonel durum, kritik hastalarda klinik gidişat üzerinde etkili bir parametre olup, yoğun bakım ünitesi (YBÜ) hastalarının bu açıdan değerlendirilerek, beslenme desteğinin gereksinimle uyumlu şekilde ve doğru bir planlama ile zamanında sağlanması oldukça önemlidir (1,2).

Malnutrisyon, pediatrik YBÜ hastalarında henüz kabul esnasında dahi sıklıkla mevcut olup, YBÜ kalışı süresince kötüleşme gösteren ve müdahale edilmediği takdirde hastanede kalış süresi ve uzun vadede mortalite riskinde artışa yol açan bir durumdur (1-6).

Pediatrik YBÜ hastaları; yaş, hastalık tipi, uygulamalar, eşlik eden durumlar ve mevcut nutrisyonel durum bakımından heterojen bir popülasyon olduğu için uygulanacak beslenme desteğinin birey bazında kararlaştırılmış klinik iyileşmeyi hedefleyen bir strateji ile uygulanması gerekmektedir (1,2,7). Ayrıca, çocuklarda kritik hastalık döneminde nutrisyonel ihtiyaçlar erişkin hastalardan metabolizma ve büyüme durumları, altta yatan hastalık ve komorbid durumlar, önceden varolan enerji rezervleri (özellikle küçük bebeklerde) ve hastalık yanıtı gibi faktörler açısından farklılık gösterebilir. Bu nedenle ideal olanı, kritik hasta çocuklarda yapılan çalışmalar yolu ile elde edilecek kanıta dayalı veriler ışığında bu hasta grubuna özgü beslenme desteği kılavuzlarının geliştirilmesidir (7).

Ancak, pediatrik kritik hasta popülasyonunda beslenme desteğine yönelik kısıtlı sayıda çalışma mevcut olup, bu durum kanıta dayalı standart beslenme desteği stratejilerinin geliştirilmesini zorlaştırmaktadır (8-10). Dolayısıyla, kritik hasta çocukta beslenme desteği, bu desteğin ne zaman ve hangi formda başlanacağına

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rulmasını olanaksız kılmakta ve klinik pratik, birbirinden farklı beslenme desteği stratejileri çerçevesinde yürütülmektedir. Temel olarak, geçerli nutrisyonel durum değerlendirme yöntemlerinin geliştirilmesi, standart bir malnutrisyon tanımının kabulü, klinik sonuçlar bakımından olumlu etkisi olacak optimal enerji ve protein desteğinin belirlenmesi, aşırı destek veya yetersiz kalori desteği riskinin uygun şekilde gözetimi, erken dönem EN tedavi algoritmasının ve ek bir tedavi olarak PN uygulaması ve optimal zamanlamasının ve immunonutrisyonun klinik sonuçlar üzerine rolünün belirlenmesi gibi alanlar henüz tartışmalı olup, kanıta dayalı beslenme desteği tedavisinin uygulamaya geçebilmesi için bu alanlarda iyi tasarlanmış prospektif klinik çalışmalara ihtiyaç vardır. Pediatrik kritik hasta popülasyonu heterojen bir popülasyon olduğu için beslenme desteğinin özellikle sepsisli çocukların her bir hastalık dönemine (erken, resüsitasyon sonrası, stabilizasyon, YBÜ çıkışı) özgü spesifik ve dinamik ihtiyaçları ve eşlik eden komplikasyonlar temelinde klinik sonuçların iyileştirilmesi hedefiyle bireyselleştirilerek yapılması önemlidir.

