



BÖLÜM 89

Pulmoner Hipertansiyon Varlığında Peroperatif Hasta Yönetimi

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GİRİŞ

Pulmoner Hipertansiyon(PH); yüksek pulmoner arter basıncı(PAB) ve pulmoner vasküler rezistanisin (PVR) eşlik ettiği, sonuçta sağ kalp yetmezliği (SKY) ile sonuçlanan klinik durumdur.¹ PH, sağ kalp fonksiyonları üzerindeki olumsuz etkisi nedeniyle sağ kalımı etkiler.

PH 5 grup altında sınıflandırılmaktadır. Sol kalp hastalıklarına bağlı PH (SoKH-PH) 2. grubu oluşturur ve en çok karşılaşılan alt gruptur. Prevelansı çalışmalarla ekokardiyografik tanı kriterlerinin farklılığı nedeniyle %23-80 arasında değişmektedir.² SoKH-PH yönetmek için altta yatan etiyolojinin tedavisinin optimizasyonu dışında spesifik kabul gören kesin tedavi mevcut değildir.

SoKH-PH nedenleri; kapak hastalıkları, iskemik kalp hastalıkları, ve sol kalp yetmezliğidir. (korunmuş ya da azalmış ejeksiyon fraksiyonu ile birlikte.³ Semptomatik şiddetli mitral kapak hastalığının neredeyse tamamında, semptomatik aort darlığı hastalarının %60'ında, ciddi sol ventrikül sistolik disfonksiyonunun %60'ında, izole diyastolik disfonksiyonun %70'inde ve kalp yetmezliğinin %25 - %100'ünde PH ile karşılaşılmaktadır.⁴

PH; pulmoner yataktaki yeniden yapılanmanın henüz gelişmediği izole postkapiller PH ve yeniden yapılanmanın olduğu kombinasyon (Prekapiller ve Postkapiller) PH olarak karşımıza çıkabilir.⁵ Tablo 1

Tablo 1: Pulmoner Hipertansiyon ve hemodinamik parametreler

İZOLE POSTKAPİLLER PHT	MAP > 20 mmHg PCWB >15 mmHg Diastolik Pulmoner Gradiyent(DPG) <7 mmHg PVR < 3 WU Trans Pulmoner Gradiyent(TPG) ≤12 mmHg
KOMBİNE (PREKAPİLLER ve POSTKAPİLLER PHT)	MAP > 20 mmHg PCWB >15 mmHg Diastolik Pulmoner Gradiyent(DPG) ≥ 7 mmHg PVR ≥ 3 WU TPG > 12 mmHg

PH kalp cerrahisinde önemli bir prognostik faktördür.⁶ Hastalarda hemodinamik bozulma, SKY gelişimi, solunum yetmezliği, yoğun bakım tedavisinde uzama, hastane yatis süresinde artış

