

2. 1.c. Aort

2.1.c.1. Asendan Aort Hastalıkları ve Medikal Tedavisi

Ahmet Rıfki ORA¹

Giriş

Aorta insan vücudundaki en büyük arterdir. İnsan ömrü boyunca ortalama 150 ila 200 milyon litre kanın vücuda taşınıp dağıtılmasından sorumludur. Her ne kadar bütün bir yapı olsa da, klinik açıdan referans olabilmesi için esas olarak diafragma ile torakal ve abdominal aorta olarak 2 ana bölüme ayrılır. Diafragmaya kadar olan kısım torakal aorta olarak bilinir ve kendi arasında asendan, arkus ve desendan aorta olarak bölümlere ayrılır. Asendan aorta sinotübüler bileşkeden başlar ve brakiosefalik trunkusa kadar devam eder. Brakiosefalik trunkus ile sol subklavian arter arasındaki kısım arkus aorta, sol subklavian arterden başlayarak diafragmaya kadar olan kısım ise desendan aorta olarak isimlendirilir. Aorta 3 katmanlı bir yapıdır. Bu tabakalar; Tunica intima, tunica media ve tunica externa olarak adlandırılır. “Elastik arter” yapısının bir prototipidir ve bunu sağlayabilmesi için de oldukça kalın media tabakasında zengin düz kas ve elastik fiberler içermektedir. Bu sayede oldukça elastik bir halde olan aortanın kalınlığı genç erişkinlerde yaklaşık 2 mm kadar olmaktadır (1). Bu kalınlığa sahip olan aortanın duvarının beslenebilmek için kendisine ait vasa vasorum adı verilen bir damar ağı bulunur. Ortalama düz kas hacmi

¹ Op. Dr., Isparta Şehir Hastanesi Kalp-Damar Cerrahisi Kliniği, drahmecora@gmail.com

olarak önerilmemektedir (80). Enfeksiyonun natürü net olarak belirlendiğinde, spektrumunun daraltılması uygun yaklaşım olacaktır. cerrahi tedavi olmadan, sadece antibiyoterapi ile devam edilmesi hem teşhis hem de kesin sonuç için önerilmemektedir ve hastane içi mortaliteyi %50 oranında arttırdığı bildirilmiştir (81). Cerrahi girişim sonrasında intravenöz antibiyoterapinin minimum 6 hafta süre ile, seçilmiş vakalarda ise bu sürenin 6 aya uzatılarak devamı uygun görülmektedir (82). Bu tedaviden sonra baskılayıcı antibiyoterapi devamı halen daha tartışmalı bir konudur ancak enfekte aortun cerrahi müdahalesi sonrasında greft materyalinin konulduğu alanlar ulaşılması güç bölgeler olması nedeniyle yenileyen bir enfeksiyonun engellenmesi için çoğu yayında enfeksiyonun yenileme riski olan hastalarda veya agresif enfeksiyon sonrası cerrahi tedavi yapılan olgularda ömür boyu antibiyotik kullanımı önerilmektedir (83,84).

Sonuç

Asendan aort patolojilerinin çoğunun tedavisi sonuçta cerrahiye dayanmaktadır. Ancak aort diseksiyonu gibi çok acil cerrahi müdahaleyi gerektiren durumlar dışında kalan patolojilerde medikal tedavi ve medikal tedavi ile takip de tedavide önemli yer almaktadır.

