Right ventricular longitudinal strain in transthyretin cardiac amyloidosis (ATTR-CA)

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Transthyretin cardiac amyloidosis (ATTR-CA) is a life-threatening condition characterized by a restrictive physiology. This condition can be hereditary (ATTRv) or acquired (ATTRwt). Left ventricular global longitudinal strain (LVGLS) measured with speckle-tracking echocardiography (STE) has been well described and it appears to be significantly lower in ATTR-CA than in other hypertrophic phenotypes, presenting with a typical "apical sparing" pattern. Furthermore, LVGLS can predict prognosis among patients with ATTR-CA beyond LVEF. Few studies investigated the role of right ventricular longitudinal strain in ATTR-CA.

The aim of this study is to describe right ventricular (RV) involvement in patients with ATTR-CA with the use of STE and to explore its prognostic implications.

We retrospectively analyzed echocardiographic images of 221 patients with ATTR-CA evaluated between 1995 and 2019 at our Centre. Since the right ventricular free wall strain (RVFWSL) is the current standard parameter being evaluated when performing STE, we chose it as variable of interest among the others collected. Finally, univariate and multivariate linear regression analyses were used to analyze variables related with clinical events such as heart failure and death.

The median age of our cohort was 76.7 years old and they were predominantly males. Among these, most patients had a diagnosis of ATTR-CA wild-type (only 32.1% of study population was affected by ATTRv).

At STE, LVGLS was abnormal in both ATTRwt patients (-12%; IQR: -13.75% to -10.15%) and ATTRv patients (-12.5%; IQR: -15.5% to -10.73%) with no significant difference between groups (p=0.1715). Furthermore, STE showed impaired right ventricular longitudinal function in both aetiologies, but with a different grade of involvement as the median RVFWSL was -19.8% (IQR: -25.1% to -13.9%) in the ATTRv group and -16.4% in the ATTRwt group (IQR: -21.65% to -12.2%) (p=0.043).

In our study, a right ventricular apical sparing pattern was not observed.

In the univariate analysis, RVFWSL and other parameters such as age, eGFR, tricuspid regurgitation and LVGLS were significantly associated with heart failure, so they were forced into multivariable analysis, but RVFWSL did not show an independent correlation with the endpoint, although a certain trend toward significance could be observed (HR 1.037 95%CI 0.998 - 1.077; p=0.063).

Finally, we explored the association between our collected variables and death. At univariate analysis, RVFWSL showed a strong correlation with death (HR 1.034; 95%CI 1.005 - 1.064; p=0.021), together with NYHA class, eGFR, LVEF and LVGLS. Notably, RVFWSL predicted death at our multivariable regression analysis (HR 1.041 95%CI 1.010 - 1.072; p=0.008).

RVFWSL is an emerging parameter to evaluate RV dysfunction which appears significantly impaired in patients with ATTR-CA. In this setting, it might have not only a diagnostic role, but also a prognostic power, although further data are needed.