

Bölüm 42

ANTİ-HER-2 TEDAVİLER İLE GELİŞEN KARDİYOTOKSİSİTE VE YÖNETİMİ

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GİRİŞ

Kanser hastalarının yaşamdan beklenti süresi son 15-20 yılda belirgin olarak artmıştır. Bu sonuca ulaşmak için yoğun anti kanser tedaviyle birlikte önemli oranda yan etkilerle de başa çıkmak gerekmektedir. Bunların en önemlilerinden biri ve hastanın yaşam süresi ve kalitesini en çok etkileyeni kardiyotoksitedir. Kemoterapiye bağlı klinik kalp yetersizliği (KY) insidansı %1-5 arasındadır. Asemptomatik sol ventrikül disfonksiyonu %5-20 oranındadır (1). Kemoterapiye bağlı oluşan iki tip kardiyotoksosite bilinmektedir. Tip 1 kardiyotoksosite doz bağımlıdır ve kalıcı miyokard hasarına neden olur, antrasiklinler bu kategorinin prototipidir. Tip 2 kardiyotoksosite dozdan bağımsız ve genellikle geri dönüşümlüdür, trastuzumab örnek olarak gösterilebilir (2,3). Kardiyotoksitenin gelişimi akut (tedavi anında veya kısa süre içinde), subakut (kemoterapi tamamlandıktan günler veya haftalar içinde) veya kronik (ilaç verildikten aylar sonra) olarak gözlenebilir.

Meme kanseri, kadınlarda en sık tanı alan kanser olup kanserli kadınlarda ikinci önde gelen ölüm nedenidir (4). Pek çok meme kanseri için elde edilen sonuçlar olumlu olsa da insan epidermal büyüme faktörü reseptörü-2 (HER-2) pozitif meme kanserleri agresif bir klinik seyir izleyebilir ve daha yüksek hastalık nüksü ve ölüm oranları ile ilişkili olabilir (5,6). Bu tür tümörler, HER-2 'nin aşırı ekspresyonu ve / veya ERBB2 geninin amplifikasyonu ile karakterizedir (5,7). HER-2' nin hücre dışı bölgesini hedefleyen monoklonal antikorun (trastuzumab) geliştirilmesi, bu hastaların tedavisinde devrim yaratarak hastalısız ve genel hayatta kalma oranlarında büyük gelişmelere yol açmıştır (8). Ek olarak, yeni anti-HER-2 tedavilerin geliştirilmesi, bu popülasyon için kanser sonuçlarında daha fazla iyileşmeler sağlamıştır (9-12).

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SONUÇ

Trastuzumab gibi HER-2 hedefli tedaviler genellikle iyi tolere edilir. Bununla birlikte, HER-2'ye yönelik tedavilerin güvenilirliği, kardiyotoksik etkileri sorgulanmaktadır. Kardiyotoksisite kemoterapi dozunu sınırlayıcı olabildiği için kanser tedavisi üzerinde büyük önemi bulunmaktadır. Kanser tedavisindeki gelişmeler göz önüne alındığında, tedaviyi takip eden doktorun geri dönüştürülebilir yan etkilere erken tanı koyabilmesi, kardiyovasküler yan etki oluşabilecek hastaları ve risk faktörlerini belirleyebilmesi, hastaların anti-kanser tedavilerini sürdürmelerini sağlamak için yaşam tarzı değişiklikleri de dahil gerekli düzenlemeleri yapabilmesi gerekmektedir. Ayrıca subklinik olguların tespiti ve tedavisini sağlayarak potansiyel kardiyak etkiyi azaltmaya çalışması da gerekmektedir. Kemoterapötik ajanların kardiyotoksik etkileri her ne kadar nadir gözükse de, ortaya çıktığı anda kanser hastalarında daha fazla morbidite ve mortaliteye neden olmaktadır. Kardiyovasküler yan etkilerin ortaya çıkmaması ve mevcut olan hastalığı daha da kötüleştirmemesi için kardiyologların ve onkologların yakın takip ve işbirliği yapması elzemdir. Bu sebeple, kardiyotoksik etkilerin en sık görüldüğü kemoterapötikler, olası kardiyotoksik etkiler, hastayı bu etkilerden korumak için yapılabilecekler ve tedavi yönetimi klinisyenler için büyük önem arz etmektedir.

Anahtar Kelimeler: Anti-HER-2 tedavi, kardiyotoksisite, kardiyotoksisite yönetimi.