KAYNAKÇA

1. Mehta NM, Skillman HE, Irving SY, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Pediatric Critically Ill Patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition. *Pediatr Crit Care Med.* 2017;18:675-715.
2. Hulst J, Joosten K, Zimmermann L, et al: Malnutrition in critically ill children: From admission to 6 months after discharge. *Clin Nutr.* 2004;23:223-232.
3. Wei X, Day AG, Ouellette-Kuntz H, Heyland DK. The Association Between Nutritional Adequacy and Long-Term Outcomes in Critically Ill Patients Requiring Prolonged Mechanical Ventilation: A Multicenter Cohort Study. *Crit Care Med.* 2015;43:1569-1579.
4. Hoffer LJ, Bistran BR. Appropriate protein provision in critical illness: a systematic and narrative review. *Am J Clin Nutr.* 2012;96:591-600.
5. Hoffer LJ, Bistran BR. What is the best nutritional support for critically ill patients? *Hepatobiliary Surg Nutr.* 2014;3:172-174.
6. Hulst JM, van Goudoever JB, Zimmermann LJ, et al: The effect of cumulative energy and protein deficiency on anthropometric parameters in a pediatric ICU population. *Clin Nutr.* 2004;23:1381-1389.
7. Joffe A, Anton N, Lequier L, et al. Nutritional support for critically ill children. *Cochrane Database Syst Rev.* 2016;5:CD005144.
8. ASPEN Board of directors and the clinical guidelines task force. Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. *JPEN J Parenter Enteral Nutr.* 2002;26:1-138.
9. Druyan ME, Compher C, Boullata JI, et al; American Society for Parenteral and Enteral Nutrition Board of Directors: Clinical guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients: Applying the GRADE system to development of A.S.P.E.N. clinical guidelines. *JPEN J Parenter Enteral Nutr.* 2012;36:77-80.
10. Klein S, Kinney J, Jeejeebhoy K, et al. Nutrition support in clinical practice: review of published data and recommendations for future research directions. Summary of a conference sponsored by the National Institutes of Health, American Society for Parenteral and Enteral Nutrition, and American Society for Clinical Nutrition. *Am J Clin Nutr.* 1997;66:683-706.

11. Wischmeyer PE. Nutrition Therapy in Sepsis. *Crit Care Clin.* 2018;34:107-125.
12. Gillis C, Carli F. Promoting Perioperative Metabolic and Nutritional Care. *Anesthesiology.* 2015;123:1455-1472.
13. Preiser JC, van Zanten AR, Berger MM, et al. Metabolic and nutritional support of critically ill patients: consensus and controversies. *Crit Care.* 2015;19:35.
14. Dinglas VD, Aronson Friedman L, Colantuoni E, et al. Muscle Weakness and 5-Year Survival in Acute Respiratory Distress Syndrome Survivors. *Crit Care Med.* 2017;45:446-453.
15. Alberda C, Gramlich L, Jones N, et al. The relationship between nutritional intake and clinical outcomes in critically ill patients: results of an international multicenter observational study. *Intensive Care Med.* 2009;35:1728-1737.
16. Alberda C, Gramlich L, Jones N, et al. The relationship between nutritional intake and clinical outcomes in critically ill patients: results of an international multicenter observational study. *Intensive Care Med.* 2009;35:1728-1737.
17. Nitenberg G. Nutritional support in sepsis and multiple organ failure. *Nestle Nutr Workshop Ser Clin Perform Programme.* 2003;8:223-244.
18. Wischmeyer PE. Are we creating survivors...or victims in critical care? Delivering targeted nutrition to improve outcomes. *Curr Opin Crit Care.* 2016;22:279-284.
19. Sobotka L, Soeters PB, Raguso CA, et al. Basics in Clinical Nutrition: Nutritional support in critically ill and septic patients. *e-SPEN, the European e-Journal of Clinical Nutrition and Metabolism* 2010;5:e97-e99.
20. Chwals WJ. Overfeeding the critically ill child: fact or fantasy?. *New Horizons.* 1994;2:147-155.
21. Zaloga GP, Roberts P. Permissive underfeeding. *New Horizons.* 1994;2:257-263.
22. Stroud M. Protein and the critically ill; do we know what to give?. *Proc Nutr Soc* 2007;66:378-383.
23. NASPGHAN (2011). Pediatric parenteral nutrition A comprehensive review (30 Mayıs 2019 tarihinde <https://www.naspgghan.org/files/documents/pdfs/Parenteral%20Nutrition%20Slide%20Set.pdf> adresinden ulaşılmıştır).
24. NASPGHAN (2012). Pediatric enteral nutrition A comprehensive review (30 Mayıs 2019 tarihinde <https://www.naspgghan.org/files/documents/pdfs/medicalresources/nutrition/Enteral%20Nutrition%20Slide%20Deck%20PDF%20COMPLETE-%20v12Oct2012.pdf> adresinden ulaşılmıştır).
25. Iapichino G, Assi E, Minuto A, et al. Which metabolic strategies in the early phase of injury? *Minerva Anesthesiol.* 1999;65:455-463.
26. Wolfe RR. Sepsis as a modulator of adaptation to low and high carbohydrate and low and high fat intakes. *Eur J Clin Nutr.* 1999;53 (Suppl 1):S136-142.
27. Briassoulis G, Zavras N, Hatzis T. Malnutrition, nutritional indices, and early enteral feeding in critically ill children. *Nutrition.* 2001;17:548-557.
28. Heyland DK. Nutritional support in the critically ill patient: a critical review of the evidence. *Crit Care Clin.* 1998;14:423-440.
29. Preiser JC, Chioloro R, Wernerman J. Nutrition papers in ICU patients: what lies between the lines?. *Intensive Care Med.* 2003;29:156-166.
30. van der Kuip M, Oosterveld MJ, van Bokhorst-de van der Schueren MA, et al: Nutritional support in 111 pediatric intensive care units: A European survey. *Intensive Care Med.* 2004; 30:1807-1813.
31. Schofield WN. Predicting basal metabolic rate, new standards and review of previous work. *Hum Nutr Clin Nutr.* 1985;39(Suppl 1):5-41.
32. Energy and protein requirements. Report of a joint FAO/WHO/UNU Expert Consultation. *World Health Organ Tech Rep Ser.* 1985;724:1-206.
33. Taylor RM, Cheeseman P, Preedy V, et al. Can energy expenditure be predicted in critically ill children? *Pediatr Crit Care Med.* 2003;4:176-180.
34. Framson CM, LeLeiko NS, Dallal GE, et al: Energy expenditure in critically ill children. *Pediatr Crit Care Med.* 2007;8:264-267.