Kaynaklar

1. Mensel B, Kühn JP, Schneider T et al. Mean thoracic aortic wall thickness determination by cine MRI with steady-state free precession: validation with dark blood imaging. *Acad Radiol.* 2013; 20(8):1004-1008. doi: 10.1016/j.acra.2013.03.014.
2. Levický V, Doležel S. Elastic tissue and smooth muscle volume in elastic and muscular type arteries in the dog. *Physiol Bohemoslov.* 1980; 29(4):351-360.
3. Dieter, Robert S., Raymond A. Dieter Jr, and Raymond A. Dieter III, eds. (2019) *Diseases of the Aorta.* Springer Nature.
4. Braverman AC, Thompson RW, Sanchez LA. (2012) *Braunwald's Heart Disease.* (9th edit) Philadelphia:Elsevier Saunders.
5. Erbel R, Aboyans V, Boileau C et al. Grupa Robocza Europejskiego Towarzystwa Kardiologicznego (ESC) do spraw rozpoznawania i leczenia chorób aorty. Wytuczne ESC dotyczące rozpoznawania i leczenia chorób aorty w 2014 roku (2014 ESC Guidelines on the diagnosis and treatment of aortic diseases). *Kardiol Pol.* 2014; 72(12):1169-1252. Polish. doi: 10.5603/KP.2014.0225.
6. Logan AG. Hypertension in aging patients. *Expert Rev Cardiovasc Ther.* 2011; 9(1):113-120. doi: 10.1586/erc.10.171.
7. Davis A, Holloway C, Lewandowski AJ et al. Diameters of the normal thoracic aorta measured by cardiovascular magnetic resonance imaging; correlation with gender, body surface area and body mass index. *Journal of Cardiovascular Magnetic Resonance.* 2013; 15(1): 1-3.

8. Devereux RB, de Simone G, Arnett DK et al. Normal limits in relation to age, body size and gender of two-dimensional echocardiographic aortic root dimensions in persons ≥ 15 years of age. *Am J Cardiol.* 2012;110(8):1189-1194. doi: 10.1016/j.amjcard.2012.05.063
9. Kältsch H, Lehmann N, Möhlenkamp S et al. Body-surface adjusted aortic reference diameters for improved identification of patients with thoracic aortic aneurysms: results from the population-based Heinz Nixdorf Recall study. *Int J Cardiol.* 2013;163(1):72-78. doi: 10.1016/j.ijcard.2011.05.039.
10. Rogers IS, Massaro JM, Truong QA et al. Distribution, determinants, and normal reference values of thoracic and abdominal aortic diameters by computed tomography (from the Framingham Heart Study). *Am J Cardiol.* 2013;111(10):1510-1516. doi: 10.1016/j.amjcard.2013.01.306.
11. Vríz O, Driussi C, Bettio M et al. Aortic root dimensions and stiffness in healthy subjects. *Am J Cardiol.* 2013;112(8):1224-1229. doi: 10.1016/j.amjcard.2013.05.068.
12. Mongeon FP, Marcotte F, Terrone DG. Multimodality Noninvasive Imaging of Thoracic Aortic Aneurysms: Time to Standardize? *Can J Cardiol.* 2016;32(1):48-59. doi: 10.1016/j.cjca.2015.09.025.
13. Hiratzka LF, Bakris GL, Beckman JA, 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. *J Am Coll Cardiol.* 2010;55(14):127-129. doi: 10.1016/j.jacc.2010.02.015.
14. von Kodolitsch Y, Nienaber CA, Dieckmann C et al. Chest radiography for the diagnosis of acute aortic syndrome. *Am J Med* 2004;116(2):73-77. doi: 10.1016/j.amjmed.2003.08.030.
15. Evangelista A, Flachskampf FA, Erbel R et al. Echocardiography in aortic diseases: EAE recommendations for clinical practice. *Eur J Echocardiogr* 2010;11(8):645-658. doi: 10.1093/ejechocard/jeq056. Erratum in: *Eur J Echocardiogr.* 2011;12(8):642.
16. Van Zaane B, Nierich AP, Buhre WF et al. Resolving the blind spot of transesophageal echocardiography: a new diagnostic device for visualizing the ascending aorta in cardiac surgery. *Br J Anaesth* 2007;98(4):434-441 doi: 10.1093/bja/aem009.
17. Mussa FF, Horton JD, Moridzadeh R et al. Acute Aortic Dissection and Intramural Hematoma: A Systematic Review. *JAMA.* 2016;316(7):754-63. doi: 10.1001/jama.2016.10026.
18. Mitchell RN. (2015) Blood Vessels. *Robbins and cotran pathologic basis of disease.* Philadelphia: Elsevier Saunders.
19. Kuzmik GA, Sang AX, Elefteriades JA. Natural history of thoracic aortic aneurysms. *J Vasc Surg* 2012;56(2):565-571. doi: 10.1016/j.jvs.2012.04.053.
20. Ladich E, Yahagi K, Romero ME et al. Vascular diseases: aortitis, aortic aneurysms, and vascular calcification. *Cardiovasc Pathol* 2016; 25(5):432-441. doi: 10.1016/j.carpath.2016.07.002.
21. Bossone E, Eagle KA. Epidemiology and management of aortic disease: aortic aneurysms and acute aortic syndromes. *Nat Rev Cardiol* 2021; 18(5):331-348. doi: 10.1038/s41569-020-00472-6.
22. Erbel R, Aboyans V, Boileau C et al. ESC Committee for Practice Guidelines. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J.* 2014;35(41):2873-2926. doi: 10.1093/eurheartj/ehu281.
23. Isselbacher EM. Thoracic and abdominal aortic aneurysms. *Circulation.* 2005;111(6):816-28. doi: 10.1161/01.CIR.0000154569.08857.7A.
24. Albornoz G, Coady MA, Roberts M, Davies RR, Tranquilli M, Rizzo JA, Elefteriades JA. Familial thoracic aortic aneurysms and dissections--incidence, modes of inheritance, and phenotypic patterns. *Ann Thorac Surg.* 2006;82(4):1400-1405. doi: 10.1016/j.athoracur.2006.04.098.

