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Case report

Extrinsic compression of the left main coronary artery: A rare cause of cardiogenic shock ☆☆☆

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ARTICLE INFO

Article history:

Received 22 December 2020

Revised 30 December 2020

Accepted 2 January 2021

Keywords:

Myocardial infarction

Mediastinal tumor

Schwannoma

External compression

Cystic mass

ABSTRACT

A left main coronary artery (LMCA) stenosis due to extrinsic compression by mediastinal tumor is a rare finding. In this case reports, we present a 63-year-old woman, who was transferred to the emergency department with chief complains of persistent chest and back pain. An electrocardiogram revealed diffuse ST-segment depression (elevation in lead aVR). Contrast-enhanced computed tomography (CT) showed a huge cystic mass above the left atrium. After the CT examination, she was temporarily in shock. Compression of the LMCA was evident on the CT angiography and a diagnosis of acute myocardial infarction due to compression of the LMCA by a tumor was made. An emergent resection of the tumor was performed. Histopathological assessment of the resected cyst revealed that it was a schwannoma. She made an uneventful postoperative recovery. A follow-up 3-dimensional CT scan performed after the operation confirmed no evidence of LMCA compression.

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Introduction

Atherosclerosis is the most common cause of myocardial infarction, but there are various non-atherosclerotic diseases

which provoke acute coronary syndrome [1]. Coronary stenosis by external compression is one of the mechanisms that induce myocardial ischemia, and this diagnosis is important because the treatment strategy could be different. We encountered a case of mediastinal schwannoma that resulted to car-

☆ Acknowledgments: This research received no grant from any funding agency in the public, commercial, or not-for-profit sectors.

☆☆ Competing Interests: The authors have declared that no competing interests exist.

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<https://doi.org/10.1016/j.radcr.2021.01.005>

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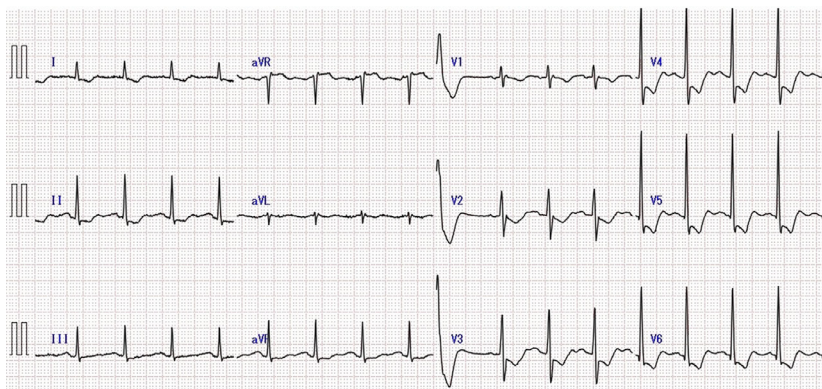


Fig. 1 – The electrocardiogram showed diffuse ST-segment depression (elevation in lead aVR) and a premature ventricular complex.

diogenic shock due to compression of the left main coronary artery (LMCA). In this case, a rapid diagnosis was made using CT angiography, and the patient was saved through an emergency surgery.

Case report

A 63-year-old woman who was a known hypertensive patient on medication, was transferred to the emergency department with a chief complaint of persistent chest and back pain. Two months prior to presentation, she started experiencing chest pain and difficulty in breathing during physical activities, and her symptoms gradually worsened. An electrocardiogram revealed sinus rhythm, but diffuse ST-segment depression (elevation in lead aVR) and a premature ventricular complex (Fig. 1). Laboratory studies confirmed elevated cardiac troponin I levels (620 pg/ml). Echocardiography showed diffuse hypokinesis of the left ventricle. Contrast-enhanced CT was performed to investigate the cause. The CT showed a 6.3 cm × 4.5 cm × 5.5 cm cystic mass above the left atrium (Fig. 2). The relative density of the mass was 15–56 Hounsfield units on plain CT, and a slight contrast effect was also recognized. After the CT examination, she was temporarily in shock, but improved with the administration of noradrenaline. Compression of the LMCA was evident on the coronal slab maximal intensity projection image and 3-dimensional CT reconstruction (Figs. 3A and B). A diagnosis of acute myocardial infarction was made due to compression of the LMCA by the tumor, and an emergent resection of the tumor was performed. After a median sternotomy and opening of the pericardium, ventricular fibrillation (VF) occurred suddenly. Direct-current cardioversion was performed, and subsequently the junctional rhythm and cardiogenic shock state were sustained. The patient required cardiopulmonary resuscitation for about 3 minutes and underwent cardiopulmonary bypass and cardioplegic arrest. Detachment of the tumor from the main pulmonary artery was difficult due to severe adhesions and bleeding from the mass because of the proliferated vascularization. Total resection of the mass was judged to be high risk in this situation; therefore, only the part that was compressing

