中文題目:右心室形變在接受 Anthracycline 治療的乳癌病患併發氣促的預測效力

英文題目:The predictive value of right ventricular strain in Epirubicin induced cardiotoxicity in patients with breast cancer

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Abstract

Background: With the improvement of cancer therapies, the life span extended but the quality has been threatened by the treatment induced toxicity. Cardiotoxicity leads to not only edema, exercise intolerance but fatal arrhythmia and heart failure. However, most cardiac complications failed to be observed until specific symptoms developed. Speckle tracking echocardiography (STE) is a sensitive imaging modality in detecting early occult myocardial dysfunction. In this study, we aim to identify the very early myocardial injury upon the receipt of chemotherapy in breast cancer patients using STE.

Methods: In this longitudinal, prospective study, we enrolled patients with newly diagnosed breast cancer preparing to receive Epirubicin therapy. Patients who underwent chemo- or radiotherapy before have history of heart failure or significant structure heart disease were excluded. Also, 10 age and gender matched controls were also enrolled. Echocardiography including speckle tracking echocardiography was performed sequentially at baseline, on the day after the first cycle (T2) and after the completion of three cycles (T3) of Epirubicin. During the 6-month follow-up, the severity of dyspnea was evaluated monthly by the assessment scale. In addition, by intraperitoneal injection of Doxorubicin in 12 week old Sprague Dawley rats at a dose of 4 mg/kg/day for the consecutive five days, we successfully developed a cardiotoxicity model. Sequential echocardiography and STE were followed.

Results: A total number of 35 patients newly diagnosed as breast cancer and preparing for Epirubicin therapy were prospectively recruited, while 5 were excluded due to poor image qualities. Compared with the baseline, right ventricular longitudinal strain (RVLS_FW) at T2 significantly declined (-22.49±4.97 v.s. -18.48±4.46, p=0.001) (Figure 1), which was also positively associated with the development of dyspnea (R^2=0.8, p=0.01). At T3, both of left global longitudinal strain and RVLS_FW were significantly impaired (-21.4±4.12 v.s. -16.94±6.81%;

-22.49±4.97 v.s. -16.86±7.27%, p=0.01; 0.001, respectively). Also, the accumulating dose of Epirubicin positively correlated to the development of dyspnea (R^2=0.38, p=0.04) and the decline of RVLS_FW (R^2=0.53, p=0.02) (Figure 2). This was noted prior to left ventricular systolic or diastolic dysfunction. Correspondingly, in the Doxorubicin induced rat cardiotoxicity models, declines of both right and left ventricular strain were also observed at the early stage (Figure 3).

Conclusions:

Right ventricular longitudinal strain was superior to other parameters in predicting the development of dyspnea in breast cancer patients receiving Epirubicin therapy. Larger scale studies are required to validate its role in long term survivals and the associated mechanism.

Key words: Doxorubicin, speckle tracking echocardiography, cardiotoxicity

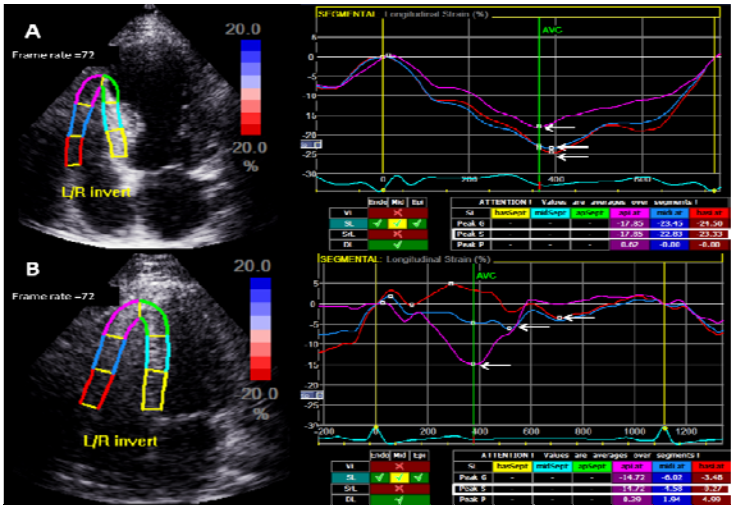

Figure 1. Right ventricle strain was calculated automatically by tracing the endocardial margin of the right ventricle in an apical 4-chamber view. The apical, middle and basal segments of RV peak systolic strains were highlighted (arrow) and the average of the regional strains was recorded. (A) An example of preserved right ventricle strain. (B) An example of impaired right ventricle strain

