ných niekoľko kazuistík, ktoré dokumentujú prípady pacientov, kde sa po transplantácii srdca pre terminálne srdcové zlyhávanie zistila prítomnosť PPGL (25, 41). Na skríning PPGL by sa malo myslieť u pacientov so srdcovým zlyhávaním, najmä ak ide o mladší vek pacienta, rezistentnú artériovú hypertenziu, paroxyzmálnu hypertenziu sprevádzanú vegetatívnou symptomatológiou. Vyšetrenie metanefrínov by malo byť však optimálne realizované až po kompenzácii a odznení akútnej fázy, pre možnú falošnú pozitivitu pri akútnych stresových stavoch (15, 25).

Záver

CICMP predstavujú zriedkavú, avšak veľmi závažnú až potenciálne fatálnu komplikáciu PPGL. Včasná diagnostika a adekvátny manažment vedie u väčšiny pacientov k zlepšeniu až normalizácii funkcie srdca. V prípade neliečených pacientov, resp. pacientov s inoperabilnými alebo metastatickými formami PPGL, je miera mortality vysoká, presahuje 30 %. U cca 5 % pacientov môže byť srdcové zlyhávanie prvým prejavom PPGL, preto je potrebné zvažovať PPGL v diferenciálnej diagnostike príčin niektorých druhov kardiomyopatií (25).

