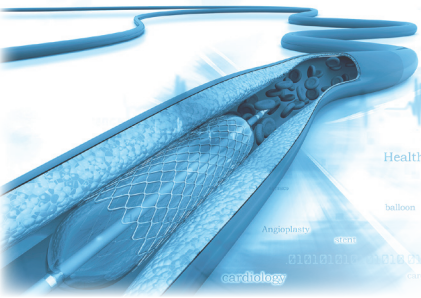
CHAPTER 19



ANESTHESIA MANAGEMENT IN ARTERIOVENOUS FISTULA SURGERY

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INTRODUCTION

Hemodialysis (HD) patients are connected to life by vascular access routes. For this purpose, HD catheters, arteriovenous fistula (AVF) and arteriovenous graft are used. One of the most important reasons affecting morbidity, mortality and health expenditures in these patients is complications in vascular access routes. AVF is primarily preferred because it can be used for a long time, has fewer complications compared to other vascular routes, and has a lower cost. The American National Kidney Foundation-Kidney Disease Outcomes Quality Initiative (NKF-DOQI) recommends increasing the rate of AVF use and keeping the rate of dialysis catheter use below 10% in its 2006 statement (1). As of the end of 2019, the most frequently used vascular access route in regular HD patients in our country is AVF (76.5%) (2). The most functional type with the least complication rate among AVFs is the radiocephalic arteriovenous fistula, which was defined by Cimino and Brescia in 1962 (3).

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anesthetic agent after intraneural injection, direct trauma, edema or hematoma formation (10, 12). The introduction of US and neurostimulation technologies in BPB improves needle insertion accuracy, resulting in a faster onset of action, lower required volume of anesthetic, and a longer-lasting anesthetic effect. It also reduced the incidence of related vascular and neurological complications (32, 33). Although GA, LA and RA techniques can be used to create AVF; European Society for Vascular Surgery (ESVS) guidelines recommend consideration, and European Kidney Association-European Society for Dialysis and Transplantation (ERA-EDTA) guidelines recommend RA for all primary AVF (47). The Kidney Disease Outcomes Quality Initiative guideline (NKF-DOQI) states that the choice of anesthesia technique should be based on institutional experience, surgical technique, and patient characteristics (48).

As a result, in the selection of anesthesia techniques in AVF surgery, the most comfortable and uncomplicated process should be provided for the patient by choosing according to the experience of the anesthesiologist, surgical technique and patient characteristics.

REFERENCES

1. National Kidney Foundation. NKF K/DOQI Guidelines: Clinical Practice Guidelines and Recommendations, 2006.
2. Süleymanlar G, Ateş K, Seyahi N, Nefroloji-Diyaliz ve Transplantasyon Registry 2019, Türk Nefroloji Derneği Yayınları, Ankara.
3. Koksoy C, Demirci RK, Balci D, Solak T, Köse SK. Brachiobasilic versus brachiocephalic arteriovenous fistula: a prospective randomized study. J Vasc Surg. 2009; 49(1): 171-7.
4. González Cárdenas, V, Vargas, J, & Echeverri, J, & Díaz, S, Mena, Y. (2013). Pre-anesthesia evaluation in patients with chronic renal disease (emphasis on cardiovascular risk). Colombian Journal of Anesthesiology. 41. 139-45.
5. Ozyaprak B, Kahraman N. Our ultrafiltration experience in open heart surgery patients with chronic renal failure. Ann Clin Anal Med. 2020;11 (Suppl 2): 105-9.
6. Krishnan M Preoperative care of patients with kidney disease. Am Fam Physician. 2002; 66 (8): 1471-6.
7. Wong V, Ward R, Taylor J, et al. Factors associated with early failure of arteriovenous fistulae for haemodialysis access. Eur J Vasc Endovasc Surg. 1996; 12(2): 207-13.
8. Howell SJ, Sear YM, Yeates D, Goldrace M, Sear JW, Foex P. Risk factors for cardiovascular death after elective surgery under general anaesthesia. Br. J Anaesth. 1998; 80(1): 14-9.
9. Shemesh D, Olsha O, Orkin D, et al. Sympathectomy-like effects of brachial plexus