25. Laukka D, Pan E, Fordell T et al. Prevalence of thoracic aortic aneurysms and dilatations in patients with intracranial aneurysms. *J Vasc Surg.* 2019;70(6):1801-1808. doi: 10.1016/j.jvs.2019.01.066.
26. Braverman, A. C., Schermerhorn M. (2018) *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine* (11th edit) Philadelphia:Elsevier Saunders.
27. Hiratzka LF, Bakris GL, Beckman JA et al. 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; Society for Vascular Medicine. 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):266-369. doi: 10.1161/CIR.0b013e3181d4739e.
28. Bossone E, Pluchinotta FR, Andreas M et al. Aortitis. *Vascul Pharmacol.* 2016;80:1-10. doi: 10.1016/j.vph.2015.11.084.
29. Tajima Y, Goto H, Ohara M et al. Oral Steroid Use and Abdominal Aortic Aneurysm Expansion- Positive Association. *Circ J.* 2017; 81(12):1774-1782. doi: 10.1253/circj.CJ-16-0902.
30. Halushka MK, Angelini A, Bartoloni G et al. Consensus statement on surgical pathology of the aorta from the Society for Cardiovascular Pathology and the Association For European Cardiovascular Pathology: II. Noninflammatory degenerative diseases - nomenclature and diagnostic criteria. *Cardiovasc Pathol.* 2016;25(3):247-257. doi: 10.1016/j.carpath.2016.03.002.
31. Halushka, Marc K. Genetic diseases of the aorta (including aneurysms). *Cellular and Molecular Pathobiology of Cardiovascular Disease.* Academic Press, 2014; 239-255.
32. Jain D, Dietz HC, Oswald GL, et al. Causes and histopathology of ascending aortic disease in children and young adults. *Cardiovasc Pathol.* 2011;20(1):15-25. doi: 10.1016/j.carpath.2009.09.008.
33. Booher AM, Eagle KA. Diagnosis and management issues in thoracic aortic aneurysm. *Am Heart J.* 2011;162(1):38-46.e1. doi: 10.1016/j.ahj.2011.04.010.
34. Clouse WD, Hallett JW Jr, Schaff HV et al. Improved prognosis of thoracic aortic aneurysms: a population-based study. *JAMA.* 1998; 280(22):1926-1929. doi: 10.1001/jama.280.22.1926.
35. Piepoli MF, Hoes AW, Agewall S et al. ESC Scientific Document Group. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur Heart J.* 2016; 37(29):2315-2381. doi: 10.1093/eurheartj/ehw106.
36. Mach F, Baigent C, Catapano AL et al. ESC Scientific Document Group. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. *Eur Heart J.* 2020;41(1):111-188. doi: 10.1093/eurheartj/ehz455. Erratum in: *Eur Heart J*, 41(44):4255.

