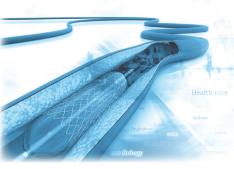
CHAPTER 2



ANESTHESIA MANAGEMENT IN THE PROXIMAL AORTIC SURGERY

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INTRODUCTION

The aorta is anatomically divided into four sections; root of the aorta (the part of the aortic valve ring, aortic valve cusps and sinus valsalva), ascending aorta (from the sinotubular junction to the beginning of the truncus brachiocephalic artery), aortic arch (horizontal part of the aorta, brachiocephalic artery, left common carotid artery and left subclavian artery are arising from the aorta), descending thoracic aorta (the part that starts after left subclavian artery, extends to the diaphragm) (1).

Aortic diseases are classified as; acute aortic syndromes, aortic aneurysms, genetic diseases affecting the aorta (Marfan syndrome, coarctation of the aorta, diseases related to bicuspid aorta), atherosclerotic lesions of the aorta, aortitis (giant cell arteritis, Takayasu arteritis), aortic tumors (2). Acute aortic dissection, intramural hematoma, penetrating aortic ulcer, aortic aneurysm rupture, pseudoaneurysm, and traumas are evaluated as acute aortic syndromes (2).

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provided by intravenous administration of protamine sulfate at a dose of 350 units per kilogram.

POSTOPERATIVE PERIOD

At the end of the operation, patients should be transferred to the intensive care unit by providing intubated and full monitoring. Coagulopathy, bleeding, cardiac tamponade, stroke or encephalopathy, malperfusion of the extremities, renal failure, respiratory failure are the major problems encountered in these patients in the postoperative intensive care unit. After a patient's hypothermia, metabolic acidosis, bleeding and coagulability disorders are corrected and hemodynamic stability is achieved, the patient should be prepared for extubation by evaluating the neurological status. Relief of pain in the postoperative period is important for the patient's respiratory functions.

CONCLUSION

Proximal aortic surgeries are the most risky surgeries of cardiovascular surgery. Anesthesia management is very important and is one of the factors affecting mortality and morbidity of patients. The anesthetist should work in coordination with the surgeon and perfusionist. The patient should be followed closely and carefully perioperatively, and additional monitorizations are required for prognosis.

REFERENCES

- 1. Kudsioğlu, T. (2015). Aort anevrizmaları ve Diseksiyonlarında Anestezi Yönetimi. Aslı Dönmez (Ed.), Kalp ve Anestezi içinde (s. 417 - 32). Ankara: İntertip Yayınevi.
- 2. Erkuş ME, Demirbağ R. 2014 Avrupa Kardiyoloji Derneği Aort Hastalıkları Kılavuzu'nda öne çıkanlar. Türk Kardiyol Dern Arş - Arch Turk Soc Cardiol. 2015; 43(1): 12-7.
- 3. Nienaber CA, Eagle KA. Aortic dissection: new frontiers in diagnosis and management: Part I: from etiology to diagnostic strategies. Circulation. 2003; 108(5): 628.
- 4. Hensley, F.A, Martin D. E, Gravlee G. P. (2014). Pratik Yaklaşım ile Kardiyak Anestezi. (Çiğdem Evren Denker, Çev. Ed.). Ankara: Güneş tıp Kitabevleri.
- 5. Nienaber CA, Eagle KA. Aortic dissection: new frontiers in diagnosis and management: Part II: therapeutic management and follow-up. Circulation. 2003; 108(6): 772.

- 6. Lombardi JV, Hughes GC, Appoo JJ, Bavaria JE, Beck AW, Cambria RP et al. Society for Vascular Surgery (SVS) and Society of Thoracic Surgeons (STS) reporting standards for type B aortic dissections. J Vasc Surg. 2020; 71(3): 723-47.
- 7. Tsai TT, Nienaber CA, Eagle KA. Acute aortic syndromes. Circulation. 2005; 112 (24): 3802-13
- 8. Murphy MC, Castner CF, Kouchoukos NT. Acute Aortic Syndromes: Diagnosis and Treatment. Mo Med. 2017; 114(6): 458-63.
- 9. Downey RJ, Austin JH, Pepino P, Dickstein ML, Homma S, Rose EA. Right ventricular obstruction in aortic dissection: a mechanism of hemodynamic collapse. Ann Thorac Surg. 1996; 61(3): 988-90.
- 10. Nishiwaki K, Komatsu T, Shimada Y, Takeuchi E, Abe T. Severe tracheal compression caused by false aneurysm arising from the ascending aorta: successful airway management using induced hypotension and bronchoscopy. Anesthesiology. 1990; 73(5):1047-9.
- 11. Kavrut Öztürk N, Öztürk T. (2020). Aort anevrizması ve diseksiyonlarında anestezi. Aydoğdu Titiz T (Ed), Kardiyovasküler Anestezi (s.84-90) 1. Baskı. Ankara: Türkiye Klinikleri; .
- 12. Juo YY, Mantha A, Ebrahimi R, Ziaeian B, Benharash P. Incidence of Myocardial Infarction After High-Risk Vascular Operations in Adults. JAMA Surg. 2017; 152(11): e173360.
- 13. Feldman M, Shah M, Elefteriades JA. Medical management of acute type A aortic dissection. Ann Thorac Cardiovasc Surg. 2009;15(5):286-93.
- 14. Harrington P, Davies J, Melby S. Diagnosis and clinical management of aortic dissection. Research Reports in Clinical Cardiology. 2014;5:123-32.
- 15. Torasik Aort Hastalıklarının Tanı ve Tedavisinde Ortak Görüşler. Aort Cerrahisi ve Endovasküler Tedaviler Çalışma Grubu. Türk Kalp ve Damar Cerrahisi Derneği 2016 http:// ebem.com/ public/ uploads/ files/ pdf/ Torasik Aort Hastalikların Tanı ve Tedavisinde Ortak Görüsler.
- 16. Matalanis G, Hata M, Buxton BF. A retrospective comparative study of deep hypothermic circulatory arrest, retrograde and antegrade cerebral perfusion in aortic arch surgery. Ann Thorac Cardiovasc Surg. 2003; 9: 174-9.
- 17. Englum BR, Andersen ND, Husain AM, Mathew JP, Hughes GC. Degree of hypothermia in aortic arch surgery optimal temperature for cerebral and spinal protection: deep hypothermia remains the gold standard in the absence of randomized data. Ann Cardiothorac Surg. 2013; 2(2):184-93.
- 18. Stecker MM, Cheung AT, Pochettino A, Kent GP, Patterson T, Weiss SJ, Bavaria JE. Deep hypothermic circulatory arrest: I. Effects of cooling on electroencephalogram and evoked potentials. Ann Thorac Surg. 2001; 71(1): 14.
- 19. American Society of Anesthesiologists and Society of Cardiovascular Anesthesiologists Task Force on Transesophageal Echocardiography. Practice guidelines for perioperative transesophageal echocardiography. An updated report by the American Society of Anesthesiologists and the Society of Cardiovascular

