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Leiomyosarcoma: an unusual cardiac tumor. Case report and literature review

Un tumor cardiaco infrecuente: leiomiosarcoma. Reporte de caso y revisión de la literatura

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Cardiac tumor, leiomyosarcoma, right atrium.

Palabras clave:
Tumor cardiaco, leiomiosarcoma, aurícula derecha.

ABSTRACT

A 17-year-old female was admitted to the hospital with progressive shortness of breath. It started three weeks before admission, and initially presented only on moderate exertion, worsening until it was present at rest and accompanied with orthopnea. Five days before admission, she developed hemoptysis. Three days before, she had a syncope and was taken to the emergency department of a nearby hospital. After she was examined, an acute abdominal pain secondary to cholecystitis was diagnosed. Cholecystectomy was performed and as an additional finding, surgeons reported hepatomegaly and took a liver biopsy. After these, an abdominal and chest computed tomography (CT scan) with IV contrast was performed, where a right atrial tumor with pericardial extension was reported. Based on this, they decided to perform a transthoracic echocardiogram and discovered a hyper-echogenic right atrial tumor, covering the entire cavity and protruding through the tricuspid valve. She was transferred to our hospital and taken to cardiac surgery due to worsening heart failure symptoms, where 80% of the tumor was resected. A high grade leiomyosarcoma was reported. A couple weeks later, the patient died secondary to refractory septic shock.

RESUMEN

Paciente femenino de 17 años, que comienza su padecimiento actual tres semanas previas, presentando disnea de medianos esfuerzos, progresando hasta presentar disnea en reposo y ortopnea, agregándose cinco días previos a su ingreso hemoptisis. Tres días antes presentó síncope, motivo por el cual es llevada al Servicio de Urgencias de otro hospital, donde diagnosticaron abdomen agudo secundario a colecistitis. Ingresó a colecistectomía, donde detectaron hepatomegalia, obteniendo biopsia. Se le indicó tomografía contrastada de tórax y abdomen donde detectan un tumor dependiente de la aurícula derecha con invasión de pericardio. Se realizó ecocardiograma transtorácico que demostró un tumor hiperecoico, que cubría la totalidad de la aurícula derecha, la cual protruía a través de la válvula tricúspide. Es trasladada a nuestro hospital y, secundario a insuficiencia cardiaca aguda, se le realizó cirugía, resecando 80% del tumor. Se confirmó por patología leiomiosarcoma de alto grado. La paciente fallece dos semanas después secundario a choque séptico refractario.

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INTRODUCTION

Cardiac tumors are a very rare entity, with an approximate incidence of 0.02% of tumors reported every year. Secondary tumors are the most common and, within primary tumors, 75% are benign, with cardiac myxomas as the most frequent among them. A quarter of these tend to be malignant (sarcomas on its majority) and from these, rhabdomyosarcomas predominate.[1]

Leiomyosarcomas represent only 1% of cardiac tumors and have a very broad clinical presentation, ranging from asymptomatic to congestive heart failure, systemic embolization, constitutional symptoms and arrhythmias. Heart failure symptoms tend to present late

in the evolution, a reason why most of them are diagnosed in a late stage, giving them a poor prognosis. These tumors usually grow in an outward fashion, with high rates of lung metastasis. Generally, the highest incidence is in the fourth decade of life, without a gender prevalence. Due to its rapid clinical progression and without a proper treatment, it is usually fatal in less than 6 months.[2]

We present the case of a 17-year-old female patient, who was diagnosed with a right atrium leiomyosarcoma. To our knowledge, there are no more than 200 cases published in the global literature; being the 4th case reported in Latin America and with the youngest age of presentation. Previous reports describe the case of a 43-year-old Chilean patient in 1996, a 32-year-old Mexican woman in 2002 and a 40-year-old Mexican man in 2017.[3]

CLINICAL CASE

A 17-year-old female patient with a past medical history of cholelithiasis at 12 years of age. She was taken to the emergency department of a nearby hospital after having a syncope. She began her current condition three weeks before, complaining of progressive shortness of breath that initially was presented only on moderate exertion, that increased until it was present at rest and accompanied with orthopnea. Five days before admission she developed hemoptysis and two days later, she had a syncope and was taken to the emergency department. Upon arrival an acute abdominal pain was reported, and an abdominal ultrasound was performed. The results where compatible with acute cholecystitis, therefore she was taken to an open cholecystectomy, where as a finding, they reported hepatomegaly and took a liver biopsy. The next day, a chest and abdominal CT scan was performed *(Figure 1)*, spotting a right atrial tumor with pericardial extension, as well as multiple bilateral lung nodules.