37. Ladouceur M, Fermanian C, Lupoglazoff JM et al. Effect of beta-blockade on ascending aortic dilatation in children with the Marfan syndrome. *Am J Cardiol.* 2007;99(3):406-9. doi: 10.1016/j.amjcard.2006.08.048.
38. Ahimastos AA, Aggarwal A, D'Orsa KM et al. Effect of perindopril on large artery stiffness and aortic root diameter in patients with Marfan syndrome: a randomized controlled trial. *JAMA.* 2007;298(13):1539-1547. doi: 10.1001/jama.298.13.1539. Retraction in: *JAMA,* 314(24):2692-2693.
39. Yetman AT, Bornemeier RA, McCrindle BW. Usefulness of enalapril versus propranolol or atenolol for prevention of aortic dilation in patients with the Marfan syndrome. *Am J Cardiol.* 2005;95(9):1125-1127. doi: 10.1016/j.amjcard.2005.01.032. PMID: 15842990.
40. Hiratzka LF, Bakris GL, Beckman JA et al. 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; Society for Vascular Medicine. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with thoracic aortic disease: executive summary. 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. *Catheter Cardiovasc Interv.* 2010;76(2):43-86. doi: 10.1002/ccd.22537.
41. Clough RE, Nienaber CA. Management of acute aortic syndrome. *Nat Rev Cardiol.* 2015;12(2):103-14. doi: 10.1038/nrcardio.2014.203.
42. Januzzi JL, Marayati F, Mehta RH et al. Comparison of aortic dissection in patients with and without Marfan's syndrome (results from the International Registry of Aortic Dissection). *Am J Cardiol.* 2004; 94(3):400-402. doi: 10.1016/j.
43. Golledge J, Eagle KA. Acute aortic dissection. *Lancet.* 2008; 372(9632):55-66. doi: 10.1016/S0140-6736(08)60994-0.
44. Mussa FF, Horton JD, Moridzadeh R et al. Acute Aortic Dissection and Intramural Hematoma: A Systematic Review. *JAMA.* 2016; 316(7):754-763. doi: 10.1001/jama.2016.10026.
45. DeMartino RR, Sen I, Huang Y et al. Population-Based Assessment of the Incidence of Aortic Dissection, Intramural Hematoma, and Penetrating Ulcer, and Its Associated Mortality From 1995 to 2015. *Circ Cardiovasc Qual Outcomes.* 2018;11(8):e004689. doi: 10.1161/CIRCOUTCOMES.118.004689.
46. Chiu KW, Lakshminarayan R, Ettles DF. Acute aortic syndrome: CT findings. *Clin Radiol.* 2013;68(7):741-748. doi: 10.1016/j.crad.2013.03.001.
47. Uchida K, Imoto K, Takahashi M et al. Pathologic characteristics and surgical indications of superacute type A intramural hematoma. *Ann Thorac Surg.* 2005;79(5):1518-1521. doi: 10.1016/j.athoracsur.2004.11.017.
48. Alomari IB, Hamirani YS, Madera G et al. Aortic intramural hematoma and its complications. *Circulation.* 2014;129(6):711-716. doi:10.1161/CIRCULATIONAHA.113.001809.
49. Nathan DP, Boonn W, Lai E et al. Presentation, complications, and natural history of penetrating atherosclerotic ulcer disease. *J Vasc Surg.* 2012;55(1):10-15. doi: 10.1016/j.jvs.2011.08.005.
50. Jánosi RA, Gorla R, Tsagakis K et al. Thoracic Endovascular Repair of Complicated Penetrating Aortic Ulcer: An 11-Year Single-Center Experience. *J Endovasc Ther.* 2016;23(1):150-9. doi: 10.1177/1526602815613790.

