Calcified Right Atrial Myxoma Demonstrated by Magnetic Resonance Imaging*

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Cardiac myxoma of the right atrium was diagnosed in a 64-year-old woman by use of MRI. With the MRI technique, an absence of signal intensity was shown within parts of the tumor, indicating the presence of intratumoral calcification. The MRI also demonstrated an intratumoral area of high signal intensity which was related to the presence of hemorrhage within the tumor. Both MRI findings were confirmed on pathologic examination of the surgical specimen. Magnetic resonance imaging may be a useful test to evaluate the heart for mass lesions in those patients in whom echocardiography is inadequate.

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Magnetic resonance imaging provides detailed information on the normal and abnormal anatomy of the heart and great vessels.1 Moving blood causes no signal, so that the myocardium and intracardiac structures can be clearly visualized.

Besides the accurate demonstration of morphologic detail, MRI also has the potential to characterize pathologic processes based on alterations in signal intensity with different imaging techniques.2 The signal intensity of normal and abnormal tissues is related to the proton density, and longitudinal (T₁) and transverse (T₂) relaxation parameters. Differences in T₁ and T₂ relaxation parameters can be correlated with characteristics of tissues.

In this report, we illustrate the ability of MRI to diagnose and characterize a calcified myxoma in the right atrium.

CASE REPORT

A 64-year-old woman was admitted because of a one-year history of chest discomfort. A chest roentgenogram demonstrated a calcified mass in the region of the right atrium. A two-dimensional echocardiogram was not adequate due to obesity.

The MRI was performed using a Philips 0.5-tesla Gyroscan. Multislice spin-echo images in transverse, sagittal, and coronal planes were obtained. The TE was 30 ms, and the TR was determined by the RR-interval when gated to every heartbeat. A single-slice multi-echo was obtained at the level of the greatest diameter of the tumor (TE 30-60-90-120 ms).

The relative signal intensity of the tumor, on images obtained with different TE values, was used for characterization of tissue. The exact location of the myxoma within the right atrium and the relationship with the tricuspid valve were demonstrated by MRI (Fig 1A). The myxoma was pedunculated and arose from the interatrial septum. Direct imaging in multiple planes by MRI offered diagnostic information which was helpful in planning the surgical approach.

Areas of low signal intensity were noted in the myxoma due to intratumoral calcifications. Both at short and long echo times, these calcifications were visualized as areas of low signal intensity. In the center of the tumor, an area of relatively high signal intensity was identified, probably related to an area of hemorrhage (Fig 1B).

Subsequently, the myxoma was confirmed by surgery. Histologic examination demonstrated a calcified mass compatible with myxoma. An area of old hemorrhage was noted in the tumor, which correlated with an area of high signal intensity on MRI.

DISCUSSION

Myxomas are the most common type of primary cardiac tumor. Most of these tumors occur in the left atrium and arise from the interatrial septum.3 Clinical diagnosis is often difficult because of the nonspecific presentation of myxomas. Echocardiography is considered the procedure of choice for the diagnosis of intracardiac tumors; however, when echocardiography provides inadequate images, as in obese patients and patients with obstructive pulmonary disease, MRI offers a diagnostic alternative.4 In our case, MRI was helpful in identifying the myxoma in the right atrium, while echocardiography was suboptimal due to the obesity of this patient.

Contrast of tissues on MRI is related to differences in T₁.

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Acute Pulmonary Edema Associated with the Use of Oral Ritodrine for Premature Labor*

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We describe a patient who developed acute pulmonary edema while taking oral ritodrine for the treatment of premature labor and recovered after its discontinuation. The mechanism of development of pulmonary edema associated with β-sympathomimetic agents is still not fully understood. Patients taking oral ritodrine should be observed for cardiopulmonary signs and symptoms.

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In addition to the treatment of bronchial asthma, β₂-sympathomimetic drugs such as ritodrine, terbutaline, and fenoterol are widely used for the treatment of premature uterine contractions. Parenteral β₂-sympathomimetic agents have well-described cardiopulmonary toxic effects such as acute pulmonary edema,1,2 myocardial ischemia with angina,3,4 cardiac dysrhythmia,5,6 and symptomatic hypotension.7,8 However, no serious cardiopulmonary toxicity has been reported with oral ritodrine.9,10 The aim of this report is to describe a patient who developed acute pulmonary edema with oral ritodrine administration and discuss its possible pathogenesis.

