Expanding indications for cardiac MIBG imaging of sympathetic activity

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Numerous studies have shown that parameters derived from cardiac metaiodobenzylguanidine (MIBG) imaging correlate with the severity of heart failure regardless of the underlying disease. Such parameters, in particular the delayed heart to mediastinum (H/M) rate, provide very powerful predictive power for cardiac events and mortality. Therefore it is not surprising that new descriptions of the utility of cardiac MIBG imaging in diseases that can cause heart failure are reported.

In this issue of our journal, Horiguchi et al. provide a detailed description of findings in a series of patients with Churg-Strauss syndrome [1]. This rare disease consists of systemic necrotizing vasculitis with eosinophilic infiltration and granulomatous inflammation with inflammation of small vessels of various organs including the heart [2]. Endomyocardial biopsy in the acute phase demonstrates eosinophilic infiltration of the myocardium and fibrinoid necrosis of the small vessels, with interstitial fibrosis in the subacute phase. Patients with cardiac involvement have a poor prognosis and may require specific management. Results of the current study indicate that cardiac sympathetic imaging with MIBG can detect cardiac involvement in Churg-Strauss syndrome with high accuracy and predicts rehospitalization due to heart failure progression.

The authors performed cardiac MIBG imaging and myocardial perfusion studies with ^{201}Tl in a cohort of 28 patients with Churg-Strauss syndrome, 12 of whom had cardiac involvement. All patients had asthma, eosinophilia and neuropathy. A group of 14 patients with bronchial

asthma and without cardiac disease served as controls. Plasma B-type natriuretic peptide (BNP), left ventricular volumes and total defect score were higher and left ventricular ejection fraction (LVEF) was lower in patients with cardiac involvement. C-reactive protein and other parameters studied were not. Early and delayed H/M were significantly lower, and washout higher, in patients with cardiac involvement.

Importantly, the study brings the information from myocardial perfusion imaging together with cardiac sympathetic activity. There were no reversible perfusion defects in patients who were able to exercise. Fixed defects were most frequently seen in the apical region and were seen in 63% of patients with heart failure and in no patient without. Receiver-operating characteristic (ROC) analysis showed the highest sensitivity for delayed H/M and the highest specificity for the washout rate. All cardiac events at follow-up consisted of rehospitalization due to heart failure progression. There were significantly lower cardiac event-free rates in patients with lower H/M rates and higher BNP levels. The cardiac event-free rate was significantly higher in patients with early H/M >2.18 and BNP <21.8 , underlining the importance of combining the prognostic information coming from MIBG parameters with that of other commonly used biomarkers.

Although the study is retrospective in nature and is limited by the difficulty in accruing a large sample size in a rare disease, patients are very well characterized and studied in detail. Whether cardiac MIBG imaging would help in the early diagnosis of cardiac involvement in Churg-Strauss disease remains to be demonstrated. In the present series, the accuracy of delayed H/M ratio and washout rate to detect cardiac involvement were higher than those of BNP, although differences did not reach statistical significance. However, the possible advantages or disadvantages

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of cardiac sympathetic imaging over echocardiography or MRI, or their respective added value, cannot be derived from the present studies. Interestingly, in patients with cardiac involvement, BNP, left ventricular volumes and LVEF did not correlate with MIBG parameters, indicating that sympathetic activity provides information not directly related to biochemical or functional status of the patients with the syndrome.

The values of H/M ratios reported in the present study, both for patients with Churg-Strauss syndrome and controls, are higher than the ones reported in other series [3, 4]. In particular, H/M values in patients with cardiac involvement and events are clearly above the 1.60 threshold used in other large prognostic studies such as the ADMIRE-HF to identify risk for events [5, 6]. This is probably due to differences between the Japanese and Caucasian populations that may account for a different pattern of sympathetic innervation or activity, or may result in differences in single photon emission computed tomography (SPECT) quantitation.

Through a mechanism that has not been fully explained and which involves cytokine release, coronary spastic angina is often present in Churg-Strauss syndrome. To which extent coronary spastic angina in these patients could result in repetitive myocardial ischaemia that could be the cause of MIBG activity defects in the myocardium [7] remains to be clarified. Because of eosinophilic inflammation, in patients with Churg-Strauss syndrome with spastic angina symptoms seem to be refractory to vasodilators and sensitive to corticosteroid therapy. While the study provides convincing evidence that the MIBG parameters predict cardiac events, the series does not provide information on the possible use of cardiac MIBG imaging in assessing treatment or in the prediction and evaluation of therapeutic effect. However, the authors have previously shown that cardiac MIBG parameters improve after intravenous immunoglobulin therapy in patients with heart failure associated with Churg-Strauss syndrome [8].

In summary, the present study by Horiguchi et al. provides the first description of the role of cardiac sympathetic imaging with MIBG in Churg-Strauss syndrome and shows the predictive power of MIBG parameters for events in another well-characterized group of patients with heart failure. The study adds another convincing piece to the already broad list of conditions where cardiac MIBG imaging can be useful and clinically applied.

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