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KAYNAKLAR

1. Thunberg CA, Gaitan BD, Grewal A. Pulmonary hypertension in patients undergoing cardiac surgery: pathophysiology, perioperative management, and outcomes. *J Cardiothorac Vasc Anesth.* 2013 Jun;27(3):551-72. doi: 10.1053/j.jvca.2012.07.017. Epub 2012 Oct 1. PMID: 23036624.
2. Al-Omary MS, Sugito S, Boyle AJ. Pulmonary Hypertension Due to Left Heart Disease: Diagnosis, Pathophysiology, and Therapy. *Hypertension.* 2020 Jun;75 (6):1397-1408. doi: 10.1161/HYPERTENSIONAHA.119.14330. Epub 2020 Apr 27. PMID: 32336230.
3. Vachiéry JL, Adir Y, Barberà JA. Pulmonary hypertension due to left heart diseases. *J Am Coll Cardiol.* 2013 Dec 24;62(25 Suppl):D100-8. doi: 10.1016/j.jacc.2013.10.033. PMID: 24355634.
4. Badesch DB, Champion HC, Sanchez MA, et al. Diagnosis and assessment of pulmonaryarterial hypertension. *J Am Coll Cardiol* 2009; 54: 55-6.)(Vahanian A, Baumgartner H, Bax J, Butchart E, Dion R, Filippatos G, et al. Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology; ESC Committee for Practice Guidelines. Guidelines on the management of valvular heart disease: The Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology. *Eur Heart J* 2007; 28: 230-68.
5. Simonneau G, Montani D, Celermajer DS. Haemodynamic definitions and updated clinical classification of pulmonary hypertension. *Eur Respir J.* 2019 Jan 24;53(1):1801913. doi: 10.1183/13993003.01913-2018. PMID: 30545968; PMCID: PMC6351336.
6. By Anne Q. N. Nguyen, Alain Deschamps. Perioperative Considerations in Cardiac Surgery. Chapter 15 A Pathophysiological Approach to Understanding Pulmonary Hypertension in Cardiac Surgery Submitted: February 22nd 2011 Reviewed: September 2nd 2011 Published: February 29th 2012 DOI: 10.5772/27744
7. Anne Q. N. Nguyen, Alain Deschamps. A Pathophysiological Approach to Understanding Pulmonary Hypertension in Cardiac Surgery. Denault Montreal Heart Institute and Université de Montréal Canada perioperative considerations in cardiac surgery. February 29th 2012. DOI: 10.5772/27744
8. Wan S, LeClerc JL, Vincent JL. Inflammatory response to cardiopulmonary bypass: mechanisms involved and possible therapeutic strategies. *Chest.* 1997 Sep;112(3):676-92. doi: 10.1378/chest.112.3.676. PMID: 9315800.
9. Lesage AM, Tsuchioka H, Young WG Jr. Pathogenesis of pulmonary damage during extracorporeal perfusion. *Arch Surg.* 1966 Dec;93(6):10028. doi:10.1001/arch-surg.1966.01330060146021. PMID: 5954321.
10. Whitman GJ, Martel D, Weiss M, et al. Reversal of protamine-induced catastrophic pulmonary vasoconstriction by prostaglandin E1. *Ann Thorac Surg* 1990;50:303-5.
11. Jerath A, Srinivas C, Vegas A. The successful management of severe protamine-induced pulmonary hyper-
12. Ralley FE. The use of nitric oxide for managing catastrophic pulmonary vasoconstriction arising from protamine administration. *Anesth Analg.* 2009 Nov 21. PMID: 19933533.
13. Guan Z, Shen X, Zhang YJ, Use of epoprostenol to treat severe pulmonary vasoconstriction induced by protamine in cardiac surgery. *Medicine (Baltimore).* 2018 Jul;97(28):e10908. doi: 10.1097/MD.00000000000010908. PMID: 29995750; PMCID: PMC6076185.
14. Magne J, Mathieu P, Dumesnil JG. Impact of prosthesis-patient mismatch on survival after mitral valve replacement. *Circulation.* 2007 Mar 20;115(11):1417-25. doi:10.1161/CIRCULATIONAHA.106.631549. Epub 2007 Mar 5. PMID: 17339554.
15. Sukernik, M. R., Mets, B., & Bennett-Guerrero, E. (2001). Patent foramen ovale and its significance in the perioperative period. *Anesth Analg.* 93, 5, 1137-1146
16. Denault A, Deschamps A, Tardif JC. Pulmonary hypertension in cardiac surgery. *Curr Cardiol Rev.* 2010 Feb;6(1):1-14. doi: 10.2174/157340310790231671. PMID: 21286273; PMCID: PMC2845789.
17. Robitaille A, Denault AY, Couture P. Importance of relative pulmonary hypertension in cardiac surgery: the mean systemic-to-pulmonary artery pressure ratio. *J Cardiothorac Vasc Anesth.* 2006 Jun;20(3):331-9. doi: 10.1053/j.jvca.2005.11.018. Epub 2006 Apr 19. PMID: 16750732.
18. Gille J, Seyfarth HJ, Gerlach S. Perioperative anaesthesiological management of patients with pulmonary hypertension. *Anesthesiol Res Pract.* 2012;2012:356982. doi: 10.1155/2012/356982. Epub 2012 Oct 12. PMID: 23097665; PMCID: PMC3477529.
19. Sueta CA, Gheorghiade M, Adams KF Jr. Safety and efficacy of epoprostenol in patients with severe congestive heart failure. Epoprostenol Multicenter Research Group. *Am J Cardiol.* 1995;75:34A-43A. doi: 10.1016/s0002-9149(99)80381-6
20. Calif RM, Adams KF, McKenna WJ, et al. A randomized controlled trial of epoprostenol therapy for severe congestive heart failure: the Flolan International Randomized Survival Trial (FIRST). *Am Heart J.* 1997;134:44-54. doi: 10.1016/s0002-8703(97)70105-4
21. Lüscher TF, Enseleit F, Pacher R,, et al; Heart Failure ET(A) Receptor Blockade Trial. Hemodynamic and neurohumoral effects of selective endothelin A (ET(A)) receptor blockade in chronic heart failure: the Heart Failure ET(A) Receptor Blockade Trial (HEAT). *Circulation.* 2002;106:2666-2672. doi: 10.1161/01.cir.0000038497.80095.e1
22. Anand I, McMurray J, Cohn JN, EARTH Investigators. Long-term effects of darusentan on left-ventricular remodelling and clinical outcomes in the Endothelin A Receptor Antagonist Trial in Heart Failure (EARTH): randomised, double-blind, placebo-controlled trial. *Lancet.* 2004;364:347- 354. doi: 10.1016/S0140-6736(04)16723-8.



