Right ventricular acute infarct associated with massive acute arterial pulmonary thrombosis without coronary obliteration. An autopsy study.

Isolated right ventricular infarction associated with normal coronary arteries has been described infrequently. Only rarely, pure right ventricular infarction secondary to massive pulmonary embolism, without right ventricular hypertrophy has been described. We describe an autopsy case of a 75 years old man with these pathology findings.

Keywords: acute myocardial infarction, right ventricle, heart, massive pulmonary embolism

El infarto de ventrículo derecho rara vez se identifica con arterias coronarias normales. Sólo se han descrito aislados casos de infarto de ventrículo derecho aislado asociado con tromboembolismo pulmonar masivo, sin hipertrofia significativa del ventrículo derecho. Describimos estos hallazgos anatomopatológicos en la autopsia de un varón de 75 años

Palabras clave: infarto agudo de miocardio, ventrículo derecho, tromboembolismo pulmonar masivo.

INTRODUCTION

Acute pulmonary embolism is clinically associated with right ventricular dysfunction with dilatation and failure (Lualdi and Goldhaber, 1995; McConnell et al. 1996). Detection of right ventricular hypokinesis helps to stratify patients’ risk because right ventricular dysfunction confers a worse prognosis than does normal right ventricular function after pulmonary embolism, even in normotensive patients (Lualdi and Goldhaber, 1995; Ribeiro et al. 1998).

In autopsy studies of myocardial infarction, isolated right ventricular infarction is found in 1.9 to 4.2 % of cases (Bahrman et al. 1976; Coma-Canella et al. 1988; Daubert et al. 1988; Colantonio et al. 1990).

Carlon et al (1985) described for the first time an isolated right ventricular subendocardial infarction associated with normal coronary arteries, in a patient with pulmonary hypertension and right ventricular hypertrophy, who died with septicemia shortly after mitral valve replacement (Carlson et al. 1985). Three years later, Coma-Canella et al (1988) described a series of six autopsied patients with pure right ventricular infarction secondary to massive pulmonary embolism, without right ventricular hypertrophy (Coma-Canella et al. 1988).

CASE DESCRIPTION

We have recently studied an autopsy case of a 75 years old man with massive pulmonary thromboembolism (figure 1) and isolated right ventricular acute myocardial infarction, without right ventricular hypertrophy.

The patient was referred to hospital for abdominal pain. Two days later, he suffered from an abrupt onset of dyspnea, and thoracic pain, with severe hypoxia. X ray films did not show significant alterations, and ECG revealed a complete right branch blockade. Massive pulmonary embolism with right ventricular failure was the clinical diagnosis, considering risks factors like patient’s motionlessness at hospital, and in a few hours after onset of symptoms, the patient suffered a cardio-respiratory arrest, and died. Thrombolytic therapy treatment was established during the resuscitation procedures.

Autopsy study showed a bilateral massive pulmonary thromboembolism, extending into the main pulmonary arteries, and hemorrhagic infarction in
right lower pulmonary lobule. The heart weight was within normal limits (350 g), with dilated right chambers, and the thickness of the posterior wall of the right ventricle was 0.4 cm, and the thickness of the left ventricle wall was 1.5 cm. Coronary arteries did not show significant lesions, with slight atherosclerotic coronary obstruction (< 50%) of left anterior descendent and right coronary artery. The right coronary artery was dominant. Both the right atrial and ventricular cavities were free of thrombi and the endothelium and valvular structures were intact. Microscopic study shows a recent (8-12 h) right ventricular myocardial infarction involving entire (anterolateral and posterior) right ventricular wall. The necrosis of the right ventricle was transmural.

In the rest of the organs, an isolated small intestine perforated ulcer located at 40 cm from ileocecal valve was appreciated. The source of embolism was not found at autopsy. Hepatic congestion and splenomegaly was observed.

