

## 6. BÖLÜM

# ANESTEZİ VE ORTOPEDİK CERRAHİ ALAN İNFEKSİYONLARI

Onur SELVI

## GİRİŞ

Cerrahi alan infeksiyonları (CAİ) tüm ortopedik cerrahiler için ve özellikle eklem protez operasyonları ile ilişkili olan karmaşık ve maddi olarak külfetli komplikasyonlarındandır. Birleşik Devletleri’nde total eklem artroplastilerine bağlı infeksiyonların mali külfetinin 2020 yılının sonuna kadar 1.62 milyar dolar olması beklenmektedir (1). Hastane kaynaklı ölümlerin önemli kısmını oluşturan hastane infeksiyonlarının %20’den fazlası yara yeri infeksiyonlarıdır (2). Toplumda ilerleyen yaş ile birlikte özellikle total eklem protezlerine ihtiyaç duyan hasta sayısını artacağı öngörmektedir. Örneğin Amerika'da bu sayının 2030 yılına kadar yılda 4 milyon hastaya ulaşacağı tahmin edilmektedir (3). Cerrahiye olan bu talebin yükselmesi CAİ önlenmesinin gelecek yıllarda da önemli bir sorun olacağını göstermektedir. Oluşumları multifaktöriyel olan CAİ inceleyen çalışmalar göstermektedir ki, bu infeksiyonların kontrol altına alınabilmesi için birçok faktörün göz önünde bulundurulması, bu faktörler için risk değerlendirmesinin iyi yapılması ile sağlanabilir. CAİ oluşumu ile ilgili faktörlerin bazıları preoperatif, peroperatif ve postoperatif dönemde anestezi hekimlerinin karar, yaklaşım ve tutumlarından etkilenir. Bu değişkenlerin kontrolü ancak CAİ ve anestezi arasındaki ilişkiyi kavrayabilen bir hekim tarafından öngörebilir ve engellenebilir. Örneğin Amerikan Anestezi Derneği (ASA) skoru  $\geq 3$  olması postoperatif eklem infeksiyonu için yüksek risk teşkil eder (4). Benzer şekilde preoperatif değerlendirme esnasında hastanın infeksiyona yatkınlığı ile ilgili ipucu oluşturan ve anestezi hekiminin farkındalık geliştirmesi gereken daha bunun gibi birçok örnek verilebilir (5,6). CAİ için risk değerlendirilmesi yapılrken anestezi hekimlerinin kontrolünde olan bu değişkenlerinde mortalite ve morbiditeyi etkilediğini anlamak gereklidir.

maliyet hesabı, hastanede kalış süresi, hasta konforu gibi sebeplerle son yıllar-daki eğilim nöroaksiyel anestezi yönüne kaymaktadır. Birçok yerel komite ve hastane nöroaksiyel anestezi yönünde politika değişikliğine gitmektedir (54). Klinisyenler nihai karara hastanın en yüksek yararı ve güvenliği doğrultusunda ortak bir fikir birliğine içinde birlikte karar vermelidir.