35. Hardy CM, Dwyer J, Snelling LK, et al. Pitfalls in predicting resting energy requirements in critically ill children: A comparison of predictive methods to indirect calorimetry. *Nutr Clin Pract.* 2002;17:182-189.
36. Sy J, Gourishankar A, Gordon WE, et al. Bicarbonate kinetics and predicted energy expenditure in critically ill children. *Am J Clin Nutr.* 2008;88:340-347.
37. Jotterand Chaparro C, Laure Depeyre J, Longchamp D, et al. How much protein and energy are needed to equilibrate nitrogen and energy balances in ventilated critically ill children? *Clin Nutr.* 2016;35:460-467.
38. Oshima T, Deutz NE, Doig G, et al. Protein-energy nutrition in the ICU is the power couple: A hypothesis forming analysis. *Clin Nutr.* 2016;35:968-974.
39. Uehara M, Plank LD, Hill GL. Components of energy expenditure in patients with severe sepsis and major trauma: a basis for clinical care. *Crit Care Med.* 1999;27:1295-1302.
40. Kreymann G, Grosser S, Buggisch P, et al. Oxygen consumption and resting metabolic rate in sepsis, sepsis syndrome, and septic shock. *Crit Care Med.* 1993;21:1012-1019.
41. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr.* 2016;40:159-211.
42. Mehta NM, Bechard LJ, Zurakowski D, et al: Adequate enteral protein intake is inversely associated with 60-d mortality in critically ill children: A multicenter, prospective, cohort study. *Am J Clin Nutr.* 2015; 102:199-206.
43. Vanhorebeek I, Verbruggen S, Casaer MP, et al. Effect of early supplemental parenteral nutrition in the paediatric ICU: a preplanned observational study of post-randomisation treatments in the PEPaNIC trial. *Lancet Respir Med.* 2017;5:475-483.
44. Heyland DK, Dhaliwal R, Jiang X, et al. Identifying critically ill patients who benefit the most from nutrition therapy: the development and initial validation of a novel risk assessment tool. *Crit Care.* 2011; 15(6):R268.
45. Mehta NM, Bechard LJ, Cahill N, et al: Nutritional practices and their relationship to clinical outcomes in critically ill children—an international multicenter cohort study. *Crit Care Med.* 2012;40:2204-2211.
46. Wong JJ, Han WM, Sultana R, et al. Nutrition delivery affects outcomes in pediatric acute respiratory distress syndrome. *JPEN J Parenter Enteral Nutr.* 2017;41:1007-1013.
47. Pradelli L, Mayer K, Muscaritoli M, et al. n-3 fatty acid-enriched parenteral nutrition regimens in elective surgical and ICU patients: a meta-analysis. *Crit Care.* 2012; 16:R184.
48. Manzanares W, Langlois PL, Dhaliwal R, et al. Intravenous fish oil lipid emulsions in critically ill patients: an updated systematic review and meta-analysis. *Crit Care.* 2015;19:167.
49. Doig GS, Simpson F, Sweetman EA, et al. Early parenteral nutrition in critically ill patients with short-term relative contraindications to early enteral nutrition: a randomized controlled trial. *JAMA.* 2013;309:2130-2138.
50. Heidegger CP, Berger MM, Graf S, et al. Optimisation of energy provision with supplemental parenteral nutrition in critically ill patients: a randomised controlled clinical trial. *Lancet.* 2013;381:385-393.
51. Harvey SE, Parrott F, Harrison DA, et al. Trial of the route of early nutritional support in critically ill adults. *N Engl J Med.* 2014;371:1673-1684.
52. Casaer MP, Van den Berghe G. Nutrition in the acute phase of critical illness. *N Engl J Med.* 2014;370:1227-1236.
53. Novak F, Heyland DK, Avenell A, et al. Glutamine supplementation in serious illness: a systematic review of the evidence. *Crit Care Med.* 2002;30:2022-2029.
54. Poindexter BB, Ehrenkranz RA, Stoll BJ, et al.; National Institute of Child Health and Human Development Neonatal Research Network. Parenteral glutamine supplementation does not reduce the risk of mortality or late-onset sepsis in extremely low birth weight infants. *Pediatrics.* 2004;113:1209-1215.

