

Primary Cardiac Synovial Sarcoma Originating from the Mitral Valve Causing Left Ventricular Outflow Tract Obstruction

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ABSTRACT

An 11-year-old boy was admitted due to different episodes of syncope and convulsion. Echocardiogram revealed a mass of 2×4 cm originating from the mitral subvalvular apparatus and more precisely from the antero-lateral papillary muscle, protruding in the left ventricle outflow tract causing intermittent obstruction. The patient underwent surgical excision of the left sided mass. Pathology confirmed the diagnosis of primary synovial sarcoma. At 6 months after the operation a small mass in the left ventricle of 1×1 cm was detected. The patient underwent reoperation consisting in radical resection of the subvalvular apparatus and mitral valve replacement. Histology confirmed that the mass was a cardiac synovial sarcoma. At 1 year after surgery the patient is doing well.

INTRODUCTION

Synovial sarcoma (SS) comprises approximately 10% of all soft tissue sarcoma, and primary cardiac SS is extremely rare [Wang 2013]. SS generally arises from the para-articular soft tissues of the extremities and is rarely found at sites that have no apparent synovial structures. The aggressive nature of SS makes its early detection difficult, and patients usually present with symptoms of local obstruction. Here, we report a very rare case of a child with primary cardiac SS originating from the antero-lateral papillary muscle who underwent a successful surgical resection.

CASE REPORT

An 11-year-old boy was transferred to our institution for evaluation for recurrent episodes of syncope, and dyspnea on the last month. Auscultation revealed normal breath sounds, a decreased S1, and diamond shaped systolic murmur which lasted throughout systole. There were no signs of congestive heart failure. Chest X-ray was normal. Transthoracic echocardiography revealed a mass of 2×4 cm protruding in the left outflow tract and originating from the mitral subvalvular apparatus (Figure 1, A), creating a gradient of 65 mmHg through the left ventricle outflow tract, mild

mitral regurgitation, and good left ventricle function. The CT showed no signs of local and adjacent infiltration of the thorax and no adenopathy. Scintigraphy showed no signs of metastasis. The patient underwent sternotomy. The mass exposure was tempted through the left atrium. We noticed that the mass originated from the tip of the antero-lateral papillary muscle and protruded into the left ventricle outflow tract. An aortotomy was performed and the mass was identified. We then excised the mass both through the left atrium and the aortotomy, sparing the mitral cords (Figure 1, B). On gross appearance, the tumor mass was solid with a tan white color and in the cutting sections had a firm, elastic consistency.

The surgical specimen was fixed in formalin, paraffin embedded, sectioned at $3 \mu\text{m}$ thick, and stained conventionally with hematoxylin and eosin. The histology revealed a monomorphous spindle cell proliferation with scant to moderate cytoplasm and nuclei with fine chromatin, organized in interlacing fascicles with indistinct cell margins or sheets of long spindle cells. On some sections the cells seemed to cluster and have a more epithelioid appearance and the stroma contained abundant fine collagen (Figure 2, A and B). Only this monophasic pattern was encountered, even with thorough sampling of the tumor.

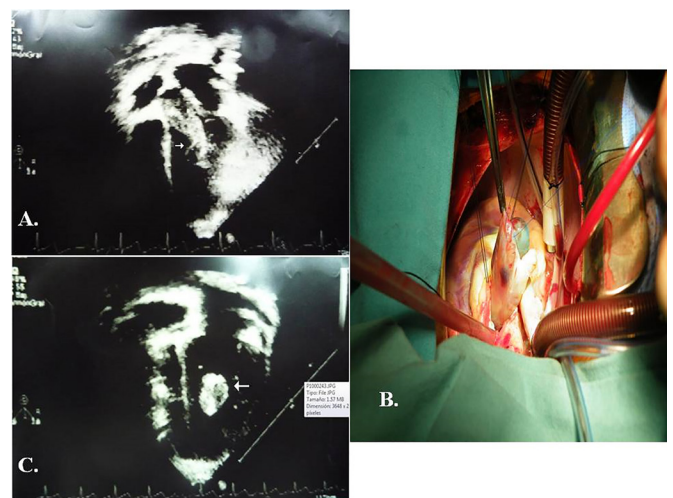


Figure 1. A, Two-dimensional echocardiograms show a large pedunculated mass (2×4 cm) protruding in the left ventricular outflow tract. B, Total removal of the tumoral mass through the aortotomy. C, The echocardiography at 6 months after the operation demonstrating a 1×1 cm mass attached to the mitral valve.

