



## EDITORIAL COMMENT

# Longitudinal strain by speckle tracking echocardiography: Is it useful in clinical practice for differentiating Takotsubo syndrome from anterior myocardial infarction?



## *Strain* longitudinal por ecocardiografia com *speckle tracking*. Será útil na prática clínica para diferenciar a síndrome de Takotsubo do enfarte agudo do miocárdio anterior?

Nuno Marques<sup>a,b,c</sup>

<sup>a</sup> Portugal

<sup>b</sup> Centro Hospitalar Universitário do Algarve, Faro, Portugal

<sup>c</sup> Departamento de Ciências Biomédicas e Medicina da Universidade do Algarve, Faro, Portugal

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Takotsubo syndrome (TTS) is characterized by reversible left ventricular systolic dysfunction that extends beyond the territory of a single coronary artery, in the absence of significant obstructive coronary disease. It can mimic an acute coronary syndrome (ACS), as the clinical presentation typically includes chest pain, ECG changes and elevation of cardiac biomarkers.<sup>1</sup>

In terms of differential diagnosis, as pointed out by Pestana et al. in this issue of the *Journal*,<sup>2</sup> the greatest difficulty may be in distinguishing apical TTS (the most common form) from ACS with anterior ST-segment elevation. The authors compared two groups of patients, one of 17 patients with apical TTS, and the other of 20 patients with anterior ACS, aiming to identify echocardiographic features differentiating between the two groups, using global and regional longitudinal strain.

Differential diagnosis between apical TTS and anterior ACS is more difficult in patients with anterior ST-segment

elevation on the electrocardiogram (ECG). In TTS registries, electrocardiographic presentation with ST-segment elevation occurs in 44% of cases, almost always in an anterior location.<sup>3</sup> The ST-segment elevation in TTS occurs mainly in leads V2-V5, DII and aVR, whereas in anterior ACS it occurs in leads V1-V4, DI and aVL. This criterion presents high sensitivity and specificity in the differential diagnosis between the two conditions.<sup>4</sup> In Pestana et al.'s study,<sup>2</sup> only six TTS patients presented ST-segment elevation, and its location was not specified. ST-segment elevation in TTS is thought to be influenced by several variables, including the distribution pattern of left ventricular ballooning and time from symptom onset to presentation, which can also influence the results of longitudinal strain obtained by speckle tracking echocardiography.<sup>3</sup> Therefore, in studies comparing TTS and anterior ACS patients, it would be more useful to include TTS patients with anterior ST-segment elevation and similar time from symptom onset to presentation.

This requirement also applies to all baseline patient characteristics. In studies aiming to compare two patient groups, their baseline characteristics should be as similar as possible, particularly when the study population is small. In rare diseases such as TTS, it is difficult to select patients.

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E-mail address: [marqns@gmail.com](mailto:marqns@gmail.com)

However, in common diseases such as ACS, it is both possible and desirable to select a group of patients with similar demographic characteristics, cardiovascular risk factors and other characteristics that could influence the longitudinal strain results.

Interestingly, Pestana et al. found no significant differences between patients with TTS and patients with anterior ACS regarding conventional echocardiographic parameters, such as wall motion score index (WMSI). However, another study found that WMSI is very different between the two groups and determined that a cutoff of 1.75 has sensitivity of 83% and specificity of 100% for the diagnosis of TTS.<sup>5</sup>

In all studies aiming to assess longitudinal strain by speckle tracking, the echocardiography laboratory's assessment of inter- and intra-observer variability should be provided, particularly when the sample size is small, the differences between groups are small, and/or the standard deviations are wide. Moreover, it is important to specify the number of patients excluded from the study because accurate readings were impossible due to a poor acoustic window, as well as the number of non-assessable segments allowed in the assessment of left ventricular longitudinal strain, and how strain was measured in patients with non-assessable segments. Pestana et al.<sup>2</sup> do not address these issues in their article, although they are relevant to appropriate interpretation of the results.<sup>6</sup>

Furthermore, assessment of longitudinal strain in TTS patients presents an additional challenge, as the temporal evolution of TTS is variable, and rapid resolution of contractility changes may occur in some cases, which greatly influences global and regional longitudinal strain values in the first 24 hours.<sup>3,7</sup> In their study Pestana et al. state that patients were only included in their study if they had had an echocardiogram within 48 hours of symptom onset.<sup>2</sup> However, they do not report the mean time from symptom onset to echocardiogram, nor do they mention the relevance of this factor to the results obtained.

Compared to similar studies with a larger number of patients,<sup>8,9</sup> it is worth noting that in Pestana et al.,<sup>2</sup> there was reduced longitudinal strain in the basal inferior and inferolateral segments in patients with anterior ACS that is not seen in other studies, in which regional strain results in these segments are within the normal range.<sup>8,9</sup> The authors do not put forward an explanation for these unexpected results. The wide standard deviations of the regional strain values reported by Pestana et al. also make it difficult to draw firm conclusions.

The authors found a significantly lower strain gradient in patients with TTS than in patients with anterior ACS,<sup>2</sup> which has been described in the literature.<sup>8,9</sup> This gradient may be of some use to differentiate the two patient groups, but no cutoff value was established, nor was its sensitivity and specificity assessed, which, added to the study's other limitations, reduces its clinical usefulness.

The main clinical value of non-invasive differentiation of TTS from anterior ACS would be to be able to avoid immediate coronary angiography in patients who, despite presenting with anterior ST-segment elevation on the ECG, are in fact suffering from TTS. However, from a clinical and ethical point of view, failure to perform appropriate and timely revascularization in a patient with an anterior ACS would have such a dramatic impact on his or her prognosis that only a characteristic with 100% specificity for identifying TTS could be acceptable for use in clinical practice. Given these clinical implications, the low rate of complications of coronary angiography and the rarity of TTS, the decision not to perform immediate coronary angiography in a patient presenting with anterior ST-segment elevation would be difficult to justify and apply in clinical practice.

## Conflicts of interest

The author has no conflicts of interest to declare.

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