block in arteriovenous access surgery. Ultrasound Med Biol. 2006; 32(6): 817-22.
10. Lo Monte AI, Damiano G, Mularo A, et al. Comparison between local and regional anesthesia in arteriovenous fistula creation. J Vasc Access. 2011; 12(4): 331-5.
11. Malinzak EB, Gan TJ. Regional anesthesia for vascular Access surgery. Anesth Analg. 2009; 109(3): 976-80.
12. Macfarlane AJ, Kearns RJ, Aitken E, Kinsella J, Clancy MJ. Does regional compared to local anaesthesia influence outcome after arteriovenous fistula creation? Trials. 2013;14(1): 263.
13. Shoshiashvili V, Tataradze A, Beglarishvili L, Managadze L, Chkhotua A. Evaluation of efficacy of regional and local anesthesia techniques in arteriovenous fistula criation for dialysis. Georgia Med News. 2014; (236): 7-12.
14. Sladen RN. Anesthetic considerations for the patient with renal failure. Anesthesiol Clin North Am. 2000; 18(4): 863-2.
15. Dhonneur G, Rebaine C, Slavov V, Ruggier R, De Chaubry V, Duvaldestin P. Neostigmine reversal of vecuronium neuromuscular block and the influence of renal failure. Anesth Analg. 1996; 82(1): 134-8.
16. Cooper RA, Mirakhur RK, Wierda JM, Maddineni VR. Pharmacokinetics of rocuronium bromide in patients with and without renal failure. Eur J Anaesthesiol Suppl. 1995; 11: 43-4.
17. Miller RD, Way WL, Hamilton WK, Layzer RB. Succinylcholine-induced hyperkalemia in patients with renal failure? Anesthesiology. 1972; 36(2): 138-41.
18. Bom A, Bradley M, Cameron K, Clark JK, Van Egmond J, Feilden H, et al. A novel concept of reversing neuromuscular block: chemical encapsulation of rocuronium bromide by a cyclodextrin-based synthetic host. Angew Chem Int Ed Engl. 2002; 41(2): 266-70.
19. Food and Drug Administration: BRIDION® (sugammadex) Injection, for intravenous use. Initial U.S. Approval: 2015. (Reference ID:3860969).
20. Adams DR, Tollinche LE, Yeoh CB, Artman J, Mehta M, Phillips D, et al. Short-term safety and effectiveness of sugammadex for surgical patients with end-stage renal disease: a two-center retrospective study. Anaesthesia. 2020; 75(3): 348-52.
21. Conzen PF, Nuscheler M, Melotte A, Verhaegen M, Leupolt T, Van Aken H, et al. Renal function and serum fluoride concentrations in patients with stable renal insufficiency after anesthesia with sevoflurane or enflurane. Anesth Analg. 1995; 81(3): 569-75.
22. Sear I: Effect of renal function and failure. In Park GR, Sladen RN (eds): Sedation and Anesthesia in the Critically Ill. Oxford, Blackwell Science, 1995.
23. Koehntop DE, Rodman JH. Fentanyl pharmacokinetics in patients undergoing renal transplantation. Pharmacotherapy. 1997 Jul-Aug;17(4):746-52
24. Hoke JF, Shlugman D, Dershwitz M, et al: Pharmacokinetics and pharmacodynamics of remifentanil in persons with renal failure compared with healthy volunteers. Anesthesiology. 1997; 87: 533-41.
25. De Martin S, Orlando R, Bertoli M, Pegoraro P, Palatini P. Differential effect of