23. Packer M, McMurray JJV, Krum H, et al; ENABLE Investigators and Committees. Long-term effect of endothelin receptor antagonism with bosentan on the morbidity and mortality of patients with severe chronic heart failure: primary results of the ENABLE trials. *JACC Heart Fail.* 2017;5:317–326. doi: 10.1016/j.jchf.2017.02.021
24. Packer M, McMurray J, Massie BM, et al. Clinical effects of endothelin receptor antagonism with bosentan in patients with severe chronic heart failure: results of a pilot study. *J Card Fail.* 2005;11:12–20. doi: 10.1016/j.cardfail.2004.05.006
25. Kaluski E, Cotter G, Leitman M, et al. Clinical and hemodynamic effects of bosentan dose optimization in symptomatic heart failure patients with severe systolic dysfunction, associated with secondary pulmonary hypertension—a multi-center randomized study. *Cardiology.* 2008;109:273–280. doi: 10.1159/000107791
26. Koller B, Steringer-Mascherbauer R, Ebner CH, et al. Pilot study of endothelin receptor blockade in heart failure with diastolic dysfunction and pulmonary hypertension (BADDHY-Trial). *Heart Lung Circ.* 2017;26:433–441. doi: 10.1016/j.hlc.2016.09.004
27. Guazzi M, Vicenzi M, Arena R. Pulmonary hypertension in heart failure with preserved ejection fraction: a target of phosphodi-esterase-5 inhibition in a 1-year study. *Circulation.* 2011;124:164–174. doi: 10.1161/CIRCULATIONAHA.110.983866
28. Guay CA, Morin-Thibault LV, Bonnet S. Pulmonary hypertension-targeted therapies in heart failure: a systematic review and meta-analysis. *PLoS One.* 2018;13:e0204610. doi: 10.1371/journal.pone.0204610
29. Bonderman D, Ghio S, Felix SB, et al; Left Ventricular Systolic Dysfunction Associated With Pulmonary Hypertension Riociguat Trial (LEPHT) Study Group. Riociguat for patients with pulmonary hypertension caused by systolic left ventricular dysfunction: a phase IIb double-blind, randomized, placebo-controlled, dose-ranging hemodynamic study. *Circulation.* 2013;128:502–511. doi: