

13. BÖLÜM

ORTOPEDİK CERRAHİ ALAN İNFEKSİYONLARINI ÖNLEME STRATEJİLERİ

Ülkü SUR ÜNAL

GİRİŞ

İnfeksiyon önleme çabalarındaki son gelişmelere rağmen, ortopedik cerrahi alan infeksiyonları (CAİ) hastaneye yatırılan hastalar arasında morbidite, mortalite, hastane kalış süresinde artış ve sağlık harcamalarının artışında önemli bir nedeni olmaya devam etmektedir (1). Hastalık Kontrol ve Önleme Merkezleri (CDC) sağlık bakımı ile ilişkili infeksiyon (SBİ) yaygınlık araştırması, 2011 yılında Amerika Birleşik Devletleri’nde yatan hastalar arasında yaklaşık 160.000 CAİ olduğunu tahmin ederek, CAİ’nu en yaygın SBİ haline getirdi (2). Ameliyat geçiren hastalar arasında yapılan çalışmada CAİ geçiren hastalarda CAİ olmayan diğer hastalara kıyasla yoğun bakım ünitesinde kalma oranında %60, hastaneye yeniden yatma oranında 5 kat ve mortalite oranında iki kat artış olduğu saptanmıştır (3). CAİ’ları ayrıca sağlık masraflarında ciddi bir artıştan sorumludur. Ortalama infeksiyon başına maliyet yaklaşık 5.000-13.000 ABD Doları arasında değişmektedir (4). Genel olarak, CAİ’ların tüketici fiyat endeksine göre sağlık hizmetleri harcamalarında yıllık 3,5 ila 10 milyar dolarlık bir kısmı oluşturduğu tahmin edilmektedir (5). Araştırma ayrıca, CAİ’ların yaklaşık %55’inin kanita dayalı stratejilerin uygun şekilde uygulanmasıyla önlenebilir olabileceğini ileri sürmektedir (4).

ÖNERİLER VE CAİ ÖNLEME STRATEJİLERİ

CDC Cerrahi Alan İnfeksiyonunu Önleme Kılavuzu 2017, protez eklem arthroplastisi üzerine yeni bir bölüm dahil olmak üzere 14 ana alanı kapsamaktadır (5). Bu kılavuzda ana başlıklar halinde CAİ önleme stratejileri; parenteral antimikrobial profilaksi, glisemik kontrol, normotermi, oksijenizasyon, antiseptik profilaksi olarak belirtilmektedir.

SON SÖZ

Cerrahi bölge infeksiyon riski, önceden var olan tıbbi durumlar, yerleşik deri bakterilerinin miktarı ve türü, perioperatif glikoz seviyeleri, vücut sıcaklığı dalgalanmaları ve ameliyat öncesi, ameliyat sırasında ve ameliyat sonrası bakım gibi bir dizi hasta faktörüne bağlıdır. Bu nedenle hangi yaraların infekte olacağını tahmin etmek zordur. Bu nedenle sağlık personeli, tüm cerrahi vákalarda yara kontaminasyonu riskini en aza indirmek için müdahaleye yetkin risk faktörlerine sahip hastaların erken tanımlanması ve bakım süreci boyunca konak savunmalarını desteklemek için çaba göstermelidir. Bunlar ve diğer iyi araştırılmış müdahaleler bir araya getirilmeli ve hastalara her gün sağlanması gereken en iyi bakımının ayrılmaz bileşenleri olarak düşünülmelidir.