chronic renal failure on the pharmacokinetics of lidocaine in patients receiving and not receiving hemodialysis. Clin Pharmacol Ther. 2006; 80(6): 597-606.
26. Sean JE, Vonda B, Cephas PS. Intravenous regional anesthesia: a review. Seminars in Anesthesia, Perioperative Medicine and Pain. 1998; 17(1): 2-9.
27. Felice K, Pharm D, Schumann HM. Intravenous lipid emulsion for local anesthetic toxicity: A review of the literature. Journal of Medical Toxicology. 2008; 4(3): 184-192.
28. Tanoubi I, Vialles N, Cuvillon P, Ripart J. Systemic toxicity with mepivacaine following axillary block in a patient terminal kidney failure. Ann Fr Anesth Reanim. 2006; 25: 33-5.
29. Kimura Y, Kamada Y, Kimura A et al Ropivacaine-induced toxicity with overdose suspected after axillary brachial plexus block. J Anesth. 2007; 21: 413-6.
30. Neal JM, Woodward CM, Harrison TK. The American Society of Regional Anesthesia and Pain Medicine. Checklist for Managing Local Anesthetics Systemic Toxicity: 2017 Version. Reg Anesth Pain Med. 2018; 43: 150-3.
31. Rang ST, West NL, Howard J, Cousins J. Anesthesia for Chronic Renal Disease and Renal Transplantation. EAU-EBU Update Ser. 2006; 4(6): 246-56.
32. Capdevila X, Biboulet P, Morau D, Mannion S, Choquet O. How and why to use ultrasound for regional blockade. Acta Anaesthesiol Belg. 2008; 59: 147-54.
33. Marhofer P, Schrögendorfer K, Koinig H, Kapral S, Weinstabl C, Mayer N. Ultrasound guidance improves sensory block and onset time of three-in one blocks. Anesth Analg. 1997; 85: 854-7.
34. Meena S, Arya V, Sen I, Minz M, Prakash M. Ultrasound-guided supraclavicular brachial plexus anaesthesia improves arteriovenous fistula flow characteristics in end-stage renal disease patients. Southern African Journal of Anaesthesia and Analgesia. 2015; 21(5): 12-5
35. Atlas of Human Anatomy, Frank H. Netter 4. Edition, 2006 Elsevier Inc.
36. Urmey WF. Upper Extremity Blocks. In: Brown DL, ed. Regional Anesthesia and Analgesia. 1st ed. Philadelphia: Saunders; 1996:254-78.
37. Jankovic D. Brakiyal Pleksus Blokları, Rejyonel Sinir Blokları ve İnfiltrasyon Tedavisi 3. Baskı, Logos Yayıncılık 2006, Sayfa: 82-122.
38. Admir Hadzic, Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı, Sayfa 150-60.
39. Admir Hadzic, Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı Sayfa 354-58.
40. Admir Hadzic, Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı Sayfa 168-72.
41. Admir Hadzic, Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı Sayfa 362-6.
42. Admir Hadzic, Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı Sayfa 370-1.
43. Admir Hadzic Hadzic Periferik Sinir Blokları ve Ultrason Eşliğinde Rejyonal

Anestezi İçin Anatomi, Güneş Tıp Kitapevleri 2. Baskı Sayfa 377-82.
44. Aitken E, Jackson A, Kearns R, Steven M, Kinsella J, Clancy M,. Effect of regional versus local anaesthesia on outcome after arteriovenous fistula creation: a randomised controlled trial. Lancet. 2016; 388(10049): 1067-74.
45. Kian K, Vassalotti JA. The new arteriovenous fistula: the need for earlier evaluation and intervention. Semin Dial. 2005; 18(1): 3-7.
46. Cole NM, Vlassakov K, Brovman EY, Heydarpour M, Urman RD. Regional Anesthesia for Arteriovenous Fistula Surgery May Reduce Hospital Length of Stay and Reoperation Rates. Vasc Endovascular Surg. 2018; 52(6): 418-26.
47. European Renal Association-European Dialysis and Transplant Association. Clinical Practice Guideline on peri and post-operative care of arteriovenous fistulas and grafts for haemodialysis in adults 2019. Available from:http://www.european-renal-best practice. org/ sites/defailut/files/u33/ERBP_006 VASCAC.ShortVersion.pdf.
48. Lok CE, Huber TS, Lee T, Shenoy S, Yevzlin AS, Abreo K, et al. National Kidney Foundation. KDOQI Clinical Practice Guideline for
49. Vascular Access: 2019 Update. Am J Kidney Dis. 2020;75(4 Suppl 2):1-164.