Based on this, they decided to take a transthoracic echocardiogram *(Figure 1)* and discovered a hyper-echogenic right atrial tumor, which covered the entire cavity,

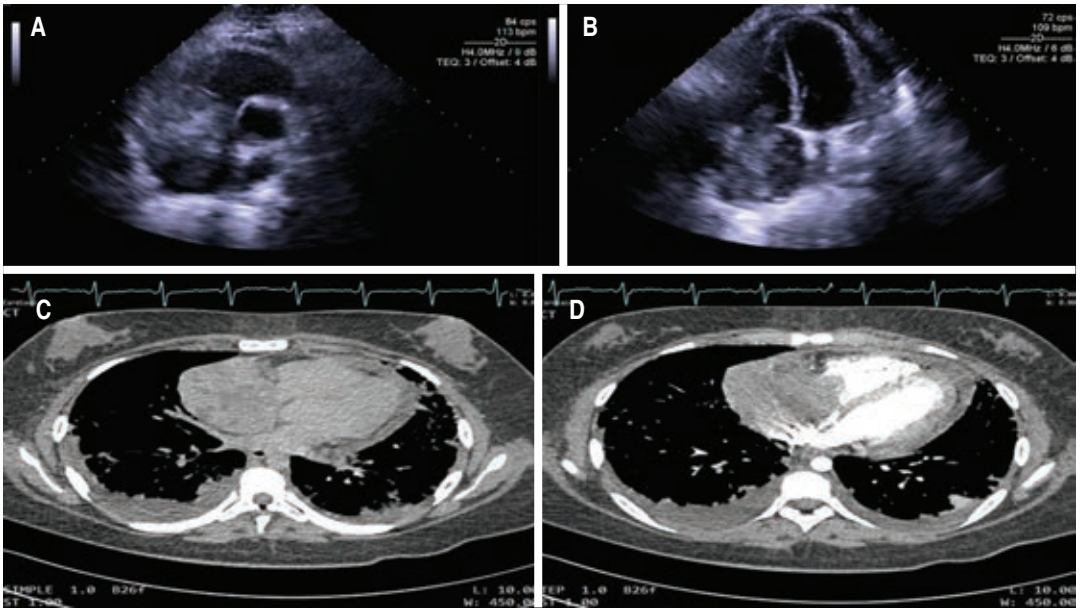

Figure 1: A. Short axis view at the level of the great vessels. A hyper-echogenic tumor is observed at the right atrium, which covers the entire cavity. **B.** Apical four chamber view: tumor is observed in the entire right atrium of 60 x 50 mm, which protrudes through the tricuspid valve. In addition, pericardial effusion is seen without hemodynamic compromise. **C.** Simple CT scan and with IV contrast (**D**). Tumor is documented in right atrium, with contrast enhancement, involving pericardium and lung. Bilateral pleural effusion.

and protruding through the tricuspid valve. With these findings, it was decided to transfer the patient to our hospital. Upon arrival, her vital signs were: HR 120 bpm, RR 28 pm BP 120/90 mmHg Sat 90% with 40% of FiO_2 Temp: 36.6 ºC. On physical examination she was well orientated, alert, with generalized edema, jugular venous distention, no lymphadenopathy, lungs were hypoaereated, with bilateral disseminated rales. Cardiac: regular rhythm, normal S1, S2 narrowly split, positive S3, without murmurs. Abdomen was soft, with a midline surgical wound without infection signs and painful on palpation close to the surgical edges, positive hepatojugular reflux, bowel sounds present. Extremities with 3+ pitting edema. Due to the patient's acute heart failure, it was decided to take her to cardiac surgery on the 3rd day of hospital admission, where a right atrium tumor of approximately 11 x 7.5 x 3.5 cm *(Figure 2A)*, with pericardial extension was found. 80% of the tumor was resected and samples of resected tumor, pericardium, pleura and lung were sent to pathology for examination *(Figure 2B)*. A high grade leiomyosarcoma was reported, with tumoral extension to pericardium, pleura and lungs. The patient had a torpid evolution in the Postoperative Care Unit, dying 21 days after surgery secondary to refractory septic shock.