55. Tubman TR, Thompson SW, McGuire W. Glutamine supplementation to prevent morbidity and mortality in preterm infants. *Cochrane Database Syst Rev.* 2008;1:CD001457.
56. Hamilton S, McAleer DM, Ariagno K, et al. A stepwise enteral nutrition algorithm for critically ill children helps achieve nutrient delivery goals. *Pediatr Crit Care Med.* 2014;15:583-589.
57. Petrillo-Albarano T, Pettignano R, Asfaw M, et al. Use of a feeding protocol to improve nutritional support through early, aggressive, enteral nutrition in the pediatric intensive care unit. *Pediatr Crit Care Med.* 2006;7:340-344.
58. Yoshimura S, Miyazu M, Yoshizawa S, et al. Efficacy of an enteral feeding protocol for providing nutritional support after paediatric cardiac surgery. *Anaesth Intensive Care.* 2015;43:587-593.
59. Mikhailov TA, Kuhn EM, Manzi J, et al: Early enteral nutrition is associated with lower mortality in critically ill children. *JPEN J Parenter Enteral Nutr.* 2014;38:459-466.
60. Canarie MF, Barry S, Carroll CL, et al; Northeast Pediatric Critical Care Research Consortium. Risk factors for delayed enteral nutrition in critically ill children. *Pediatr Crit Care Med.* 2015;16:e283-e289.
61. Fivez T, Kerklaan D, Mesotten D, et al. Early versus late parenteral nutrition in critically ill children. *N Engl J Med.* 2016;374:1111-1122.
62. Simpson F, Doig GS. Parenteral vs. enteral nutrition in the critically ill patient: a meta-analysis of trials using the intention to treat principle. *Intensive Care Med.* 2005;31:12-23.
63. Marik PE, Zaloga GP. Early enteral nutrition in acutely ill patients: A systematic review. *Crit Care Med.* 2001;29:2264-2270.
64. Montejo JC. Enteral nutrition-related gastrointestinal complications in critically ill patients: A multicenter study. The Nutritional and Metabolic Working Group of the Spanish Society of Intensive Care Medicine and Coronary Units. *Crit Care Med.* 1999;27:1447-1453.
65. Omura K, Hirano K, Kanehira E, et al. Small amount of low-residue diet with parenteral nutrition can prevent decreases in intestinal mucosal integrity. *Ann Surg.* 2000;231:112-118.
66. De Jonghe B, Appere-De-Vechi C, Fournier M, et al. A prospective survey of nutritional support practices in intensive care unit patients: What is prescribed? What is delivered? *Crit Care Med.* 2001;29:8-12.
67. Jabbar A, Chang WK, Dryden GW, et al. Gut immunology and the differential response to feeding and starvation. *Nutr Clin Pract.* 2003;18:461-482.
68. Freitas BA, Leão RT, Gomes AP, et al. Nutritional therapy and neonatal sepsis *Rev Bras Ter Intensiva.* 2011;23:492-498.