



ORIGINAL ARTICLE

## Calcific aortic stenosis and its correlation with a novel inflammatory marker, the lymphocyte/monocyte ratio



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### KEYWORDS

Calcific aortic stenosis;  
Lymphocyte/monocyte ratio;  
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### Abstract

**Introduction:** Calcific aortic valve disease, a chronic progressive disorder, is the leading cause of valve replacement among elderly patients. The lymphocyte/monocyte ratio has been recently put forward as an inflammatory marker of relevance in several cancers as well as in cardiovascular disease. This study aims to assess the correlation between severity of calcific aortic stenosis and the lymphocyte/monocyte ratio.

**Methods:** The study retrospectively included 178 patients with a diagnosis of calcific aortic stenosis and 139 age- and gender-matched controls. The patients were divided into two groups according to the severity of aortic stenosis: mild-to-moderate and severe.

**Results:** An inverse correlation was discerned between the severity of the aortic stenosis process (mean gradient) and the lymphocyte/monocyte ratio ( $r=-0.232$ ,  $p=0.002$ ). The lymphocyte/monocyte ratio was observed to decrease as the severity of aortic stenosis increased ( $p<0.001$ ) in the group with severe aortic stenosis compared with the mild-to-moderate aortic stenosis and control groups ( $p<0.001$ ,  $p=0.005$  respectively), and in the group with mild-to-moderate aortic stenosis compared with the control group ( $p=0.003$ ). Multivariate regression analysis revealed that the lymphocyte/monocyte ratio was independently related to the severity of calcific aortic stenosis ( $p=0.003$ ).

**Conclusion:** The present study demonstrated the existence of a statistically significant inverse relationship between severity of calcific aortic stenosis and the lymphocyte/monocyte ratio. The study also revealed that the lymphocyte/monocyte ratio was significantly related to the severity of the aortic valve stenosis process.

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**PALAVRAS-CHAVE**

Estenose aórtica  
calcificada;  
Relação  
linfócito/monócito;  
Ecocardiografia

**Estenose aórtica calcificada e a sua correlação com um novo marcador inflamatório: a relação linfócito/monócito**
**Resumo**

**Introdução:** A doença valvular aórtica calcificada, perturbação progressiva crónica, é a principal causa de substituição de válvulas nos doentes idosos. A relação linfócito/monócito tem sido recentemente apresentada como um marcador inflamatório de relevância no caso de diversas neoplasias, bem como de doenças cardiovasculares. Este estudo visa avaliar a correlação entre a gravidade da estenose aórtica calcificada e a relação linfócito/monócito.

**Métodos:** O estudo retrospectivo incluiu 178 doentes com um diagnóstico de estenose aórtica calcificada e 139 controlos emparelhados para a idade e o género. Os doentes foram divididos em dois grupos de acordo com a gravidade da estenose aórtica: (a) suave-moderada e (b) grave.

**Resultados:** Uma correlação inversa foi identificada entre a gravidade do processo da estenose aórtica (gradiente médio) e a razão linfócito/monócito ( $r = -0,232$ ,  $p = 0,002$ ). Observou-se que a razão linfócito/monócito diminuía à medida que a severidade da estenose aórtica aumentava ( $p < 0,001$ ) no grupo com estenose aórtica grave, quando comparado com o grupo com a estenose aórtica ligeira-moderada e com os grupos controlo ( $p < 0,001$ ;  $p = 0,005$  respetivamente), bem como no grupo com estenose aórtica ligeira-moderada, quando comparados com o grupo controlo ( $p = 0,003$ ). A análise da regressão multivariada revelou que a relação linfócito/monócito está relacionada independentemente da gravidade da estenose aórtica calcificada ( $p = 0,003$ ).

**Conclusão:** O presente estudo demonstrou a existência de uma relação estatística significativamente inversa entre a gravidade da estenose aórtica calcificada e a relação linfócito/monócito. O estudo também revelou que a relação linfócito/monócito estava significativamente relacionada com a gravidade do processo da estenose valvular aórtica.

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**Introduction**

Calcific aortic stenosis (CAS), an ever-increasing public health problem among elderly patients, is the leading cause of valve replacement within this age group.<sup>1,2</sup> The pathological process of the disease involves aortic valve thickening (sclerosis) along with fibrosis and calcification. Inflammation plays an important role in the development and progression of both aortic sclerosis and calcification.<sup>3,4</sup> This is reinforced by the observation that interventions that decrease exposure to inflammation have the potential to alleviate progressive stenosis in the aortic valve.<sup>4</sup> Therefore, the identification of inflammatory markers implicated in CAS can potentially be helpful in assessing the progression as well as the severity of the disease. A previous study reported the relationship between severity of CAS and the neutrophil/lymphocyte ratio (NLR), which is an inflammatory marker calculated from blood count parameters.<sup>5</sup>

Several studies have shown that the lymphocyte/monocyte ratio (LMR) is a convenient and useful marker for systemic inflammation in different malignancies and that it is closely associated with disease prognosis.<sup>6-8</sup> A recent study reported that LMR is related to in-stent restenosis and another study proposed that LMR could serve as an indicator for mortality in heart failure.<sup>9,10</sup> This study is aimed at investigating the relationship between the severity of aortic stenosis and LMR in the specific case of CAS, which is a disease closely associated with inflammation.

**Methods**

This study retrospectively included 178 patients diagnosed with CAS between April 2012 and January 2016 along with 139 age- and gender-matched controls. The control group were chosen from cardiology outpatients without prior cardiovascular disease history who were admitted for a general check-up or with atypical and/or non-cardiac complaints. Among these, individuals who underwent treadmill exercise tests and/or myocardial perfusion scintigraphy with negative test results were recruited as controls. Patients with CAS were investigated for mean aortic gradient as assessed by transthoracic echocardiography and the results were used to divide the patient pool into two groups according to disease severity: mild-to-moderate (111 patients) and severe (67 patients).

The exclusion criteria for both patient and control groups were: presence of congenital or rheumatic aortic valve disease; pre-existing diagnosis or suspicion of coronary artery disease (positive stress tests for coronary artery disease and/or any chest pain considered to be angina); left ventricular dysfunction; atrial fibrillation; hemodynamically significant arrhythmia; severe stenosis or regurgitation in other heart valves; active or chronic infection; systemic inflammatory or allergic disease; and presence of renal, hepatic or hematologic disease. Patients whose clinical, laboratory or echocardiographic data were not available on medical databases used in the study were also excluded.

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