KAYNAKLAR

1. Shakir DK, Rasul KI. Chemotherapy induced cardiomyopathy: pathogenesis, monitoring and management. J Clin Med Res. 2009;1:8-12.
2. Ewer MS, Lippman SM. Type II chemotherapy-related cardiac dysfunction: time to recognize a new entity. J Clin Oncology. 2005;23:2900-2902.
3. Mackey JR, Clemons M, Cote MA, et al. Cardiac management during adjuvant trastuzumab therapy: recommendations of the Canadian Trastuzumab Working Group. Curr Oncol. 2008;15:24-35.
4. American Cancer Society. Breast Cancer Facts & Figures 2015-2016. Atlanta, GA: American Cancer Society; 2015.
5. Slamon DJ, Clark GM, Wong SG, et al. Human breast cancer: correlation of relapse and survival with amplification of the HER-2/neu oncogene. Science. 1987;235:177-182.
6. Gonzalez-Angulo AM, Litton JK, Broglio KR, et al. High risk of recurrence for patients with breast cancer who have human epidermal growth factor receptor 2-positive, node-negative tumors 1 cm or smaller. J Clin Oncol. 2009;27:5700-5706.
7. Slamon DJ, Godolphin W, Jones LA, et al. Studies of the HER-2/neu protooncogene in human breast and ovarian cancer. Science. 1989;244:707-712.
8. Slamon DJ, Leyland-Jones B, Shak S, et al. Use of chemotherapy plus a monoclonal antibody against HER2 for metastatic breast cancer that overexpresses HER2. N Engl J Med. 2001;344:783-792.
9. Blackwell KL, Burstein HJ, Storniolo AM, et al. Randomized study of lapatinib alone or in combination with trastuzumab in women with ErbB2-positive, trastuzumab-refractory metastatic breast cancer. J Clin Oncol. 2010;28:1124-1130.

10. Geyer CE, Forster J, Lindquist D, et al. Lapatinib plus capecitabine for HER2-positive advanced breast cancer. *N Engl J Med.* 2006;355:2733–2743.
11. Baselga J, Cortes J, Kim SB, et al. CLEOPATRA Study Group. Pertuzumab plus trastuzumab plus docetaxel for metastatic breast cancer. *N Engl J Med.* 2012;366:109–119.
12. Verma S, Miles D, Gianni L, et al. EMILIA Study Group. Trastuzumab emtansine for HER2-positive advanced breast cancer. *N Engl J Med.* 2012;367:1783–1791.
13. Morris PG, Hudis CA. Trastuzumab-related cardiotoxicity following anthracycline- based adjuvant chemotherapy: how worried should we be? *J Clin Oncol.* 2010;28:3407–3410.
14. Albini A, Pennesi G, Donatelli F, et al. Cardiotoxicity of anticancer drugs: the need for cardio-oncology and cardio-oncological prevention. *J Natl Cancer Inst.* 2010;102(1):14-25. doi: 10.1093/jnci/djp440.
15. Seidman A, Hudis C, Pierri MK, et al. Cardiac dysfunction in the trastuzumab clinical trials experience. *J Clin Oncol.* 2002; 20(5):1215–1221.
16. Roberta F, Karen LS, Kimberly KC, et al. Cardiotoxicity From Human Epidermal Growth Factor Receptor-2 (HER2) Targeted Therapies. *J Am Heart Assoc.* 2017;6:e006915. DOI: 10.1161/JAHA.117.006915.
17. Moja L, Tagliabue L, Balduzzi S, et al. Trastuzumab containing regimens for early breast cancer. *Cochrane Database Syst Rev.* 2012; 4:CD006243.
18. Shah MA. Update on metastatic gastric and esophageal cancers. *J Clin Oncol.* 2015;33:1760–1769.
19. Bowles EJ, Wellman R, Feigelson HS, et al. Risk of heart failure in breast cancer patients after anthracycline and trastuzumab treatment: a retrospective cohort study. *J Natl Cancer Inst.* 2012;104:1293–1305.
20. Goldhirsch A, Gelber RD, Piccart-Gebhart MJ, et al. Herceptin Adjuvant Trial Study Team. 2 years versus 1 year of adjuvant trastuzumab for HER2-positive breast cancer (HERA): an open-label, randomised controlled trial. *Lancet.* 2013;382:1021–1028.
21. de Azambuja E, Procter MJ, van Veldhuisen DJ, et al. Trastuzumab-associated cardiac events at 8 years of median follow-up in the Herceptin Adjuvant trial (BIG 1-01). *J Clin Oncol.* 2014;32:2159–2165.
22. Romond EH, Jeong JH, Rastogi P, et al. Seven-year follow-up assessment of cardiac function in NSABP B-31, a randomized trial comparing doxorubicin and cyclophosphamide followed by paclitaxel (ACP) with ACP plus trastuzumab as adjuvant therapy for patients with node-positive, human epidermal growth factor receptor 2-positive breast cancer. *J Clin Oncol.* 2012;30:3792–3799.
23. Advani PP, Ballman KV, Dockter TJ, et al. Long-Term Cardiac Safety Analysis of NCCTG N9831 (Alliance) Adjuvant Trastuzumab Trial. *J Clin Oncol.* 2016;34:581–587.
24. Suter TM, Procter M, van Veldhuisen DJ, et al. Trastuzumab-associated cardiac adverse effects in the herceptin adjuvant trial. *J Clin Oncol.* 2007;25:3859–3865.
25. Cote GM, Sawyer DB, Chabner BA. ERBB2 inhibition and heart failure. *N Engl J Med.* 2012;367:2150–2153.
26. Yu AE, Yadav NU, Lung BY, et al. Trastuzumab interruption and treatment-induced cardiotoxicity in early HER2-positive breast cancer. *Breast Cancer Res Treat.* 2015;149:489–495.
27. Cardinale D, Colombo A, Bacchiani G, et al. Early detection of anthracycline cardiotoxicity and improvement with heart failure therapy. *Circulation.* 2015;131:1981–1988.
28. Cardinale D, Colombo A, Lamantia G, et al. Anthracycline-induced cardiomyopathy: clinical relevance and response to pharmacologic therapy. *J Am Coll Cardiol.* 2010;55:213–220.
29. Capelan M, Pugliano L, De Azambuja E, et al. Pertuzumab: new hope for patients with HER2-positive breast cancer. *Ann Oncol.* 2013;24:273–282.
30. Dawood S, Sirohi B. Pertuzumab: a new anti-HER2 drug in the management of women with breast cancer. *Future Oncol.* 2015;11:923–931.
31. Lenihan D, Suter T, Brammer M, et al. Pooled analysis of cardiac safety in patients with cancer