51. Quint LE, Williams DM, Francis IR et al. Ulcer like lesions of the aorta: imaging features and natural history. *Radiology*. 2001; 218(3):719-723. doi:10.1148/radiology.218.3.r01mr24719.
52. Bolger AF. Aortic intramural haematoma. *Heart*. 2008; 94(12):1670-1674. doi: 10.1136/hrt.2007.132811.
53. Feldman M, Shah M, Elefteriades JA. Medical management of acute type A aortic dissection. *Ann Thorac Cardiovasc Surg*. 2009; 15(5):286-293.
54. Bonser RS, Ranasinghe AM, Loubani M et al. Evidence, lack of evidence, controversy, and debate in the provision and performance of the surgery of acute type A aortic dissection. *J Am Coll Cardiol*. 2011;58(24):2455-2474. doi: 10.1016/j.jacc.2011.06.067.
55. Tolenaar JL, van Bogerijen GH, Eagle KA et al. Update in the management of aortic dissection. *Curr Treat Options Cardiovasc Med*. 2013;15(2):200-213. doi: 10.1007/s11936-012-0226-1.
56. Maleszewski JJ. Inflammatory ascending aortic disease: perspectives from pathology. *J Thorac Cardiovasc Surg*. 2015;149(2 Suppl):176-183. doi: 10.1016/j.jtcvs.2014.07.046.
57. Stone JR, Bruneval P, Angelini A et al. Consensus statement on surgical pathology of the aorta from the Society for Cardiovascular Pathology and the Association for European Cardiovascular Pathology: I. Inflammatory diseases. *Cardiovasc Pathol*. 2015;24(5):267-278. doi: 10.1016/j.carpath.2015.05.001.
58. Evans JM, O'Fallon WM, Hunder GG. Increased incidence of aortic aneurysm and dissection in giant cell (temporal) arteritis. A population-based study. *Ann Intern Med*. 1995;122(7):502-7. doi: 10.7326/0003-4819-122-7-199504010-00004.
59. Arend WP, Michel BA, Bloch DA et al.. The American College of Rheumatology 1990 criteria for the classification of Takayasu arteritis. *Arthritis Rheum*. 1990;33(8):1129-1134. doi: 10.1002/art.1780330811.
60. Evaluation of diagnostic ('classification') criteria in Behçet's disease--towards internationally agreed criteria. The International Study Group for Behçet's disease. *Br J Rheumatol*. 1992;31(5):299-308. PMID: 1581771.
61. Goie The HS, Steven MM, van der Linden SM et al. Evaluation of diagnostic criteria for ankylosing spondylitis: a comparison of the Rome, New York and modified New York criteria in patients with a positive clinical history screening test for ankylosing spondylitis. *Br J Rheumatol*. 1985;24(3):242-249. doi: 10.1093/rheumatology/24.3.242.
62. Gornik HL, Creager MA. Aortitis. *Circulation*. 2008; 117(23):3039-3051. doi: 10.1161/CIRCULATIONAHA.107.760686.
63. Huston KA, Hunder GG, Lie JT et al. Temporal arteritis: a 25-year epidemiologic, clinical, and pathologic study. *Annals of Internal Medicine*. 1978;88(2):162-167. doi: 10.7326/0003-4819-88-2-162.
64. Austen WG, Blennerhassett JB. Giant-cell aortitis causing an aneurysm of the ascending aorta and aortic regurgitation. *N Engl J Med*. 1965;272:80-83. doi: 10.1056/NEJM196501142720205.
65. Lupi-Herrera, Eulo, et al. Takayasu's arteritis. Clinical study of 107 cases. *American heart journal*. 1977;93(1):94-103. doi: 10.1016/s0002-8703(77)80178-6
66. Ishikawa K. Natural history and classification of occlusive thromboaropathy (Takayasu's disease). *Circulation*. 1978;57(1): 27-35. doi: 10.1161/01.cir.57.1.27.
67. Nasu T. Pathology of pulseless disease: a systematic study and critical review of twenty-one autopsy cases reported in Japan. *Angiology*. 1963;14(5):225-242. doi: 10.1177/000331976301400502.
68. Salvarani C, Cantini F, Boiardi L et al. Polymyalgia rheumatica and giant-cell arteritis. *N Engl J Med*. 2002;347(4):261-271. doi: 10.1056/NEJMra011913.

