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CASE REPORT

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A prominent crista terminalis associated with atrial septal aneurysm that mimics right atrial mass leading to atrial arrhythmias: a case report

Massimo Bolognesi^{1*} and Diletta Bolognesi²

Abstract

Introduction: The crista terminalis is a variant of normal anatomical structures within the right atrium that mimics an atrial mass on a transthoracic echocardiogram. Atrial septal aneurysm is a rare but well-recognized cardiac abnormality of uncertain clinical significance. The association between crista terminalis and atrial septal aneurysm is unusual but not completely casual. Both anatomical heart structures can lead to atrial arrhythmias.

Case presentation: This case report describes the accidental discovery during an echocardiographic examination of a 64-year-old Caucasian woman who had a left bundle branch block and palpitations.

Conclusion: The clinical relevance of this anatomical evidence is unknown. This was an occasional finding of transthoracic echocardiography, but in this case it is possible to assume its relationship with the occurrence of atrial arrhythmias, and also that computed tomography scan and cardiovascular magnetic resonance is mandatory to define the structure and function of these incidental findings.

Keywords: Atrial arrhythmias, Atrial septal aneurysm, Cardiovascular magnetic resonance, Computed tomography scan, Echocardiography, Prominent crista terminalis

Introduction

The crista terminalis is a fibromuscular vertical ridge of smooth myocardium within the right atrium of the heart [1]. It is located on the posterolateral wall of the chamber. It extends between the right side of the orifice of the superior vena cava inferiorly to the right side of the valve of the inferior vena cava. The echocardiographic finding of a prominent crista terminalis can mimic a right atrial mass, such as a tumor or thrombus [2,3]. Atrial septal aneurysm (ASA) is a rare cardiac abnormality of uncertain clinical significance; it has a variable incidence but transthoracic echocardiographic (TTE) studies estimate the rate to be between 0.08% and 1.2% [4]. It is recognized as a bulging of the thin, billowing septal tissue typically involving the region of the fossa ovalis. ASA is generally considered benign, but it has been associated with atrial septal defects, atrioventricular valvular prolapse [5,6], and atrial arrhythmias.

Manifestations attributed to ASA are atrial arrhythmias and arterial embolism. Interatrial septal aneurysm can act as an arrhythmic focus, generating focal atrial tachycardias [4].

Approximately two thirds of focal right atrial tachycardias occurring in the absence of structural heart disease will arise from along the crista terminalis [7]. Descriptions of the association between prominent crista terminalis and ASA are rare [8], and both are important anatomic structures responsible for atrial tachyarrhythmias [9]. In this case report we describe the original association between a prominent terminal ridge, which appeared as a 'mass' in the right atrium that needed to be differentiated from a pathological cardiac mass, and a small ASA, in a clinical context of dyspnea and palpitations in a woman with probable atrial tachyarrhythmias. The identification of physiological structures in the right atrium on TTE using subsequent cardiovascular magnetic resonance (CRM) imaging can avoid additional unnecessary, more invasive and expensive tests such as transesophageal echocardiography.

* Correspondence: massbolo1@tin.it

¹Clinical Echocardiography, Internal General Medicine, Asl 112 District of Cesena (Cesena, Italy), Via Ungaretti 494, Cesena 47521, Italy
Full list of author information is available at the end of the article

58 Case presentation

59 A 64-year-old Caucasian woman, who reported dyspnea
60 and recurrent palpitations, was seen in our office. Her
61 physical examination was unremarkable. Her blood pressure
62 was 130/80 mmHg and her pulse was regular at 78
63 beats per minute. There was no symptom or sign of
64 heart failure and no history of fever or tumor. An electro-
65 cardiogram (ECG) showed a left bundle branch block
F1 66 (Figure 1). A chest X-ray showed normal cardiac size
67 and clear lungs. ECG Holter monitoring showed frequent
68 supraventricular ectopic beats.

69 A TTE, in apical four-chamber view, depicts an im-
70 mobile, round (15mm in diameter) and non-calcified mass
F2 71 on the roof of the patient's right atrium (Figure 2; zoom
F3 72 Figure 3) mimicking a thrombus or a tumor. A small
73 ASA was also depicted without apparent shunt. The
74 remaining heart structure was normal and showed normal
75 left ventricular systolic function (ejection fraction
76 62%). Only mild tricuspid regurgitation with a normal
77 pulmonary artery systolic pressure was observed in the

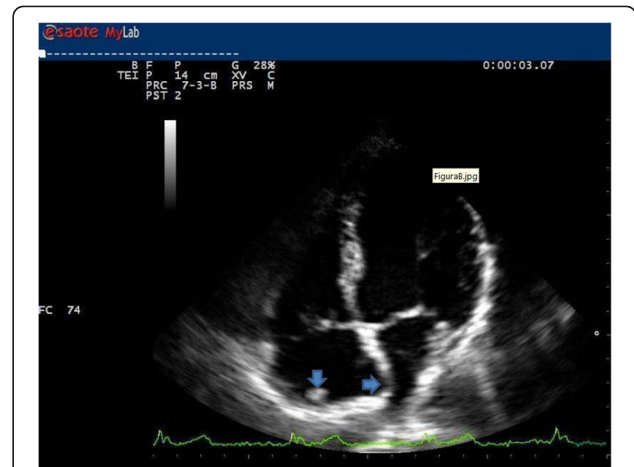


Figure 2 Transthoracic echocardiogram, in four-chamber apical view, shows prominent crista terminalis and atrial septal aneurysm (arrowheads) during atrial diastole.

