

# Prominent crista terminalis mimicking a right atrial mixoma: cardiac magnetic resonance aspects

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**Abstract.** – A 68-year-old woman came to our observation with a clinical history of isolated systolic hypertension poorly controlled by the combination of ramipril 5 mg and hydrochlorothiazide 12.5 mg o.d. The ECG showed sinus rhythm with heart rate of 68 beats per minute and signs of left ventricular hypertrophy without strain. Further investigation included an echocardiogram that showed normal left and right cavities and normal cardiac valves. At the level of the posterior wall of the right atrial (RA) an apparent smooth, bean-like tumor, having a thin pedicle, was identified as a RA mixoma. Cardiac MRI was requested and showed in two sequential slices a muscular ridge, identified as a prominent crista terminalis.

Some para-physiological structures sited in the RA may have the appearance of tumors, as crista terminalis, Eustachian valve extending into the RA chambers and Chiari network. The multiplan projections of MRI allow the cardiologist to identify the presence of intracardiac masses and to make a differential diagnosis between neoplasms and variant anatomic structures.

*Key Words:*

Right atrial masses, Crista terminalis.

## Introduction

Primitive cardiac tumors are 0,28% of all human neoplasm. In the 85% of the cases they are benign masses.

The cardiac masses are rarely localized in the right atrium (RA). Magnetic Resonance Imaging (MRI) is being used for detection and staging of cardiac masses, usually after an

initial echocardiographic investigation<sup>1-3</sup>. In this report we present the case of a patient with an incidental pseudomass of the RA, that was correctly diagnosed only by images of MRI.

A.M., a 68-year-old woman, came to our observation with a clinical history of isolated systolic hypertension poorly controlled by the combination of ramipril 5 mg and hydrochlorothiazide 12.5 mg orally. She was asymptomatic.

The cardiac physical examination revealed an aortic 2/6 systolic ejection murmur. The chest was clear and pedal edema was absent. Sitting blood pressure was 190/86 mmHg (average of 3 measurements). Grade II hypertensive retinopathy was found on ophthalmoscopy.

The ECG showed sinus rhythm with heart rate of 68 beats per minute and signs of left ventricular hypertrophy without strain.

No abnormalities were detected on routine laboratory tests.

A new antihypertensive treatment was prescribed: nebivolol 5 mg orally, manidipine 20 mg orally, long-acting indapamide 1.5 mg orally. After 1 month of follow-up blood pressure was 140/74 mmHg.

Further investigation included an echocardiogram that showed normal left and right cavities and normal cardiac valves. At the level of the posterior wall of the RA an apparent smooth, bean-like tumor, having a thin pedicle, was identified as a RA mixoma (Figure 1).

Cardiac MRI was requested and showed in two sequential slices (10 mm thick) a muscular ridge, identified as a prominent crista terminalis (Figure 2).

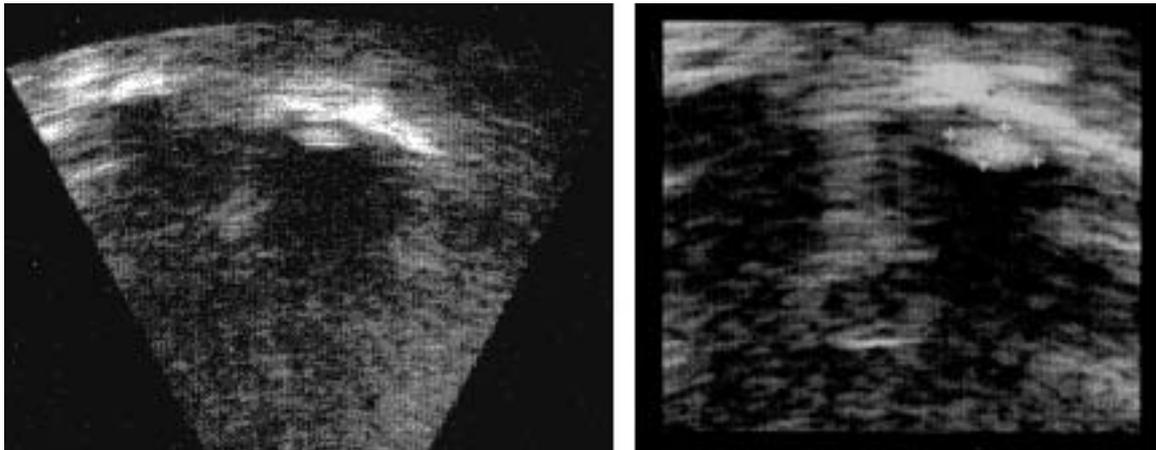


Figure 1. Apical four-chamber echo image showing a mass at the level of the posterior wall of the right atrium, identified as a right atrium mixoma.