69. Maksimowicz-McKinnon K, Clark TM, Hoffman GS. Limitations of therapy and a guarded prognosis in an American cohort of Takayasu arteritis patients. *Arthritis Rheum.* 2007;56(3):1000-1009. doi: 10.1002/art.22404.
70. Hoffman GS, Cid MC, Hellmann DB et al. International Network for the Study of Systemic Vasculitides. A multicenter, randomized, double-blind, placebo-controlled trial of adjuvant methotrexate treatment for giant cell arteritis. *Arthritis Rheum.* 2002;46(5):1309-1318. doi: 10.1002/art.10262.
71. Stone JR, Bruneval P, Angelini A et al. Consensus statement on surgical pathology of the aorta from the Society for Cardiovascular Pathology and the Association for European Cardiovascular Pathology: I. Inflammatory diseases. *Cardiovasc Pathol.* 2015;24(5):267-278. doi: 10.1016/j.carpath.2015.05.001.
72. Maleszewski JJ. Inflammatory ascending aortic disease: perspectives from pathology. *J Thorac Cardiovasc Surg.* 2015;149(2 Suppl):176-183. doi: 10.1016/j.jtcvs.2014.07.046.
73. Ewart JM, Burke ML, Bunt TJ. Spontaneous abdominal aortic infections. Essentials of diagnosis and management. *Am Surg.* 1983; 49(1):37-50.
74. Sekar N. Primary aortic infections and infected aneurysms. *Ann Vasc Dis.* 2010;3(1):24-27. doi: 10.3400/avd.AVDctiia09001.
75. Wittgen CM, Sanford JL, Mai K, Doan MK. Aortic Infection: Pathophysiology, Bacteriology, and Management. *Diseases of the Aorta* (2019) Springer, Cham.
76. Fichelle JM, Tabet G, Cormier P et al. Infected infrarenal aortic aneurysms: when is in situ reconstruction safe? *J Vasc Surg.* 1993; 17(4):635-645. doi: 10.1067/mva.1993.38670.
77. Gelabert HA, Quinones-Baldrich WJ. Mycotic aneurysm of the suprarenal aorta secondary to *Streptococcus pneumoniae*: an unusual pathogen. *Ann Vasc Surg.* 1991;5(6):529-532. doi: 10.1007/BF02015277.
78. Bennett DE. Primary mycotic aneurysms of the aorta. Report of case and review of the literature. *Arch Surg.* 1967;94(6):758-765. doi: 10.1001/archsurg.1967.01330120012004. PMID: 6071707.
79. Mundth ED, Darling RC, Alvarado RH, Buckley MJ, Linton RR, Austen WG. Surgical management of mycotic aneurysms and the complications of infection in vascular reconstructive surgery. *Am J Surg.* 1969;17(4):460-470. doi: 10.1016/0002-9610(69)90004-x.
80. Gornik HL, Creager MA. Aortitis. *Circulation.* 2008;117(23):3039-3051. doi: 10.1161/CIRCULATIONAHA.107.760686.
81. Hsu RB, Chang CI, Wu IH, Lin FY. Selective medical treatment of infected aneurysms of the aorta in high risk patients. *J Vasc Surg.* 2009; 49(1):66-70. doi: 10.1016/j.jvs.2008.08.004.
82. Clough RE, Black SA, Lyons OT, Zayed HA, Bell RE, Carrell T, Waltham M, Sabharwal T, Taylor PR. Is endovascular repair of mycotic aortic aneurysms a durable treatment option? *Eur J Vasc Endovasc Surg.* 2009;37(4):407-412. doi: 10.1016/j.ejvs.2008.11.025.
83. Kim YW. Infected aneurysm: current management. *Ann Vasc Dis.* 2020;3(1):7-15. doi: 10.3400/avd.AVDctiia09003.
84. Weis-Müller BT, Rascanu C, Sagban A, Grabitz K, Godehardt E, Sandmann W. Single-center experience with open surgical treatment of 36 infected aneurysms of the thoracic, thoracoabdominal, and abdominal aorta. *Ann Vasc Surg.* 2011;25(8):1020-1025. doi: 10.1016/j.avsg.2011.03.009.