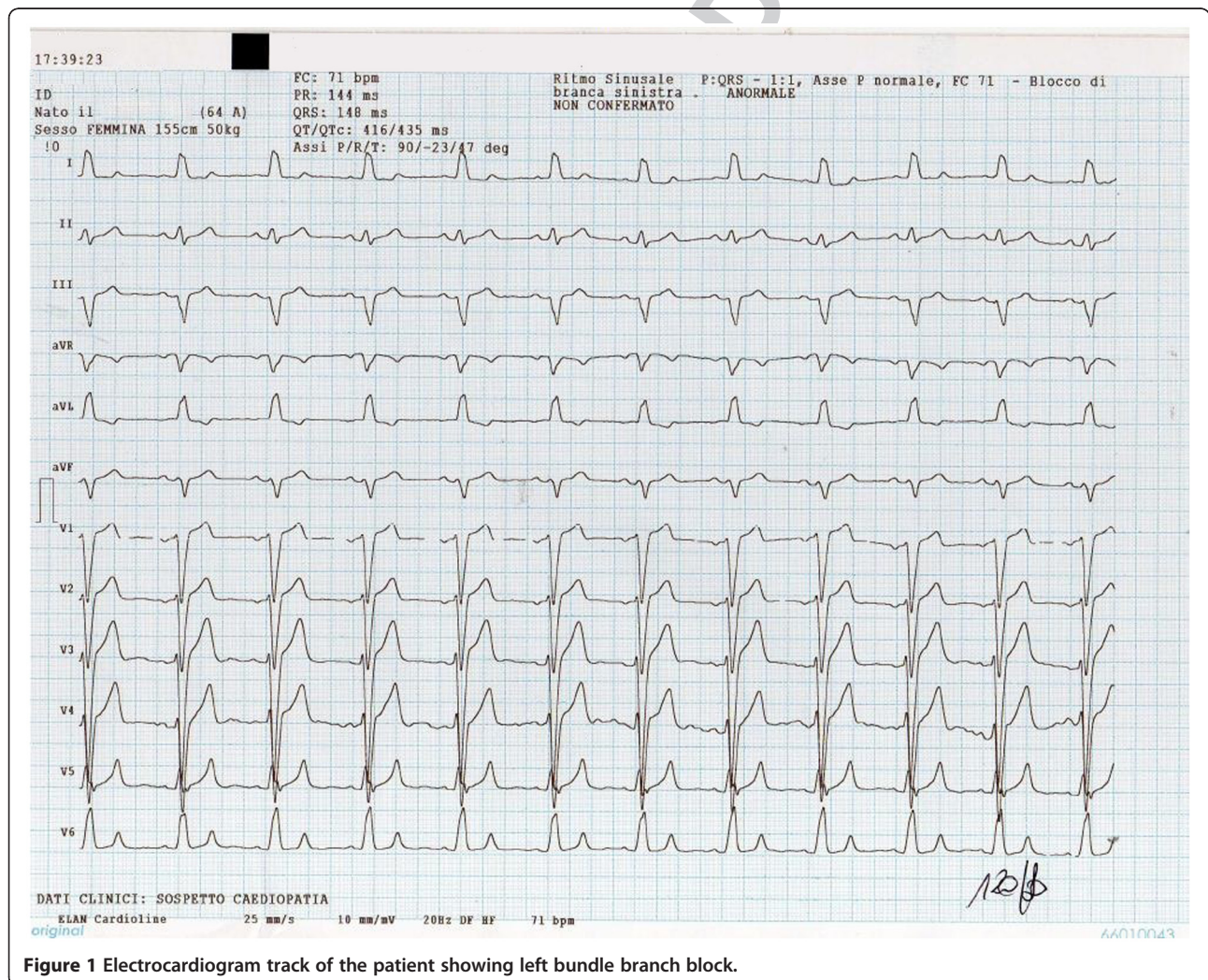


Figure 1 Electrocardiogram track of the patient showing left bundle branch block.