- treated with pertuzumab. *Ann Oncol.* 2012;23:791–800.
32. Swain SM, Ewer MS, Cortés J, et al. Cardiac tolerability of pertuzumab plus trastuzumab plus docetaxel in patients with HER2-positive metastatic breast cancer in CLEOPATRA: a randomized, double-blind, placebo-controlled phase III study. *Oncologist.* 2013;18:257–264.
 33. Gianni L, Pienkowski T, Im Y-H, et al. Efficacy and safety of neoadjuvant pertuzumab and trastuzumab in women with locally advanced, inflammatory, or early HER2-positive breast cancer (NeoSphere): a randomised multicentre, open-label, phase 2 trial. *Lancet Oncol.* 2012;13:25–32.
 34. Schneeweiss A, Chia S, Hickish T, et al. Pertuzumab plus trastuzumab in combination with standard neoadjuvant anthracycline-containing and anthracycline-free chemotherapy regimens in patients with HER2-positive early breast cancer: a randomized phase II cardiac safety study (TRYPHAENA). *Ann Oncol.* 2013;24:2278–2284.
 35. Valachis A, Nearchou A, Polyzos NP, et al. Cardiac toxicity in breast cancer patients treated with dual HER2 blockade. *Int J Cancer.* 2013;133:2245–2252.
 36. Martínez MT, Pérez-Fidalgo JA, Martín-Martorell P, et al. Treatment of HER2 positive advanced breast cancer with T-DM1: a review of the literature. *Crit Rev Oncol Hematol.* 2016;97:96–106.
 37. Burris HA, Rugo HS, Vukelja SJ, et al. Phase II study of the antibody drug conjugate trastuzumab-DM1 for the treatment of human epidermal growth factor receptor 2 (HER2)-positive breast cancer after prior HER2-directed therapy. *J Clin Oncol.* 2011;29:398–405.
 38. Krop IE, LoRusso P, Miller KD, et al. A phase II study of trastuzumab emtansine in patients with human epidermal growth factor receptor 2-positive metastatic breast cancer who were previously treated with trastuzumab, lapatinib, an anthracycline, a taxane, and capecitabine. *J Clin Oncol.* 2012;30:3234–3241.
 39. Hurvitz SA, Dirix L, Kocsis J, et al. Phase II randomized study of trastuzumab emtansine versus trastuzumab plus docetaxel in patients with human epidermal growth factor receptor 2-positive metastatic breast cancer. *J Clin Oncol.* 2013;31:1157–1163.
 40. Gupta M, Wang B, Carrothers TJ, et al. Effects of trastuzumab emtansine (T-DM1) on QT interval and safety of pertuzumab plus T-DM1 in patients with previously treated human epidermal growth factor receptor 2-positive metastatic breast cancer. *Clin Pharmacol Drug Dev.* 2013;2:11–24.
 41. Miller KD, Diéras V, Harbeck N, et al. Phase IIa trial of trastuzumab emtansine with pertuzumab for patients with human epidermal growth factor receptor 2-positive, locally advanced, or metastatic breast cancer. *J Clin Oncol.* 2014;32:1437–1444.
 42. Krop IE, Kim S-B, González-Martín A, et al. Trastuzumab emtansine versus treatment of physician's choice for pretreated HER2-positive advanced breast cancer (TH3RESA): a randomised, open-label, phase 3 trial. *Lancet Oncol.* 2014;15:689–699.
 43. Harbeck N, Gluz O, Christgen M, et al. Final analysis of WSG-ADAPT HER2+/HR+ phase II trial: efficacy, safety, and predictive markers for 12-weeks of neoadjuvant TDM1 with or without endocrine therapy versus trastuzumab+endocrine therapy in HER2-positive hormone-receptor-positive early breast cancer. *San Antonio Breast Cancer Symposium.* 2015;Abstract: S5-03.
 44. Martin M, Fumoleau P, Dewar JA, et al. Trastuzumab emtansine (T-DM1) plus docetaxel with or without pertuzumab in patients with HER2-positive locally advanced or metastatic breast cancer: results from a phase Ib/IIa study. *Ann Oncol.* 2016;27:1249–1256.
 45. Zhang X, Munster PN. New protein kinase inhibitors in breast cancer: afatinib and neratinib. *Expert Opin Pharmacother.* 2014;15:1277–1288.
 46. Spector NL, Yarden Y, Smith B, et al. Activation of AMP-activated protein kinase by human EGF receptor 2/EGF receptor tyrosine kinase inhibitor protects cardiac cells. *Proc Natl Acad Sci USA.* 2007;104:10607–10612.
 47. de Azambuja E, Holmes AP, Piccart-Gebhart M, et al. Lapatinib with trastuzumab for HER2-positive early breast cancer (NeoALTTO): survival outcomes of a randomised, open-label, multicentre, phase 3 trial and their association with pathological complete response. *Lancet Oncol.*