## KAYNAKÇA

1. Kurtz SM, Lau E, Watson H, Schmier JK, Parvizi J. Economic burden of periprosthetic joint infection in the United States. *J Arthroplasty* 2012;27:61–5.e1.
2. 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. *Am J Infect Control* 2009;37:387–97.
3. Kurtz SM, Ong KL, Schmier J, Mowat F, Saleh K, Dybvik E, et al. Future clinical and economic impact of revision total hip and knee arthroplasty. *J Bone Joint Surg Am* 2007;89 Suppl 3:144–51.
4. Resende VAC, Neto AC, Nunes C, Andrade R, Espregueira-Mendes J, Lopes S. Higher age, female gender, osteoarthritis and blood transfusion protect against periprosthetic joint infection in total hip or knee arthroplasties: a systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc* 2018. <https://doi.org/10.1007/s00167-018-5231-9>.
5. Patel R, Aljanipour P, Parvizi J. Advancements in Diagnosing Periprosthetic Joint Infections after Total Hip and Knee Arthroplasty. *The Open Orthopaedics Journal* 2016;10:654–61. <https://doi.org/10.2174/1874325001610010654>.
6. Tande AJ, Gomez-Urena EO, Berbari EF, Osmon DR. Management of Prosthetic Joint Infection. *Infectious Disease Clinics of North America* 2017;31:237–52. <https://doi.org/10.1016/j.idc.2017.01.009>.
7. Kopp SL, Berbari EF, Osmon DR, Schroeder DR, Hebl JR, Horlocker TT, et al. The Impact of Anesthetic Management on Surgical Site Infections in Patients Undergoing Total Knee or Total Hip Arthroplasty. *Anesth Analg* 2015;121:1215–21.
8. Poulsides LA, Ma Y, Della Valle AG, Chiu Y-L, Sculco TP, Memtsoudis SG. In-hospital surgical site infections after primary hip and knee arthroplasty—incidence and risk factors. *J Arthroplasty* 2013;28:385–9.
9. Chen Y, Chen Z, Cui S, Li Z, Yuan Z. Topical versus systemic tranexamic acid after total knee and hip arthroplasty: A meta-analysis of randomized controlled trials. *Medicine* 2016;95:e4656.
10. Xu C, Guo H, Qu P, Fu J, Kuo F-C, Chen J-Y. Preoperatively elevated serum inflammatory markers increase the risk of periprosthetic joint infection following total knee arthroplasty in patients with osteoarthritis. *Ther Clin Risk Manag* 2018;14:1719–24.
11. Sessler DI. Supplemental oxygen and surgical site infection. *Arch Surg* 2011;146:1221–2; author reply 1222–3.
12. Habre W, Peták F. Perioperative use of oxygen: variabilities across age. *Br J Anaesth* 2014;113 Suppl 2:ii26–36.
13. Smith BK, Roberts RH, Frizelle FA. O<sub>2</sub> No Longer the Go2: A Systematic Review and Meta-Analysis Comparing the Effects of Giving Perioperative Oxygen Therapy of 30% FiO<sub>2</sub> to 80% FiO<sub>2</sub> on Surgical Site Infection and Mortality. *World J Surg* 2020;44:69–77.
14. 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.
15. Global Guidelines for the Prevention of Surgical Site Infection. Geneva: World Health Organization; 2016.