CASE REPORT

A 37-year-old woman (gravida 1, para 0), 20 weeks pregnant, with a history of uterine myoma and peptic esophagitis, was admitted to the hospital with a two-day history of lower abdominal pain, nausea, and vomiting. There was no history of cardiopulmonary disease. Physical examination results were significant only for the presence of a gravid uterus extending to the umbilicus and a firm, round mass on the anterior aspect of the fundus of the uterus consistent with a myoma. Pelvic examination results revealed a long, closed cervix. Routine admission laboratory tests including ECG and serum albumin levels (3.6 g/dl) were within normal limits. The diagnosis of premature labor was made, and the patient was treated with oral ritodrine, 10 mg every 2 h, magnesium sulfate, and acetaminophen with codeine. Twenty-four hours after admission, the abdominal pain decreased in intensity and frequency, and the nausea and vomiting ceased. Magnesium sulfate therapy was stopped, and the patient continued receiving oral ritodrine, 10 mg every 3 h.

Seventy-two hours after admission, the patient developed dyspnea, tachypnea, tachycardia, and fine rales at both lung bases. The chest roentgenogram showed bilateral interstitial infiltrates with small pleural effusions. The ECG revealed sinus tachycardia. Arterial blood gas analysis (ABG) on room air showed pH 7.46, PaO₂, 25 mm Hg; PaCO₂, 69 mm Hg; and an O₂ saturation of 94.8 percent. A ventilation-perfusion lung scan was interpreted as indicating a low probability of pulmonary embolism. Barium esophagogram demonstrated no evidence of esophageal perforation. Repeated chest x-ray ABGs showed pH 7.47; PaCO₂, 29 mm Hg; PaO₂, 60 mm Hg; and O₂ saturation, 92.7 percent. During this period, the patient was taking fluids orally and received 1 to 2 L of IV fluids daily. Thoracentesis of the right side revealed clear fluid with transudative characteristics (pH, 7.50; protein, 1.5 g/dl; pleural fluid to plasma protein ratio, 0.24; LDH, 94 units/L; pleural fluid to plasma LDH ratio, 0.41; amylase, 71; glucose 101 mg/dl). After exclusion of the diagnoses of pulmonary embolism and esophageal perforation, the process was thought to be due to either acute pulmonary edema related to ritodrine or pneumonia. The ritodrine therapy was stopped. The patient began receiving O₂ via nasal cannula and cefoxitin IV. During 2 L/min O₂ via nasal cannula, ABGs were pH, 7.50; PaCO₂, 28 mm Hg; PaO₂, 89 mm Hg; and O₂ saturation, 97.7 percent. Total intake of fluid was restricted to 1 L/day. The patient started improving after the ritodrine was discontinued, and it was thought that invasive hemodynamic monitoring was not indicated. Complete resolution of signs and symptoms occurred.

REFERENCES


and T2 relaxation times and can be correlated with differences in components of tissues. Mineral-rich tissues, such as cortical bone and calcifications, contain few mobile protons, resulting in low signal regardless of the TR and TE used. Neoplasms are rich in free water. Therefore, tumors usually will have low signal on short TR/TE images and high signal on long TR/TE images. Subacute and chronic hemorrhage will show a high signal intensity on both short and long TR/TE images.

The potential of MRI for characterization of intratumoral tissue is well demonstrated in our patient. The area of high signal noted in the myxoma correlated with a chronic hemorrhage, as demonstrated in the pathologic specimen.

This case differs from others in two respects. First, the myxoma was heavily calcified, and this was shown as areas of low signal intensity on MRI, a finding consistent with calcification. Secondly, there was a small area of subjectively increased signal intensity within the tumor, corresponding to hemorrhage in the pathologic specimen. This finding has not previously been described.

In summary, in our patient, MRI accurately depicted and delineated intracardiac myxoma with high anatomic resolution in multiple planes. Furthermore, MRI has the ability to define areas of hemorrhage and large calcifications within the tumor, which can be helpful for further characterization of an intracardiac mass.