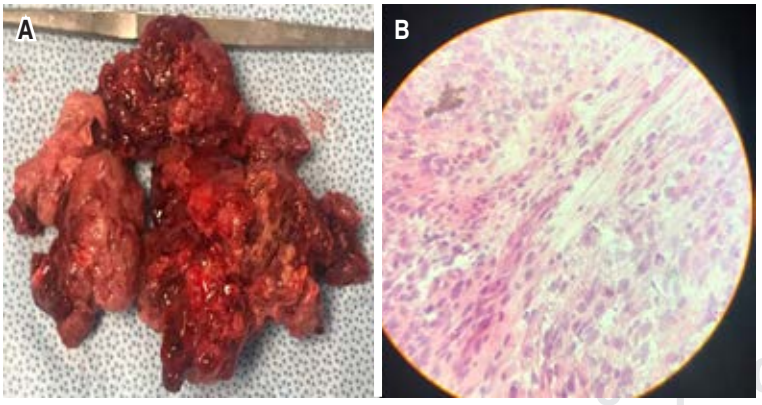

Figure 2: A. A surgical piece of right atrium with irregular heterogeneous appearance of friable consistency, weighing 80 g, 11 x 7.5 x 3.5 cm dimensions. **B.** Histological sample showing malignant mesenchymal tumor (sarcoma) poorly differentiated with a mitosis range of 25-30 per 10 fields. Positive marker for vimentin and smooth muscle antigen, with a Ki67 of 90%. Negative for desmin, CD45, pankeratins, BCL2. Compatible with leiomyosarcoma.

DISCUSSION

Leiomyosarcomas originate from the smooth muscle of cardiac vasculature or atrial endothelium. They are usually found in the left atrium and sometimes involve the pulmonary veins. It is a rapidly growing tumor, with a high frequency of distant metastasis (particularly to the lungs), as well as local recurrence after resection.[4]

The patient had the peculiarity that the tumor originated in the right atrium, according to Lestuzzi C, et al,[5] the most frequent malignancies on this location are angiosarcoma, liposarcoma and lymphoma. In fact, they mention that any tumor that originates from the roof of the atria or from the free wall of it, should be considered malignant until proven otherwise.

On histopathological examination, it is a tumor of mesenchymal origin with malignant fusiform, epithelioid or pleomorphic cells, with a hyperchromatic or vesicular nucleus and a prominent nucleolus. Its cytoplasm can be stained red in Masson's trichrome stain. Immunohistochemistry reveals that they are positive for vimentin but negative for desmin, actin, myoglobin, keratin and S-100 protein. In addition, they are positive to anti-smooth muscle antigens.[6] Our patient tumor cells presented positivity for vimentin and anti-smooth muscle antigens.

Transthoracic echocardiogram is the main imaging method to demonstrate the size of the tumor, the extension, mobility, location and the relationship with nearby structures, being more useful the transesophageal echocardiogram in tumors less than 5 mm, in addition to those located in the posterior wall.[7] On echocardiogram, the sarcomas are observed as immobile masses of 5 cm on average, adhered with a broad base to the endocardium, and have an extensive invasion to the myocardium, which can even be transmural and involve the pericardium. The intracardiac borders are described as homogeneous to the edges of the tumor,[8] as the findings of our patient.

Due to the low prevalence of these tumors, there are no clinical trials for treatments, specifically of cardiac leiomyosarcomas, being their treatment extrapolated from sarcomas

originated on other parts of the body, in addition to the experience in different case reports that have been described.

The treatment of cardiac sarcomas is believed to be based more on the location of the tumor than on its histological classification. Neoadjuvant chemotherapy is suggested prior to surgery to achieve tumor size reduction. Subsequently, surgery is the treatment of choice, as mortality is up to 90% at one year without it. Nevertheless, it has been reported that only 30% of patients reach tumor negative surgical margins. After surgery, additional chemotherapy schemes are recommended. The most commonly used schemes are those that include adriamycin and ifosfamide or gemcitabine and docetaxel.[8]

The combination of adriamycin, ifosfamide, dacarbazine and mesna has also been used, with a response rate of 34% at 4 months.[2] Currently, there is also evidence with the use of drugs that inhibit angiogenesis, such as pazopanib, which has shown greater survival in patients with high-grade sarcomas, including leiomyosarcoma.[9]

Radiotherapy does not have a clear benefit in literature reports. Lung and heart transplantation have also been performed in patients with tumor recurrence and lung metastasis.[10]

The most important predictors of worse survival are age over 50 years and tumor recurrence, it has even been reported that up to 50% of patients who had 100% tumor resection, have had recurrence.[8]

Unfortunately, our patient was not a candidate to receive a neoadjuvant chemotherapy treatment, due to hemodynamic instability, in addition to the fact that the resection of the tumor was not complete because of the large infiltration of the atrial wall. After surgery, she was not offered chemotherapy since she developed a septic shock state.

CONCLUSION

We report the case of a patient with an unusual cardiac neoplasia, with only a few cases documented in the literature. Unfortunately, an early diagnosis would be difficult due to unspecific clinical presentation, until late in the clinical evolution. Most of the patients are diagnosed at an advanced stage where distant metastasis are common. Despite treatment, the success rate is very low. We suggest that there must be further investigation about the best diagnostic and treatment approach specific for cardiac leiomyosarcomas.

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