The RA, derived from the embryonic sinus venosus<sup>4</sup>, consists of two parts separated by a prominent fibromuscular ridge<sup>5</sup>, derived from the regression of the septum spurium called crista terminalis. This structure divides the smooth-walled portion of the atrium, known as the sinus venarum from the anterolateral atrium proper and auricle, which are trabecular and lined by pectinate muscles<sup>6</sup>. Its position corresponds to the sulcus terminalis on the external surface of the heart extending between the

openings of the superior and inferior vena cavae on the posterior RA wall<sup>7-8</sup>.

Some para-physiological structures sited in the RA may have the appearance of tumors, as crista terminalis, Eustachian valve extending into the RA chambers and Chiari network (Figure 3), a series of strand-like fibrous structures arising from the region of the inferior crista terminalis.

The process of regression that forms the adult crista terminalis and Chiari network is known to occur to variable degrees, thus ac-

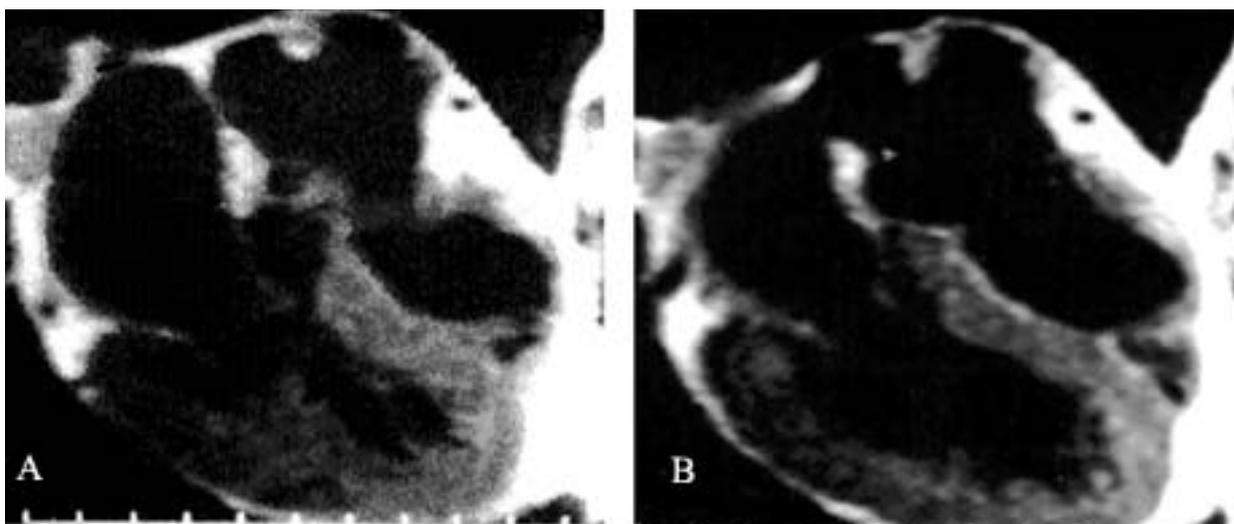


Figure 2. *A*, Axial Magnetic Resonance (MR) spin-echo (SE) image, acquired at 1 Tesla, showing a pseudomass in right atrium. *B*, Adjacent, Axial MR SE-image, acquired at more caudal level, revealing prominence of crista terminalis.