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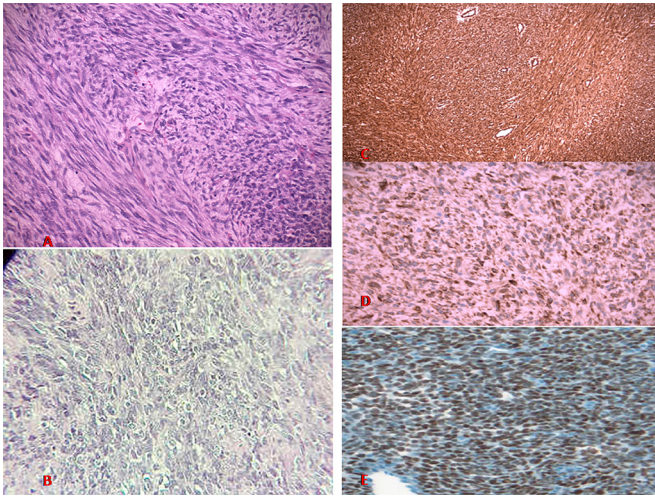


Figure 2. A monomorphous spindle cell proliferation (A, H-E 10 $\times$) with scant to moderate cytoplasm, fine chromatin nuclei, organized in interlacing fascicles with indistinct cell margins and a cluster of cells with a more epithelioid appearance (B, H-E 40 $\times$). The immunohistochemical results showed a strong diffuse staining for VIM (C, 10 $\times$), intense positive cytoplasmic staining for Bcl-2 (D, 20 $\times$), and strong diffuse nuclear positivity for TLE1 (E, 20 $\times$).

The immunohistochemistry (IHC) with the automated BenchMark ULTRA system by Ventana demonstrated a strong diffuse nuclear positivity for VIM, TLE1, Bcl-2 exhibited intense positive cytoplasmic staining, and all other antibodies were negative (Figure 2, C-E). Cytogenetics were obtained, showing the t(X;18)(p11.2;q11.2), confirming the SS.

The postoperative course was uneventful. A transthoracic echocardiography was performed 2 weeks later showing a mild to moderate mitral regurgitation and no macroscopic signs of tumor. At 6 months after the operation we detected a small mass in the left ventricle attached to the mitral valve, 1 $\times$ 1 cm (Figure 1, C). The patient was scheduled again for surgery and a wider resection of all subvalvular apparatus with mitral valve replacement was performed. The patient underwent ifosfamide and adriamycin chemotherapy. At 1 year after the second operation the patient is doing well. The patient is undergoing monthly echocardiographic examination.

DISCUSSION

Primary cardiac SS was described in 1978 [McAllister 1978] with a mean survival of 9–16.5 months, an overall 5-year survival less than 20% in patients older than 30 years, and an overall survival of almost 55% in patients younger than 30 years [Wang 2013]. Patients usually present with symptoms of local obstruction or functional interference, as our patient did. The presence of syncopes is probably due to left ventricular outflow tract obstruction. The primary cardiac SS is usually located on the pericardium or the right atrium. The presence of the SS on the left side of the heart is extremely rare. After a careful revision of the literature, a total of 69 cases with primary cardiac SS were found. Forty-one of

them had an intracardiac location and 28 a pericardial location. Only 11 of them had a primary cardiac SS on the left side: 5 patients in the left atrium; 3 patients in the left ventricle; and only 3 patients on the mitral valve [Wang 2013; Miller 2005]. Our patient represents a unique finding of the SS location on the subvalvular mitral valve apparatus, specifically from the antero-lateral papillary muscle without a direct connection with the mitral valve leaflets.

Benign myxoma, other sarcomas (including leiomyosarcoma, osteosarcoma, fibrosarcoma, Ewing sarcoma/primitive neuroectodermal tumor, myxosarcoma and undifferentiated sarcoma), and malignant peripheral nerve sheath tumors should be considered in the differential diagnosis. IHC markers may help to resolve problems posed by differential diagnosis. However, the hallmark of the morphological diagnosis of SS relies on molecular genetic studies for t(X;18) which does provide a definite solution, as this abnormality is unique to SS [Griffin 1978]. This translocation is a specific cytogenetic abnormality that occurs consistently in SS (monophasic and biphasic). Its detection by fluorescence in situ hybridization or real-time PCR has therefore become the gold standard for confirming the diagnosis of SS, as in our case. Transducin-like enhancer (TLE1) is another potential biomarker for SS. TLE1 is an important protein in the Wnt/b-catenin pathway, a signaling pathway that is strongly associated with SS [Nicholson 1997]. It was the positivity of this antibody by IHC together with coexpression of Bcl2 and the presence of t(X;18) which helped in making the diagnosis in our case.

The currently recommended treatment is wide surgical resection. During the first surgical procedure the tumoral mass was easily removed and we believed that such a resection would be enough. Unfortunately, 6 months later the tumor recidive was present in the same location, and we then treated with a more radical surgical procedure. Adjuvant chemotherapy should be considered. The employment of chemotherapy increases the 5-years survival from 20% to 40% [Nicholson 1997].

In conclusion, we believe that primary cardiac SS is a very rare cardiac tumor, with a very high recidive probability. The presence of such a tumor should be taken into consideration and a radical surgical procedure associated with adjuvant chemotherapy should be the first-line treatment.

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