- 2014;15:1137–1146.
48. Baselga J, Bradbury I, Eidtmann H, et al. Lapatinib with trastuzumab for HER2-positive early breast cancer (NeoALTO): a randomised, open-label, multicentre, phase 3 trial. *Lancet Lond Engl.* 2012;379:633–640.
 49. Harbeck N, Huang C-S, Hurvitz S, et al. Afatinib plus vinorelbine versus trastuzumab plus vinorelbine in patients with HER2-overexpressing metastatic breast cancer who had progressed on one previous trastuzumab treatment (LUX-Breast 1): an open-label, randomised, phase 3 trial. *Lancet Oncol.* 2016;17:357–366.
 50. Awada A, Colomer R, Inoue K, et al. Neratinib plus paclitaxel vs trastuzumab plus paclitaxel in previously untreated metastatic ERBB2-positive breast cancer: the NEfERT-T randomized clinical trial. *JAMA Oncol.* 2016. Published Online First: 14 April 2016.
 51. Chan A, Delaloge S, Holmes FA, et al. Neratinib after trastuzumab-based adjuvant therapy in patients with HER2-positive breast cancer (ExteNET): a multicentre, randomised, double-blind, placebo-controlled, phase 3 trial. *Lancet Oncol.* 2016;17:367–377.
 52. Bosch X, Rovira M, Sitges M, et al. Enalapril and carvedilol for preventing chemotherapy-induced left ventricular systolic dysfunction in patients with malignant hemopathies: the OVERCOME trial (prevention of left Ventricular dysfunction with Enalapril and caRvedilol in patients submitted to intensive Chemotherapy for the treatment of Malignant hEmopathies). *J Am Coll Cardiol.* 2013; 61:2355–2362.
 53. Gulati G, Heck SL, Ree AH, et al. Prevention of cardiac dysfunction during adjuvant breast cancer therapy (PRADA): a 2x2 factorial, randomized, placebocontrolled, double-blind clinical trial of candesartan and metoprolol. *Eur Heart J.* 2016; 37:1671–1680.
 54. Clarke E, Lenihan D. Cardio-oncology: a new discipline in medicine to lead us into truly integrative care. *Future Cardiol.* 2015;11:359–361.
 55. Filipa Lynce, Ana Barac, Xue Geng, et al. SAFE-HEaRt: A pilot study assessing the cardiac safety of HER2 targeted therapy in patients with HER2 positive breast cancer and reduced left ventricular function. *Journal of Clinical Oncology.* 2018;36:1038-1038.