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LETTER TO THE EDITOR

# Reply to the Letter to the Editor ''Contrast-enhanced multidetector computed tomography: A new prognosticator in acute pulmonary embolism?''

## Resposta à carta ao editor «Angiografia pulmonar por tomografia computadorizada: uma nova ferramenta prognóstica na tromboembolia pulmonar aguda?»

We are grateful to Drs Barra, Providência and Paiva for their comments on our paper.[1] They suggest that we cannot exclude that the association between RV/LV ratio and mortality is due to chance and hypothesize that other parameters could be predictive of prognosis in a larger cohort. We should emphasize that in contrast to most reports on the prognostic value of MCDT, which usually include unselected populations of low- to intermediate-risk PE (mean RV/LV ratio <1.5), we have studied a very specific population, reflected by the elevated mean RV/LV ratio (>1.6). This fact had an impact on the cohort size, leading to a low statistical power. However, even in such a small cohort, and in contrast to every other MCDT-derived index, such as obstruction burden (as either a continuous or a dichotomous variable), the RV/LV ratio emerged as the only one that was significantly different between the two groups. We believe that our results reflect a real difference, although from a statistical point of view we cannot exclude a chance association: however, we can estimate that probability to be under 5%. Our results are also in line with other observations, such as those in a recent paper by Becattini et al. with more than 450 patients demonstrating that a RV/LV ratio <0.9 has a 100% negative predictive value for death due to PE and is an independent predictor of mortality.[2] Lastly, the RV/LV ratio correlated with other surrogate markers of worse prognosis. Unfortunately, we cannot speculate whether other variables could have been predictive of prognosis in a larger cohort with similar clinical profile.

Additionally, Dr Barra et al. state that our study does not say whether MDCT can add prognostic value to currently available clinical risk scores (CRS). It should be recalled that the aim of our work was to compare radiological parameters in terms of their ability to predict long-term mortality and not to analyze their additional value to current clinical stratification systems. Although evidence is growing regarding the role of CRS in the identification of lower-risk patients who can be safely discharged home,[3] their prognostic value for intermediate- and high-risk PE is unknown.[4] Moreover, none of the available prospectively validated CRS include information from a key prognostic determinant, right ventricular function,[4] and neither PESI nor sPESI were specifically studied regarding the decision whether to proceed to thrombolysis. A recent scientific statement from the American Heart Association on the management of massive and submassive PE continues to support the use of clinical signs of impending shock/respiratory distress and evidence of RV impairment/injury for the selection of patients suitable for thrombolysis.[5] The usefulness of a CRS versus an isolated risk marker will always be dependent on a balance between incremental prognostic value versus simplicity and consequent clinical application in everyday clinical practice.[4] Moreover, the performance of a CRS may be different depending on whether the aim is to identify low-risk PE patients that can be safely discharged home or to select high-risk patients for thrombolysis. Although evidence is already available for the former, the question whether the combination of a CRS with imaging or laboratory parameters is better than each one alone for selecting patients for thrombolysis remains to be answered. In the recently presented multicenter PEITHO trial, patients with the simultaneous presence of RV dysfunction (in around half of patients using MDCT) and a positive troponin test were randomized to tenecteplase or placebo (personal communication, S Konstantinides, American College of Cardiology, 2013). Seven-day all-cause mortality in this intermediate-risk population was less than 2% in both arms, lower than that reported in the MAPPET-3 trial, in which patients were selected based only on RV dysfunction.[6]

Dr Barra et al. also suggest the use of multivariate analysis to assess the independent value of RV/LV ratio for prognostication. Although we do not question the usefulness of such methodology, we deliberately chose not to perform it, since the minimum number of events per variable needed is at least five to nine, and preferably greater

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than 10.[7] Therefore, the five events recorded might yield an insurmountable bias. However, we consider that the novel demonstration that the RV/LV ratio is also associated with mortality in a specific group of PE patients with a severely compromised RV is of clinical interest.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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