16. Sidhwa F, Itani KMF. Skin preparation before surgery: options and evidence. *Surg Infect* 2015;16:14–23.
17. Darouiche RO, Wall MJ Jr, Itani KMF, 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.
18. Carroll K, Dowsey M, Choong P, Peel T. Risk factors for superficial wound complications in hip and knee arthroplasty. *Clin Microbiol Infect* 2014;20:130–5.
19. Dumville JC, McFarlane E, Edwards P, Lipp A, Holmes A, Liu Z. Preoperative skin antiseptics for preventing surgical wound infections after clean surgery. *Cochrane Database Syst Rev* 2015;CD003949.
20. Morrey BF. Antibiotic Prophylaxis and the Risk of Surgical Site Infections following Total Hip Arthroplasty: Timely Administration Is the Most Important Factor. *Yearbook of Orthopedics* 2008;2008:5. [https://doi.org/10.1016/s0276-1092\(08\)79286-1](https://doi.org/10.1016/s0276-1092(08)79286-1).
21. Rodríguez-Pardo D. Antibiotic prophylaxis in orthopaedic surgery: Clinical practice guidelines or individualized prophylaxis? *Enferm Infect Microbiol Clin* 2019;37:557–9.
22. Clement S, Braithwaite SS, Magee MF, Ahmann A, Smith EP, Schafer RG, et al. Management of diabetes and hyperglycemia in hospitals. *Diabetes Care* 2004;27:553–91.
23. Wu C, Qu X, Liu F, Li H, Mao Y, Zhu Z. Risk Factors for Periprosthetic Joint Infection after Total Hip Arthroplasty and Total Knee Arthroplasty in Chinese Patients. *PLoS ONE* 2014;9:e95300. <https://doi.org/10.1371/journal.pone.0095300>.
24. Mraovic B, Suh D, Jacovides C, Parvizi J. Perioperative hyperglycemia and postoperative infection after lower limb arthroplasty. *J Diabetes Sci Technol* 2011;5:412–8.
25. Rizvi AA, Chillag SA, Chillag KJ. Perioperative management of diabetes and hyperglycemia in patients undergoing orthopaedic surgery. *J Am Acad Orthop Surg* 2010;18:426–35.
26. Franco T, Rupp S, Williams B, Blackmore C. Effectiveness of standardised preoperative assessment and patient instructions on admission blood glucose for patients with diabetes undergoing orthopaedic surgery at a tertiary referral hospital. *BMJ Open Quality* 2019;8:e000455. <https://doi.org/10.1136/bmjoq-2018-000455>.
27. De Hert S, Imberger G, Carlisle J, Diemunsch P, Fritsch G, Moppett I, et al. Preoperative evaluation of the adult patient undergoing non-cardiac surgery: guidelines from the European Society of Anaesthesiology. *Eur J Anaesthesiol* 2011;28:684–722.
28. Xu H, Wang Z, Guan X, Lu Y, Malone DC, Salmon JW, et al. Safety of intraoperative hypothermia for patients: meta-analyses of randomized controlled trials and observational studies. *BMC Anesthesiol* 2020;20:202.
29. Billeter AT, Hohmann SF, Druen D, Cannon R, Polk HC Jr. Unintentional perioperative hypothermia is associated with severe complications and high mortality in elective operations. *Surgery* 2014;156:1245–52.
30. Cattaneo CG, Frank SM, Hesel TW, El-Rahmany HK, Kim LJ, Tran KM. The accuracy and precision of body temperature monitoring methods during regional and general anesthesia. *Anesth Analg* 2000;90:938–45.
31. Scholten R, Leijtens B, Kremers K, Snoeck M, Koëter S. The incidence of mild hypothermia after total knee or hip arthroplasty: A study of 2600 patients. *J Orthop Traumatol* 2018;15:408–11.
32. Carson JL, Stanworth SJ, Roubinian N, Fergusson DA, Triulzi D, Doree C, et al. Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion. *Cochrane Database Syst Rev* 2016;10:CD002042.
33. Newman ET, Watters TS, Lewis JS, Jennings JM, Wellman SS, Attarian DE, et al. Impact of perioperative allogeneic and autologous blood transfusion on acute wound infection following total knee and total hip arthroplasty. *J Bone Joint Surg Am* 2014;96:279–84.
34. Gómez-Lesmes SP, Tornero E, Martínez-Pastor JC, Pereira A, Marcos M, Soriano A. Length of storage of transfused red blood cells and risk of prosthetic joint infection after primary knee arthroplasty. *J Arthroplasty* 2014;29:2016–20.