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LITERATÚRA

1. Pacak K. New biology of pheochromocytoma and paraganglioma. Endocrine Practice. 2022;28:1253-1269.
2. Farrugia FA, Charalampopoulos A. Pheochromocytoma. Endocrine Regulations 2019; 53(3):191-212.
3. Fishbein L, et al. Pheochromocytoma and Paraganglioma: Genetics, Diagnosis, and Treatment. Hematol Oncol Clin North Am. 2016; 30(1):135-50.
4. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. 2008 May 21 [Updated 2023 Sep 21]. In: Adam MP, Feldman J, Mirzaa GM, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK1548/
5. Eisenhofer G, Lenders JWM. Biochemical diagnosis of pheochromocytoma, a rediscovered catecholamine-metabolizing tumor. Clin Chem. 2018;64(12):1780-1781.
6. Kumar A, Pappachan JM, Fernandez CJ. Catecholamine-induced cardiomyopathy: an endocrinologist's perspective. Rev Cardiovasc Med. 2021;22(4):1215-1228.
7. Van Vliet PD, Burchell HB, Titus JL. Focal Myocarditis Associated With Pheochromocytoma. N Engl J Med. 1966; 274(20):1102-8.
8. Ferreira VM, Marcelino M, Piechnik SK, et al. Pheochromocytoma Is Characterized by Catecholamine-Mediated Myocarditis, Focal and Diffuse Myocardial Fibrosis, and Myocardial Dysfunction. J Am Coll Cardiol. 2016; 67(20):2364-2374.
9. Wu Y, Zeng L, Zhao S, et al. Ligands of Adrenergic Receptors: A Structural Point of View-Biomolecules. 2021;11(7):936.
10. Brodde OE et Michel MC. Adrenergic and muscarinic receptors in the human heart. Pharmacol Rev. 1999;51(4):651-690.
11. Giovannitti JA Jr, Thoms SM, Crawford JJ. Alpha -2 adrenergic receptor agonists: a review of current clinical applications. Anesth Prog. 2015;62(1):31-9.
12. Steinberg SF. Beta1-adrenergic receptor regulation revisited; the role of the extracellular N-terminus. Circ Res. 2018;123(11):1199-1201.
13. Dubois-Deruy E, Gelinas R, Beauloye C, et al. Beta 3 adrenoreceptors protect from hypertrophic remodelling through AMP-activated protein kinase and autophagy ESC Heart Fail. 2020;7(3):920-932.
14. Eisenhofer G, Pacak K, Huynh T-T, et al. Catecholamine metabolomic and secretory phenotypes in phaeochromocytoma. Endocr Relat Cancer. 2010;18:97-111.
15. Santos JR, Broffferio A, Viana B, et al. catecholamine-induced cardiomyopathy in pheochromocytoma: How to manage a rare complication in a rare disease? Horm Metab Res. 2019;51(7):458-469.
16. Haft JI, Fani K. Stress and the induction of intravascular platelet aggregation in the heart. Circulation. 1973;48:164-169.
17. Eisenhofer G, Kopin IJ, Goldstein DS. Catecholamine Metabolism: a Contemporary View with Implications for Phsyiology and Medicine. Pharmacological Reviews. 2004;56:331-349.
18. Dhalla NS. Formation of Aminochrome Leads to Cardiac Dysfunction and Sudded Cardiac Death. Circulation Research. 2018;123:409-411.
19. Tsujimoto G, Manager WM, Hoffman BB. Desensitization of beta-adrenergic receptors by pheochromocytoma. Endocrinology. 1984;114:1272-1278.
20. Golbasi Z, Sakalli M, Cicek D, et al. dynamic left ventricular outflow tract obstruction in a patient with pheochromocytoma. Jpn Heart J. 1999;40:831-835.
21. Agrawal S, Shirabi J, Garg L, et al, Pheochromocytoma and stress cardiomyopathy: insight into pathogenesis. World Journal of Cardiology. 2017;9:255-260.
22. Batisse-Lignier M, Pereira B, Motreff P, et al. Acute and Chronic Pheochromocytoma-Induced Cardiomyopathies: Different Prognoses? A Systematic Analytical Review. Medicine 2015;94:50.
23. Ferreira VM, Marcelino M, Piechnik SK et al. Pheochromocytoma Is Characterized by Catecholamine-Mediated Myocarditis, Focal and Diffuse Myocardial Fibrosis, and Myocardial Dysfunction. J Am Coll Cardiol. 2016;67(20):2364-2374.
24. Agarwal V, Kant G, Hand N, et al. Takotsubo-like cardiomyopathy in pheochromocytoma. International Journal of Cardiology. 2011;153(3):241-248.
25. Szatko A, Glinicki P, Gietka-Czernel M. Pheochromocytoma/paraganglioma-associaated cardiomyopathy. Froniters in Endocrinology. 2023. doi 10.3389/fendo.2023.1204851.
26. Y-Hassan S, Falhammar H. Clinical features, complications, and outcomes of exogenous and endogenous catecholamine-triggered takotsubo syndrome: a systemiatic review and meta-analysis of 156 published cases. Clin cardiol. 2020;43(5):459-467.
27. Cornu E, Motiejunaite J, Belmihoub I, et al. Acute Stress Cardiomyopathy: Heart of pheochromocytoma. Ann Endocrinol (Paris) 2021;82(3-4):201-205.
28. Gagnon N, Mansour S, Bitton Y, et al. Takotsubo-like cardiomyopathy in a Large cohort of patients with pheochromocytoma and paraganglioma. Endocr Pract. 2017;23(10):1178-92.
29. Lenders JW, Duh QY, Eisenhofer G, et al. Pheochromocytoma and paraganglioma: an endocrine society clinical practice guideline. J Clin Endocrinol Metab. 2014;99(6):1915-42.
30. Prys-Roberts C, Farndon JR. Efficiacy and safety of doxazosin for perioperative management of patients with pheochromocytoma. World J Surg. 2002;26(8):1037-42.
31. Buitenwerf E, Osinga TE, Timmers H, et al. Efficiacy of alpha-blockers on hemodynamic control during pheochromocytoma resection: a randomized controlled trial. J Clin Endocrinol Metab. 2020;105(7):2381-91.
32. Mateucci M, Kowalewski M, Fina D et al. Extracorporeal life support for pheochromocytoma-induced cardiogenic shock: a systematic review. Perfusion. 2020;35 (1_suppl):20-28.
33. Choudhary M, Chen Y, Friedman O, et al. Pheochromocytoma Crisis Presenting With ARDS Successfully Treated With ECMO-Assisted Adrenalectomy. AACE Clin Case Rep. 2021;7(5):310-314.
34. Zhang R, Gupta D, Albert SG. Pheochromocytoma as a reversible cause of cardiomyopathy: analysis and review of the literature, Int J Cardiol. 2017;249:319-23.
35. Wani A, Adil A, Gardezi SAA et al. Pheochromocytoma presenting as hypertrophic obstructive cardiomyopathy. JAMA cardiol. 2021;6(8):974-6.
36. Huddle KR, Kalliatkis B, Skoularigis J. Pheochromocytoma associated with clinical and echocardiographic features simulating hypertrophic obstructive cardiomyopathy. Ches.t 1996;109(5):1394-7.
37. Jacob JL, da Silveira LC, de Freitas CG, et al. Pheochromocytoma with echocardiographic features of obstructive cardiomyopathy a case report. Angiology. 1994;45(11):985-9.
38. Wang Y, Yu X, Huang Y. Predictive factors for catecholamine- induced cardiomyopathy in patients with pheochromocytoma and paraganglioma. Front Endocrinol. (Lausanne) 2022;13:853878.
39. Amar J, Brunel J, Cardot Bauters C, et al. Genetic biomarkers of life-threatening pheochromocytoma-induced cardiomyopathy Endocr Relat Cancer. 2022;29(5):267-272.
40. Zhou J, Xuan H, Miao Y et al. Acute cardiac complications and subclinical myocardial injuries associated with pheochromocytoma and paraganglioma. BMC Cardiovasc Disord. 2021;21:203.
41. Dalby MC, Burke M, Radley-Smith R, et al. Pheochromocytoma presenting after cardiac transplantation for dilated cardiomyopathy. J Heart Lung Transplant. 2001;20(7):773-5.