Hasta hastaneden çıktıktan sonra bile infeksiyon riski devam etmektedir. Sağlık personeli, hastayı ve yakınlarını doğru yara bakımı, CAİ belirtilerini nasıl tanyacakları ve semptomları cerrahlarına ve birinci basamak sağlık hizmeti sağlayıcılarına bildirmenin önemi konusunda eğitmelidir. Hastaya verilen dökümanlar kolay okunur olmalı ve birçok dilde mevcut olmalıdır. Hastaların, ameliyatların ve cerrahların türlerine göre CAİ insidansı hakkında doğru istatistiklerin toplanabilmesi için, taburculuk sonrası CAİ gözetim faaliyetlerinin tesisin infeksiyon önleme programı, cerrah, cerrahi birim ve olası sevk veya yeniden kabul merkezleri arasında koordine edilmesi de önemlidir. Tüm ameliyatların yarısından fazlasının ayakta tedavi ortamlarında yapıldığı ve tüm yatan hasta cerrahi CAİ'larının %65'inden fazlasının hasta tesisten ayrıldıktan sonra belirlendiği düşünüldüğünde, CAİ oranlarını önemli ölçüde küçümsemek ve ciddi infeksiyon sorunlarını gözden kaçırmak çok kolaydır. En önemlisi, hastanın verileri ve veri analizi tüm sağlık çalışanları ile paylaşılmalı, böylece veri geçerliliği ve devam eden ve dönemsel iyileştirme faaliyetlerine evrensel katılım konusunda anlaşma sağlanmalıdır.

KAYNAKÇA

1. de Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: incidence and impact on hospital utilization and treatment costs. American J Infect Control 2009;37:387-97.
2. Magill SS, Edwards JR, Bamberg W, Beldavs ZG, Dumyati G, Kainer MA, et al. Multistate point-prevalence survey of health care-associated infections. NEJM 2014;370:1198-208.
3. Kirkland KB, Briggs JP, Trivette SL, Wilkinson WE, Sexton DJ. The impact of surgical-site infections in the 1990s: attributable mortality, excess length of hospitalization, and extra costs. Infect Control Hosp Epidemiol 1999;20(II):725-30.
4. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. Infect Control Hosp Epidemiol 2011;32:101-14.

5. Berrios-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, et al. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg* 2017;152:784-91.
6. World Health Organization. Global guidelines on the prevention of surgical site infection, 2016. Available from: <http://www.who.int/gpsc/ssi-prevention-guidelines/en/>. Accessed February 22, 2018.
7. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. *Am J Health Syst Pharm* 2013;70:195-283. ASHP report.
8. Anderson DJ, Podgorny K, Berrios-Torres SI, Bratzler DW, Dellinger EP, Greene L, et al. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol* 2014;35(S2):S66-88.
9. Steinberg JP, Braun BI, Hellinger WC, Kusek L, Bozikis MR, Bush AJ. Timing of antimicrobial prophylaxis and the risk of surgical site infections: results from the Trial to Reduce Antimicrobial Prophylaxis Errors. *Ann Surg* 2009;250:10-6.
10. Weber WP, Marti WR, Zwahlen M, Misteli H, Rosenthal R, Reck S, et al. The timing of surgical antimicrobial prophylaxis. *Ann Surg* 2008;247:918-26.
11. Zelenitsky SA, Silverman RE, Duckworth H, Harding GK. A prospective, randomized, double-blind study of single high dose versus multiple standard dose gentamicin both in combination with metronidazole for colorectal surgical prophylaxis. *J Hosp Infect* 2000;46:135-40.
12. Zanetti G, Giardina R, Platt R. Intraoperative redosing of cefazolin and risk for surgical site infection in cardiac surgery. *Emerg Infect Dis* 2001;7:828-31.
13. Markantonis SL, Kostopanagiotou G, Panidis D, Smirniotis V, Voros D. Effects of blood loss and fluid volume replacement on serum and tissue gentamicin concentrations during colorectal surgery. *Clin Ther* 2004;26:271-81.
14. Morita S, Nishisho I, Nomura T, Fukushima Y, Morimoto T, Hira N, et al. The significance of the intraoperative repeated dosing of antimicrobials for preventing surgical wound infection in colorectal surgery. *Surg Today* 2005;35:732-8.
15. Swoboda SM, Merz C, Kostuik J, Trentler B, Lipsett PA. Does intraoperative blood loss affect antibiotic serum and tissue concentrations? *Arch Surg* 1996;131:1165-72.
16. Sullivan SA, Smith T, Chang E, Hulsey T, Vandorsten JP, Soper D, et al. Administration of cefazolin prior to skin incision is superior to cefazolin at cord clamping in preventing postcesarean infectious morbidity: a randomized, controlled trial. *Am J Obstet Gynecol* 2007;196:455, e1-e5.
17. Thigpen BD, Hood WA, Chauhan S, Bufkin L, Bofill J, Magann E, et al. Timing of prophylactic antibiotic administration in the uninfected laboring gravida: a randomized clinical trial. *Am J Obstet Gynecol* 2005;192:1864-8.
18. Wax JR, Hersey K, Philiput C, Wright MS, Nichols KV, Eggleston MK, et al. Single dose cefazolin prophylaxis for postcesarean infections: before vs. after cord clamping. *J Matern Fetal Med* 1997;6:61-5.
19. Lador A, Nasir H, Mansur N, Sharoni E, Biderman P, Leibovici L, et al. Antibiotic prophylaxis in cardiac surgery: systematic review and meta-analysis. *J Antimicrob Chemother* 2011;67:541-50.
20. Hillis LD, Smith PK, Anderson JL, Bittl JA, Bridges CR, Byrne JG, et al. 2011 ACCF/AHA guideline for coronary artery bypass graft surgery: executive summary. *J Am Coll Cardiol* 2011;58:2584-614.
21. How-to guide: prevent surgical site infections. Cambridge (MA): Institute for Healthcare Improvement; 2012 Available from: <http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventSurgicalSiteInfection.aspx>. Accessed February 22, 2018.
22. Laird AM, Miller PR, Kilgo PD, Meredith JW, Chang MC. Relationship of early hyperglycemia to mortality in trauma patients. *J Trauma Acute Care Surg* 2004;56:1058-62.

23. Vriesendorp TM, Morelis QJ, Devries JH, Legemate DA, Hoekstra JB. Early post-operative glucose levels are an independent risk factor for infection after peripheral vascular surgery. A retrospective study. *Eur J Vasc Endovasc Surg* 2004;28:520-5.
24. Jeremitsky E, Omert LA, Dunham CM, Wilberger J, Rodriguez A. The impact of hyperglycemia on patients with severe brain injury. *J Trauma Acute Care Surg* 2005;58:47-50.
25. Bagshaw SM, Egi M, George C, Bellomo R, ANZICS Database Management Committee. Early blood glucose control and mortality in critically ill patients in Australia. *Crit Care Med* 2009;37:463-70.
26. Falciglia M, Freyberg RW, Almenoff PL, D'alessio DA, Render ML. Hyperglycemia-related mortality in critically ill patients varies with admission diagnosis. *Crit Care Med* 2009;37:3001.
27. Gandhi GY, Nuttall GA, Abel MD, Mullany CJ, Schaff HV, O'brien PC, et al. Intensive intraoperative insulin therapy versus conventional glucose management during cardiac surgery: a randomized trial intensive intraoperative insulin therapy in cardiac surgery. *Ann Intern Med* 2007;146:233-43.
28. Chan RP, Galas FR, Hajjar LA, Bello CN, Piccioni MA, Auler JO Jr. Intensive perioperative glucose control does not improve outcomes of patients submitted to open-heart surgery: a randomized controlled trial. *Clinics* 2009;64:51-60.
29. Qaseem A, Humphrey LL, Chou R, Snow V, Shekelle P, Physicians CGCotACo. Use of intensive insulin therapy for the management of glycemic control in hospitalized patients: a clinical practice guideline from the American College of Physicians. *Ann Intern Med* 2011;154:260-7.
30. Lazar HL, McDonnell M, Chipkin SR, Furnary AP, Engelman RM, Sadhu AR, et al. The Society of Thoracic Surgeons practice guideline series: blood glucose management during adult cardiac surgery. *Ann Thorac Surg* 2009;87:663-9.
31. Umpierrez GE, Hellman R, Korytkowski MT, Kosiborod M, Maynard GA, Montori VM, et al. Management of hyperglycemia in hospitalized patients in non-critical care setting: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 2012;97:16-38.
32. Jacobi J, Bircher N, Krinsley J, Agus M, Braithwaite SS, Deutschman C, et al. Guidelines for the use of an insulin infusion for the management of hyperglycemia in critically ill patients. *Crit Care Med* 2012;40:3251-76.
33. Sessler DI. Complications and treatment of mild hypothermia. *Anesthesiology* 2001;95:531-43.
34. Kurz A, Sessler DI, Lenhardt R. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. *N Engl J Med* 1996;334:1209-15.
35. Melling AC, Ali B, Scott EM, Leaper DJ. Effects of preoperative warming on the incidence of wound infection after clean surgery: a randomised controlled trial. *Lancet* 2001;358:876-80.
36. Wong PF, Kumar S, Bohra A, Whetter D, Leaper DJ. Randomized clinical trial of perioperative systemic warming in major elective abdominal surgery. *Br J Surg* 2007;94:421-6.
37. Burlingame B, Denholm B, Link T, Ogg M, Spruce L, Spry C, et al. Guideline for prevention of unplanned patient hypothermia. In: Connor R, editor. AORN guidelines for perioperative practice. Denver (CO): Association of Perioperative Registered Nurses; 2016.
38. Hooper VD, Chard R, Clifford T, Fetzer S, Fossum S, Godden B, et al. ASPAN's evidence-based clinical practice guideline for the promotion of perioperative normothermia: second edition. *J Perianesth Nurs* 2010;25:346-65.
39. Unal, Ö , Ateş, M , Dağtaş, M , Ugutmen, E . "Evaluation of axillary nerve integrity and shoulder functions in patients who underwent lateral deltoid splitting approach". *Journal of Surgery and Medicine* 4 (2020): 645-648
40. Grief R, Ozan A, Horn EP, Kurz A, Sessler DI. Supplemental perioperative oxygen to reduce the incidence of surgical-wound infection. *N Engl J Med* 2000;342:161-7.

41. Belda FJ, Aguilera L, De La Asunción JG, Alberti J, Vicente R, Ferrández L, et al. Supplemental perioperative oxygen and the risk of surgical wound infection: a randomized controlled trial. *JAMA* 2005;294:2035-42.
42. Bickel A, Gurevits M, Vamos R, Ivry S, Eitan A. Perioperative hyperoxygenation and wound site infection following surgery for acute appendicitis: a randomized, prospective, controlled trial. *Arch Surg* 2011;146:464-70.
43. Meyhoff CS, Wetterslev J, Jorgensen LN, Henneberg SW, Høgdall C, Lundvall L, et al. Effect of high perioperative oxygen fraction on surgical site infection and pulmonary complications after abdominal surgery: the PROXI randomized clinical trial. *JAMA* 2009;302:1543-50.
44. Stall A, Paryavi E, Gupta R, Zadnik M, Hui E, O'Toole RV. Perioperative supplemental oxygen to reduce surgical site infection after open fixation of high-risk fractures: a randomized controlled pilot trial. *J Trauma Acute Care Surg* 2013;75:657-63.
45. Stæhr AK, Meyhoff CS, Rasmussen LS. Inspiratory oxygen fraction and postoperative complications in obese patients: a subgroup analysis of the PROXI trial. *Anesthesiology* 2011;114:1313-9.
46. Garibaldi RA. Prevention of intraoperative wound contamination with chlorhexidine shower and scrub. *J Hosp Infect* 1988;11(Suppl B):5-9.
47. Rotter ML, Larsen SO, Cooke EM, Dankert J, Daschner F, Greco D, et al. A comparison of the effects of preoperative whole-body bathing with detergent alone and with detergent containing chlorhexidine gluconate on the frequency of wound infections after clean surgery. The European Working Party on Control of Hospital Infections. *J Hosp Infect* 1988;11:310-20.
48. Ayliffe GA, Noy MF, Babb JR, Davies JG, Jackson J. A comparison of pre-operative bathing with chlorhexidine-detergent and non-medicated soap in the prevention of wound infection. *J Hosp Infect* 1983;4:237-44.
49. Byrne D, Napier A, Phillips G, Cuschieri A. Effects of whole body disinfection on skin flora in patients undergoing elective surgery. *J Hosp Infect* 1991;17:217-22.
50. Hayek LJ, Emerson JM, Gardner AM. A placebo-controlled trial of the effect of two preoperative baths or showers with chlorhexidine detergent on postoperative wound infection rates. *J Hosp Infect* 1989;13:202-4.
51. Webster J, Osborne S. Preoperative bathing or showering with skin antiseptics to prevent surgical site infection. *Cochrane Database Syst Rev* 2012;(9):CD004985.
52. Veiga DF, Damasceno CAV, Veiga-Filho J, Figueiras RG, Vieira RB, Garcia ES, et al. Randomized controlled trial of the effectiveness of chlorhexidine showers before elective plastic surgical procedures. *Infect Control Hosp Epidemiol* 2009;30:77-9.
53. Wihlborg O. The effect of washing with chlorhexidine soap on wound infection rates in general surgery. A controlled clinical study. Department of Surgery, Ljungby Hospital, Sweden. *Annales chirurgiae et gynaecologiae*. Available from: <http://europemc.org/abstract/med/3324917>. Accessed February 22, 2018.
54. Sistla SC, Prabhu G, Sistla S, Sadasivan J. Minimizing wound contamination in a "clean" surgery: comparison of chlorhexidine- ethanol and povidone-iodine. *Cancer Chemotherapy* 2010;56:261-7.
55. Darouiche RO, Wall MJ, Itani KM, Otterson MF, Webb AL, Carrick MM, et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. *N Engl J Med* 2010;362:18-26.
56. Saltzman MD, Nuber GW, Gryzlo SM, Marecek GS, Koh JL. Efficacy of surgical preparation solutions in shoulder surgery. *J Bone Joint Surg* 2009;91:1949-53.
57. Bibbo C, Patel DV, Gehrmann RM, Lin SS. Chlorhexidine provides superior skin decontamination in foot and ankle surgery; a prospective randomized study. *Clin Orthop Relat Res* 2005;438:204-8.
58. Paocharoen V, Mingmalairak C, Apisarnthanarak A. Comparison of surgical wound infection after preoperative skin preparation with 4% chlorhexidine and povidone iodine; a prospective randomized trial. *J Med Assoc Thai* 2009;92:898-902.

59. National Healthcare Safety Network. Surgical site infection (SSI) event. Atlanta (GA): Centers for Disease Control and Prevention; 2013 Available from: <http://www.cdc.gov/nhsn/PDFs/pscManual/9pscSSICurrent.pdf>. Accessed July 29, 2017.
60. Kao LS, Ghaferi AA, Ko CY, Dimick JB. Reliability of superficial surgical site infections as a hospital quality measure. *J Am Coll Surg* 2011;213:231-5.
61. Jackson SS, Leekha S, Magder LS, Pineles L, Anderson DJ, Trick WE, et al. Electronically available comorbidities should be used in surgical site infection risk adjustment. *Clin Infect Dis* 2017;65:803-10.
62. Glenny A, Song F. Antimicrobial prophylaxis in total hip replacement: a systematic review. *Health Technol Assess* 1999;3:1-57.
63. Wilson J, Charlett A, Leong G, McDougall C, Duckworth G. Rates of surgical site infection after hip replacement as a hospital performance indicator: analysis of data from the English mandatory surveillance system. *Infect Control Hosp Epidemiol* 2008;29:219-26.
64. Australian Orthopaedic Association. National Joint Replacement Registry: annual report. Adelaide [Australia]: Australian Orthopaedic Association; 2010.
65. Block JE, Stubbs HA. Reducing the risk of deep wound infection in primary joint arthroplasty with antibiotic bone cement. *Orthopedics* 2005;28:1334-45.
66. Cummins JS, Tomek IM, Kantor SR, Furnes O, Engesaeter LB, Finlayson SR. Cost- effectiveness of antibiotic-impregnated bone cement used in primary total hip arthroplasty. *J Bone Joint Surg Am* 2009;91:634-41.
67. Charnley J, Eftekhar N. Postoperative infection in total prosthetic replacement arthroplasty of the hip joint, with special reference to the bacterial content of the air of the operating room. *Br J Surg* 1969;56:641-9.
68. Lidwell OM, Lowbury EJ, Whyte W, Blowers R, Stanley SJ, Lowe D. Effect of ultraclean air in operating rooms on deep sepsis in the joint after total hip or knee replacement: a randomised study. *BMJ (Clin Res Ed)* 1982;285:10-4.
69. Brandt C, Hott U, Sohr D, Daschner F, Gastmeier P, Ruden H. Operating room ventilation with laminar airflow shows no protective effect on the surgical site infection rate in orthopedic and abdominal surgery. *Ann Surg* 2008;248:695-700.