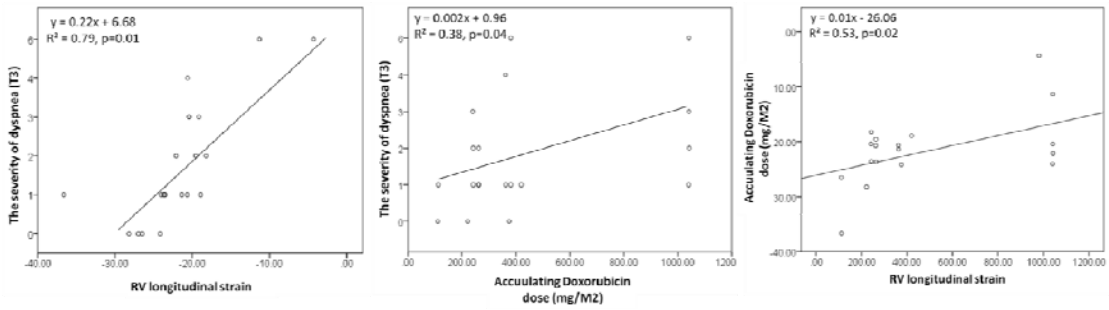

Figure2. (A) RVLS_FW on the day post the first cycle of chemotherapy (T2) was significantly attenuated along the development of dyspnea in the following period (R^2=0.8, p=0.01). **(B)** The accumulating dose of Epirubicin positively correlated to the development of dyspnea (Figure 2, R^2=0.38, p=0.04). **(C)** The decline of RVLS_FW was positively correlated with the accumulating dose of Epirubicin (Figure 3, R^2=0.53, p=0.02).

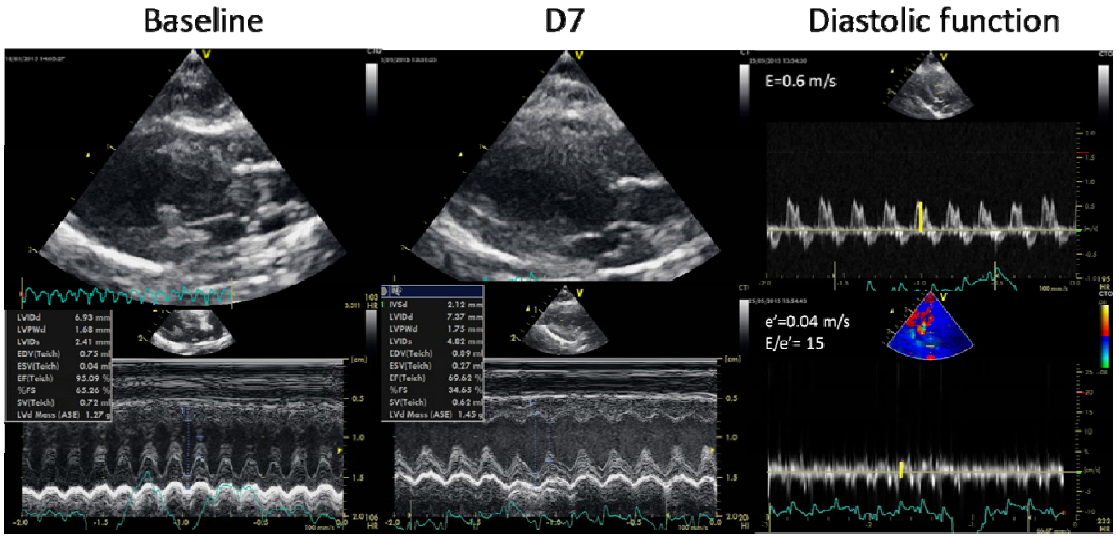

Figure3. In a Doxorubicin induced cardiotoxicity rat model, significant declines of systolic, diastolic and strain were observed at an early stage.