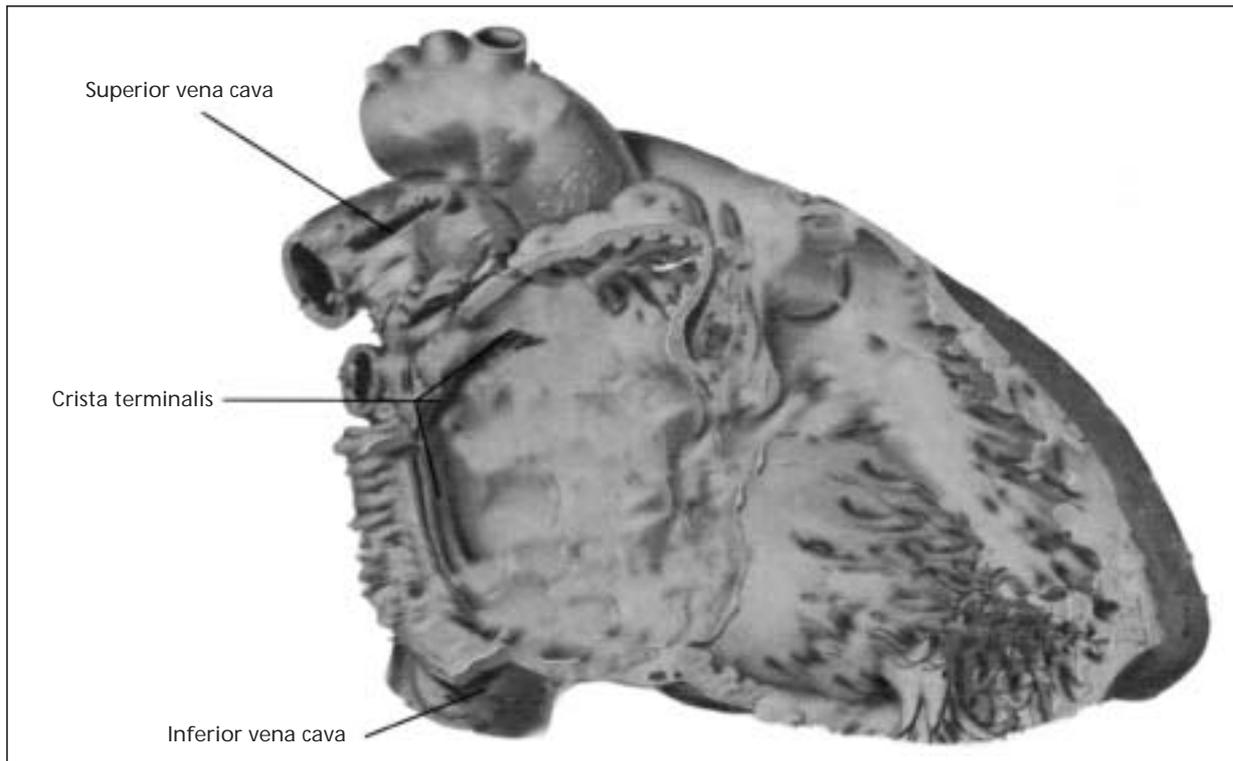


Figure 3. Anatomic schema demonstrating the extension of the crista terminalis between the openings of the superior and inferior vena cavae.

counting for the widely variable prominence exhibited by these structures<sup>9</sup>.

Prominent intracardiac structures are frequently seen within the RA, represent normal structures and should be recognized as such.

The diagnostic mistake in the identification of RA masses increases when echocardiography is used as an isolated noninvasive technique for the imaging of the heart or where echocardiography is equivocal or incomplete<sup>10-14</sup>. The multiplane projections of MRI allow the cardiologist to identify the presence of intracardiac masses and to make a differential diagnosis between neoplasms and variant anatomic structures. MRI will prevent misinterpretation of the presence of normal intracardiac structures identifying accurately the exact position and extent of fibromuscular prominent structures distinguishing among neoplasm, thrombosis or inflammation. Diagnostic difficulties may arise when normal structures are identified by MRI but not by other imaging procedures. In particular, the nor-

mal crista terminalis and the Chiari network have been reported to have the appearance of RA tumors (in up to 90% of cases using axial electrographic gated spin-echo sequences)<sup>15</sup>.

The advantage of a tomographic technique as MRI confirms that this tool has a major role in the differential diagnosis of RA masses avoiding either misdiagnosis of RA neoplasm or invasive diagnostic procedures and unnecessary hospital admissions.

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