35. Kozek-Langenecker SA, Ahmed AB, Afshari A, Albaladejo P, Aldecoa C, Barauskas G, et al. Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology: First update 2016. *Eur J Anaesthesiol* 2017;34:332–95.
36. Solomon LB. CORR Insights®: The Otto Aufranc Award: Modifiable versus Nonmodifiable Risk Factors for Infection After Hip Arthroplasty. *Clinical Orthopaedics and Related Research®* 2015;473:460–2. <https://doi.org/10.1007/s11999-014-3866-5>.
37. Berbari EF, Hanssen AD, Duffy MC, Steckelberg JM, Ilstrup DM, Harmsen WS, et al. Risk factors for prosthetic joint infection: case-control study. *Clin Infect Dis* 1998;27:1247–54.
38. Maoz G, Phillips M, Bosco J, Slover J, Stachel A, Inneh I, et al. The Otto Aufranc Award: Modifiable versus nonmodifiable risk factors for infection after hip arthroplasty. *Clin Orthop Relat Res* 2015;473:453–9.
39. Chang C-C, Lin H-C, Lin H-W, Lin H-C. Anesthetic Management and Surgical Site Infections in Total Hip or Knee ReplacementA Population-based Study. *Anesthesiology* 2010;113:279–84.
40. Pugely AJ, Martin CT, Gao Y, Mendoza-Lattes S, Callaghan JJ. Differences in short-term complications between spinal and general anesthesia for primary total knee arthroplasty. *J Bone Joint Surg Am* 2013;95:193–9.
41. Liu J, Ma C, Elkassabany N, Fleisher LA, Neuman MD. Neuraxial Anesthesia Decreases Postoperative Systemic Infection Risk Compared with General Anesthesia in Knee Arthroplasty. *Anesthesia & Analgesia* 2013;117:1010–6. <https://doi.org/10.1213/ane.0b013e3182a1bf1c>.
42. Whelan P, Morris PJ. Immunological responsiveness after transurethral resection of the prostate: general versus spinal anaesthetic. *Clin Exp Immunol* 1982;48:611–8.
43. Rashiq S, Finegan BA. The effect of spinal anesthesia on blood transfusion rate in total joint arthroplasty. *Can J Surg* 2006;49:391–6.
44. Pedersen AB, Svendsson JE, Johnsen SP, Riis A, Overgaard S. Risk factors for revision due to infection after primary total hip arthroplasty: a population-based study of 80,756 primary procedures in the Danish Hip Arthroplasty Registry. *Acta Orthop* 2010;81:542–7.
45. Zorrilla-Vaca A, Grant MC, Mathur V, Li J, Wu CL. The Impact of Neuraxial Versus General Anesthesia on the Incidence of Postoperative Surgical Site Infections Following Knee or Hip Arthroplasty. *Regional Anesthesia and Pain Medicine* 2016;41:555–63. <https://doi.org/10.1097/aap.0000000000000437>.
46. Guay J, Choi PT, Suresh S, Albert N, Kopp S, Pace NL. Neuraxial Anesthesia for the Prevention of Postoperative Mortality and Major Morbidity: An Overview of Cochrane Systematic Reviews n.d. <https://doi.org/10.1002/14651858>.
47. Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;248:189–98.
48. Hu S, Zhang Z-Y, Hua Y-Q, Li J, Cai Z-D. A comparison of regional and general anaesthesia for total replacement of the hip or knee: a meta-analysis. *J Bone Joint Surg Br* 2009;91:935–42.
49. Ong KL, Kurtz SM, Lau E, Bozic KJ, Berry DJ, Parvizi J. Prosthetic Joint Infection Risk After Total Hip Arthroplasty in the Medicare Population. *The Journal of Arthroplasty* 2009;24:105–9. <https://doi.org/10.1016/j.arth.2009.04.027>.
50. Rodgers A, Walker N, Schug S, McKee A, Kehlet H, van Zundert A, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. *BMJ* 2000;321:1493.
51. Webster F, Bremner S, McCartney CJL. Patient experiences as knowledge for the evidence base: a qualitative approach to understanding patient experiences regarding the use of regional anesthesia for hip and knee arthroplasty. *Reg Anesth Pain Med* 2011;36:461–5.
52. Oldman M, McCartney CJL, Leung A, Rawson R, Perlas A, Gadsden J, et al. A survey of orthopedic surgeons' attitudes and knowledge regarding regional anesthesia. *Anesth Analg* 2004;98:1486–90, table of contents.

53. Berry DJ, Bozic KJ. Current practice patterns in primary hip and knee arthroplasty among members of the American Association of Hip and Knee Surgeons. *J Arthroplasty* 2010;25:2–4.
54. Wong PBY, McVicar J, Nelligan K, Bleackley JC, McCartney CJL. Factors influencing the choice of anesthetic technique for primary hip and knee arthroplasty. *Pain Manag* 2016;6:297–311.
55. Adamson TE, Tschan JM, Gullion DS, Oppenberg AA. Physician communication skills and malpractice claims. A complex relationship. *West J Med* 1989;150:356–60.
56. Baysinger CL. Accidental dural puncture and postdural puncture headache management. *Int Anesthesiol Clin* 2014;52:18–39.
57. Triantafyllopoulos G, Stundner O, Memtsoudis S, Poulsides LA. Patient, Surgery, and Hospital Related Risk Factors for Surgical Site Infections following Total Hip Arthroplasty. *ScientificWorldJournal* 2015;2015:979560.
58. Chelly JE, Clark LD, Gebhard RE, Raw RM, Atchabahian A. Consensus of the Orthopedic Anesthesia, Pain, and Rehabilitation Society on the use of peripheral nerve blocks in patients receiving thromboprophylaxis. *J Clin Anesth* 2014;26:69–74.
59. Abdelaziz H, Citak M, Fleischman A, Gavrankapetanović I, Inaba Y, Makar G, et al. General Assembly, Prevention, Operating Room - Anesthesia Matters: Proceedings of International Consensus on Orthopedic Infections. *J Arthroplasty* 2019;34:S93–5.