- Anesthesiologists Task Force on Transesophageal Echocardiography. Anesthesiology. 2010; 112(5): 1084-96.
- 20. Gregory SH, Yalamuri SM, Bishawi M, Swaminathan M. The Perioperative Management of Ascending Aortic Dissection. Anesth Analg. 2018; 127(6): 1302.
- 21. Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VF, Casey DE Jr et al. 2010 ACCF/ AHA/ AATS/ ACR/ ASA/ SCA/ SCAI/ SIR/ STS/ SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. Circulation. 2010; 121(13): e266.
- 22. Kertai MD, Whitlock EL, Avidan MS. Brain monitoring with electroencephalography and the electroencephalogram-derived bispectral index during cardiac surgery. Anesth Analg. 2012; 114(3): 533-46.
- 23. James ML, Andersen ND, Swaminathan M, Phillips-Bute B, Hanna JM, Smigla GR et al. Predictors of electrocerebral inactivity with deep hypothermia. J Thorac Cardiovasc Surg. 2014; 147(3): 1002-7.
- 24. Thiele RH, Shaw AD, Bartels K, Brown CH, Grocott H, Heringlake M et al. Perioperative Quality Initiative (POQI) 6 Workgroup. American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on the Role of Neuromonitoring in Perioperative Outcomes: Cerebral Near-Infrared Spectroscopy. Anesth Analg. 2020; 131(5): 1444.
- 25. Fischer GW, Lin HM, Krol M, Galati MF, Di Luozzo G, Griepp RB, et al. Noninvasive cerebral oxygenation may predict outcome in patients undergoing aortic arch surgery. J Thorac Cardiovasc Surg. 2011; 141(3): 815-21.
- 26. Fegley MW, Spelde A, Johnson D, Desai ND, Levy WJ. Malperfusion During Hypothermic Antegrade Cerebral Perfusion: Cerebral Perfusion Index-An Early Indicator Compared to Cerebral Oximetry. J Cardiothorac Vasc Anesth. 2018; 32(4): 1835.
- 27. Karaca Ü. (2020). Kardiyovasküler Cerrahi ve Anestezi. Gökhan Yaman, Serra Topal (Ed.), Anesteziye Güncel Yaklaşım içinde (s. 328-30). Ankara: Akademisyen Kitabevi.
- 28. Tanaka A, Estrera AL. Simple retrograde cerebral perfusion is as good as complex antegrade cerebral perfusion for hemiarch replacement. J Vis Surg. 2018; 4: 50.
- 29. Lau C, Gaudino M, Iannacone EM, Gambardella I, Munjal M, Ohmes LB et al. Retrograde Cerebral Perfusion Is Effective for Prolonged Circulatory Arrest in Arch Aneurysm Repair. Ann Thorac Surg. 2018; 105(2): 491.
- 30. Stamou SC, Rausch LA, Kouchoukos NT, Lobdell KW, Khabbaz K, Murphy E, et al. Comparison between antegrade and retrograde cerebral perfusion or profound hypothermia as brain protection strategies during repair of type A aortic dissection. Ann Cardiothorac Surg. 2016; 5(4): 328.

- 31. Leshnower BG, Rangaraju S, Allen JW, Stringer AY, Gleason TG, Chen EP. Deep Hypothermia With Retrograde Cerebral Perfusion Versus Moderate Hypothermia With Antegrade Cerebral Perfusion for Arch Surgery. Ann Thorac Surg. 2019; 107(4): 1104.
- 32. Makkinejad AO, Jr JC, Norton EL, et al. Sedatives during circulatory arrest are not necessary for aortic arch repair in acute type A aortic dissection. Chin Med J. 2020; 134(2): 219-21.
- 33. Stecker MM, Cheung AT, Pochettino A, Kent GP, Patterson T, Weiss SJ, Bavaria JE. Deep hypothermic circulatory arrest: II. Changes in electroencephalogram and evoked potentials during rewarming. Ann Thorac Surg. 2001; 71(1): 22-8.
- 34. Ghadimi K, Gutsche JT, Ramakrishna H, Setegne SL, Jackson KR, Augoustides JG et al. Sodium bicarbonate use and the risk of hypernatremia in thoracic aortic surgical patients with metabolic acidosis following deep hypothermic circulatory arrest. Ann Card Anaesth. 2016; 19(3): 454-62.