![Figure 1. Massive pulmonary embolism. The heart showed dilated right ventricle chamber, without hypertropy.](image)

**DISCUSSION**

In our case, as in the rest of the cases described in the literature, right ventricular infarction was a post-mortem finding, not previously diagnosed (Coma-Canella et al. 1988).

Pulmonary embolism, may rarely present with ECG findings suggestive of an extensive acute myocardial infarction (Cassin et al. 1986; Vranckx et al. 1998). Studies of CK-MB in patients with pulmonary emboli, suggest that pulmonary emboli can induce right ventricular infarction in 7.7% patients, even when patients with a history of coronary artery disease and/or ECG changes of infarction are excluded (Adams et al. 1992). However, due to the normal values of CK usually obtained in these patients (probably due to the short time of evolution of right ventricular infarction; Coma-Canella et al. 1988), complicated with the absence specific alterations of myocardial necrosis in ECG (Colantonio et al. 1990), isolated right ventricular myocardial infarction in patients with massive pulmonary embolism is usually not diagnosed before autopsy.

Right branch blockade, that was present in our patient, and the absence of ECG right precordial recording, hinder ECG diagnosis of right ventricular myocardial infarction.

In some rare cases, evolved, instead of acute, right ventricular myocardial infarction has been found in patients with massive pulmonary embolism (Colantonio et al. 1990).

Pure right ventricular infarction secondary to massive pulmonary embolism, without right ventricular hypertrophy, and without significant coronary lesions, has been rarely described (Bahrmann et al. 1976; Coma-Canella et al. 1988; Colantonio et al. 1990; Ramirez-Rivera et al. 1993).

The pathogenesis of the necrosis of the right ventricle in these cases is associated with a decreased left ventricular filling, cardiac output and systemic circulation. There is a decrease in coronary perfusion pressure to the acutely overloaded right ventricle that may produce ischemia and worsening of right heart failure.

This downward cycle of right ventricular failure and ischemia may ultimately progress to right ventricular infarction, circulatory arrest, and death (Coma-Canella et al. 1988; Ramirez-Rivera et al. 1993; Lualdi and Goldhaber, 1995).

The necrosis of the right ventricle is mainly transmural in four cases (Coma-Canella et al. 1988). In our case, no significant left ventricle hypertrophy was associated, but this finding has not been revised in previous descriptions.
As shown is autopsy studies, isolated right ventricular infarction is more frequently associated with massive pulmonary embolism than with right ventricular hypertrophy (Coma-Canella et al. 1988; Colantonio et al. 1990; Carlson et al. 1985). On the other side, in patients with massive pulmonary embolism, isolated right ventricular infarction is more frequently found than left ventricular infarction (Coma-Canella et al. 1988).

Massive pulmonary embolism and isolated right ventricular infarction is more frequently associated with right ventricular dilatation than with right ventricular hypertrophy (Coma-Canella et al. 1988; Colantonio et al. 1990; Ramirez-Rivera et al. 1993).

In these series of patients with massive pulmonary embolism and isolated right ventricular infarction significant lesions of the right or left (in four) coronary arteries is usually observed (Coma-Canella et al. 1988; Colantonio et al. 1990), however, our patient only showed stenosis evaluated as 25-50% in both right and left anterior descendente coronary arteries. We could only find 12 similar cases described in the literature (Coma-Canella et al. 1988; Ramirez-Rivera et al. 1993; Jerjes Sanchez et al. 1995).

We conclude that special attention should be paid to right ventricular functions in order to prevent and detect acute right ventricular infarction in patients with massive pulmonary thromboembolism. In autopsy studies, a detailed examination of right chambers must be included in the gross examination and microscopic protocol of patients with clinical suspicion of pulmonary thromboembolism, with a special attention to cases with right ventricular dilatation and without right ventricular hypertrophy.

[This case was partially presented at the local Madrid meeting of the Spanish Pathology Society, held on June, 2001. http://www.seap.es/regional/madrid/junio01/ciudadreal.htm]

REFERENCES