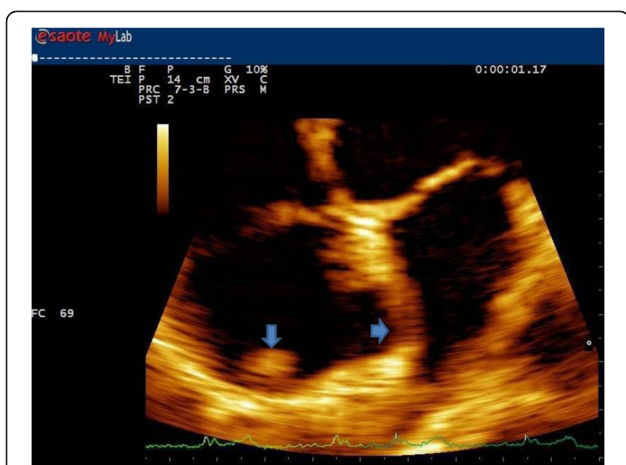


Figure 3 Zoom transthoracic echocardiogram in four-chamber view focusing on crista terminalis and atrial septal aneurysm (arrowheads).

78 absence of septal ventricular dyskinesia. Subsequently a
79 computed tomography (CT) scan was performed.
F4 80 CMR imaging was performed (Figure 4). CT and CMR
81 (T1 and T2 sequences) images of end-diastolic phase
82 showed the same findings: a round mass as a prominent
83 ridge localized at the posterolateral region of the right
84 atrium, extending toward tricuspid valve, similar to echo
85 findings and in signal intensity to myocardium; also a
86 small ASA was visualized. An additional computed

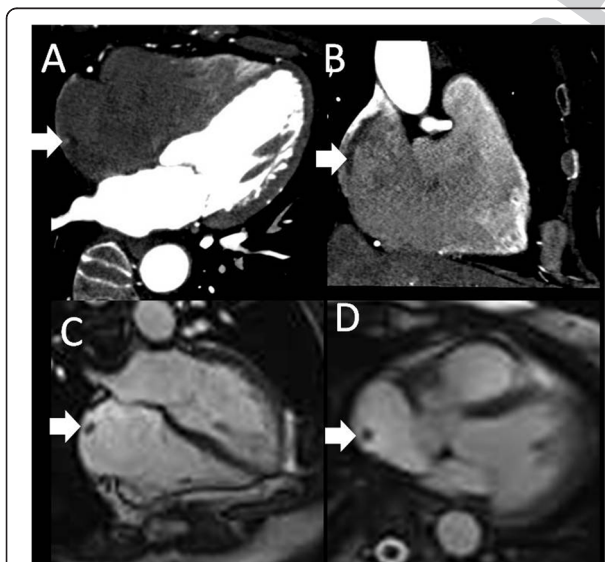


Figure 4 Computed tomography (A, B) and magnetic resonance (C, D) images of end-diastolic phase showing the prominent crista terminalis (arrows). In A and B the computed tomography images show the finding in four-chamber view and two-chamber long axis view, respectively. In C and D the steady-state free precession magnetic resonance images show the finding in four-chamber view and axial view, respectively.

tomography angiography showed that the patient's coronary artery was normal. 87
88

Discussion 89

In a recent report, normal right atrial structures were 90
identified using MRI in 59% of 149 healthy patients. 91
These structures included the Eustachian valve, Thebesian 92
valve, persistent sinus venosus, crista terminalis and 93
the Chiari network [10]. Most of these normal anatomical 94
structures in the right atrium are not visualized on TTE 95
routine standard views. The crista terminalis and ASA 96
are important anatomical structures that can not only 97
mimic pathological atrial mass, but can also be the site 98
of origin of right atrial tachyarrhythmias, referred to as 99
'cristal tachycardias' or paroxysmal atrial fibrillation and 100
atrial flutter, by initiating ectopic atrial beats [7-9]. 101
For these reasons, their association is highly suspected to be 102
the cause of not well-identified arrhythmias, and particularly 103
for the patient described in this report who had a 104
history of recurrent palpitations. 105

Conclusion 106

We consider this report interesting for the following reasons: 107
(1) it concerns a rare anatomical finding (namely the 108
combination between crista terminalis and ASA); (2) the 109
discovery of such an abnormality is incidental; (3) an 110
unusual anatomy can produce atrial arrhythmias; and (4) 111
TTE with subsequently CT scan or CMR are mandatory 112
to define the structure and function of these anatomical 113
findings. 114

Consent 115

Informed consent was collected from the patient for the 116
procedures performed. Consent for data publication was 117
also collected from the patient. 118

Written informed consent was obtained from the patient 119
for publication of this manuscript and accompanying 120
images. A copy of the written consent is available for 121
review by the Editor-in-Chief of this journal. 122

Competing interests 123

The authors declare that they have no competing interests. 124

Authors' contributions 125

The Authors' contribution was equal in data collection, data 126
analysis, manuscript writing and correction. Both authors read and 127
approved the final manuscript. 128

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Author details 132

¹Clinical Echocardiography, Internal General Medicine, Asl 112 District of 133
Cesena (Cesena, Italy), Via Ungaretti 494, Cesena 47521, Italy. ²Via 134
Lambruschini 307, Cesena 47521, Italy. 135

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