ARCHIVES OF THE
TURKISH SOCIETY
OF CARDIOLOGY

Official journal of the
TURKISH
SOCIETY OF
CARDIOLOGY

How to See Cardiotoxicity Beyond Imaging in 2022

EDITORIAL COMMENT
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Cancer is the leading cause of death worldwide, and breast cancer is one of the most common cancers.[1] Life expectancy has been prolonged, thanks to the use of chemotherapeutic agents with the risk of cardiotoxicity.

A recent study including 2625 patients (mean follow-up 5.2 years) revealed a 9% overall incidence of cardiotoxicity after anthracycline treatment.[2] It is of upmost importance for the patient to continue anticancer therapy to increase survival. This makes surveillance during regular follow-up essential. Cardiotoxicity evolving in heart failure will result in interruption of the anti cancer therapy. Advanced heart failure itself has bad prognosis, and in worst-case scenario heart failure can lead to the necessity of mechanical circulatory support with left ventricular assist device (LVAD). Mulzer et al[3] showed that almost 2% of all implantations of left ventricular devices in a high-volume center may be related to anthracycline cancer treatment.

However, if anthracycline-associated cardiac dysfunction is detected and treated early, patients frequently experience good functional recovery.[2]

Following the new European Society of Cardiology (ESC) cardio-oncology guidelines from 2022, the focus on surveillance of oncological patients receiving potential cardiotoxic chemotherapeutic agents is based on the patients' risk factors mainly using echocardiography and biomarkers. An electrocardiogram (ECG) is only recommended at baseline.[4]

This makes echocardiography the main diagnostic tool to detect and therefore prevent cardiac damage. The evaluation of cardiac function in terms of left ventricular ejection fraction using the Simpson method during chemotherapy is pivotal. The ESC Position Paper on cancer treatments and cardiovascular toxicity recommend the use of advanced echocardiographic measurements as global longitudinal strain (GLS) when available.

The European Association of Cardiovascular Imaging (EACVI) survey on standardization of cardiac chambers quantification by transthoracic echocardiography has shown that the use of Speckle Tracking Imaging (STI) is not part of routine use in the echo labs among Europe.[5] Another problem with STI remains the lack of standardization of strain measurements among different vendors.

Furthermore, it has been shown in a dedicated survey on cardiac imaging in cardiac oncology that Left Ventricular (LV) systolic function in oncologic patients receiving cardiotoxic chemotherapy was assessed using 2-dimensional (2D) left ventricular function (LV EF) in the vast majority of centers, while 3D LVEF and GLS were routinely assessed in only 29% and 53% of centers, respectively.[6]

Cancer patients under chemotherapy need to finish their therapeutic cycle to increase cancer survival; therefore, it is paramount to closely follow-up and detect cardiotoxic effects as early as possible. Echocardiography is a very strong tool in this scenario, but data show that not all the potentiality of this tool is used in this patient cohort. This fact underlines the need to increase our tools to detect cardiotoxicity.

Therefore, we should start to look for alternative diagnostic tools to help detecting early cardiotoxicity. The ESC Position Paper on cancer treatment and cardiovascular toxicity recommends using ECG, as electrocardiographic changes happen in 1% of patients immediately after infusion, and this is usually reversible.

Several studies have shown that cancer therapies induce electrocardiographic changes as QT prolongation. The main focus in these studies has been the correlation between QT prolongation and arrhythmias in these patients.[7]

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Received: September 12, 2022
Accepted: September 15, 2022

Cite this article as: Merke N. How to see cardiotoxicity beyond imaging in 2022. *Turk Kardiyol Dern Ars.* 2022;50(7):476-477.

DOI:10.5543/tkda.2022.22610

ECG is a simple and quick diagnostic tool with huge impact, as changes in repolarization under chemotherapy can detect patients at risk for cardiotoxicity at a very early stage. Early detection of cardiotoxicity will increase the possibility to finish the chemotherapeutic cycle, which is paramount for the prognosis of the patients.

The utility to use a simple tool as ECG has been discussed in Immune Checkpoint Inhibitor Myocarditis showing that all-cause mortality was associated with pathological Q waves.[8]

But, in reality, ECG seems to be more sensible to changes than we thought; as Özbay et al[9] could demonstrate nicely in their research on Anthracycline Chemotherapy-Induced Electro-Mechanical Changes: Strain Echocardiography Combined with Repolarization Parameters on Electrocardiography to Predict Early Cardiotoxicity into ECG changes in the acute and chronic state of anthracycline infusion comparing to established echocardiographic parameter as LV EF and STI.

They showed in 50 patients that repolarization parameters including QTc dispersion and T peak to end deteriorated immediately and early after the chemotherapy. They also found that circumferential strain, radial strain, and torsion values worsened during the observational period of 3 months, whereas the GLS remained unchanged.

New parameters are offered to cardio-oncology to increase diagnostic accuracy in detecting cardiotoxicity in vulnerable patients. The overall results of this very interesting study will shed light on the process of follow-up of patients under chemotherapy in order to detect possible cardiotoxicity as early as possible.

The promising use of repolarization parameters and the use of not yet implemented strain parameters in the diagnostic cascade of detecting early cardiotoxicity may become important during cancer therapy in the surveillance process.

Future research must demonstrate the strength of electrocardiographic repolarization parameters and strain parameters beyond the GLS.

As an echocardiographer, I am deeply convinced that we should use the full power of echocardiography to detect cardiotoxicity as early as possible. Additional electrocardiographic parameters may further enhance the sensitivity and specificity of our screening. This gives our patients the best chances to finish their therapeutic cycle.

Declaration of Interests: The author declare that he has no competing interest.

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