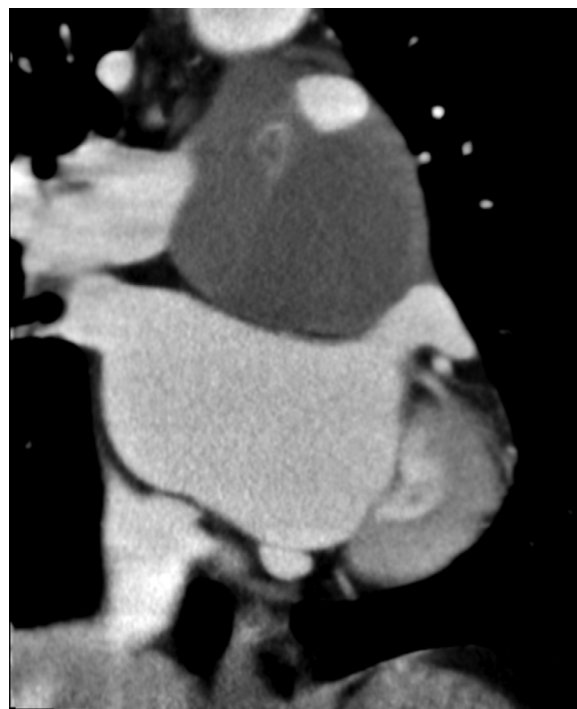


Fig. 2 – The computed tomography (CT) showed a 6.3 cm × 4.5 cm × 5.5 cm cystic mass with low contrast effect above the left atrium.

the LMCA was excised. The tumor had a smooth surface with clear yellow exudate containing cheese-like masses and fibrin. Cytopathological examination revealed no malignant cells. A diagnosis of schwannoma was made based on the histopathological findings of proliferation of spindle cells arranged in a palisading pattern. Immunohistochemical studies revealed that the tumor cells were positive for S-100 (Fig. 4A and B). She made an uneventful postoperative recovery. A follow-up 3-dimensional CT scan performed after the operation confirmed no evidence of LMCA compression (Fig. 5). We explained the possibility of malignant transformation, perforation of the tumor, and recurrence of coronary artery compression, and pro-

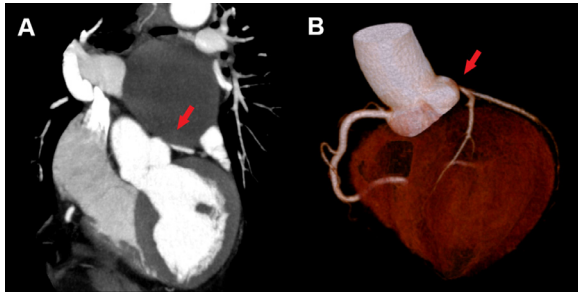


Fig. 3 – The compression of the left main coronary artery trunk (LMCA) was evident on (A) coronal slab maximal intensity projection (MIP) image (red arrow) and (B) 3-dimensional CT reconstruction (red arrow). (Color version of figure is available online.)

posed a complete resection of the mass. However, the patient declined further surgery. She was subsequently discharged and has been well for 6 months after treatment.

Discussion

We encountered a case of mediastinal schwannoma resulting in cardiogenic shock and VF due to the compression of the LMCA. Although there have been case reports of schwannoma compressing the LMCA [2], to our knowledge, this is the first successful intervention for cardiogenic shock and VF due to compression of the LMCA by mediastinal schwannoma. In this case, a rapid diagnosis was made by CT angiography, and the patient was saved by emergent surgery.

The tumor was a cystic mass, but heterogenous attenuation was observed beyond the range of simple fluid on plain CT [3], and a slight contrast effect was also recognized. Therefore, we also considered a thrombosed left sinus of Valsalva aneurysm or impending rupture of aortic dissection as differential diagnoses. On coronary CT angiography, the upper part of the LMCA was compressed and there was no flap or wall thickening of the ascending aorta; therefore, we contemplated that the possibility of a degenerated congenital cyst or cystic

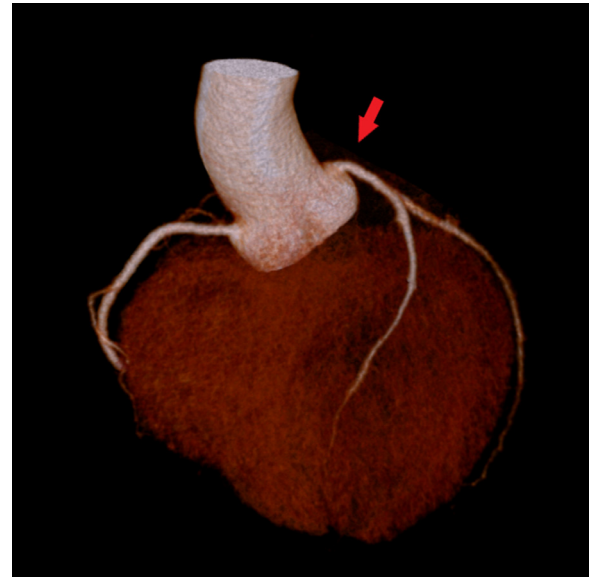


Fig. 5 – A follow-up 3-dimensional CT scan after the operation confirmed no evidence of LMCA compression (red arrow). (Color version of figure is available online.)

mass was higher than that of the other 2 diseases. Based on the location of the cystic mass (behind the main pulmonary artery and ascending aorta, and above the left atrium) and patient age, a degenerated bronchogenic cyst and schwannoma were considered as differential diagnoses [3]. The pathological examination revealed a schwannoma. This tumor is a peripheral nerve sheath tumor composed of spindle cells densely packed together or organized more loosely in association with a myxoid stroma (which commonly represents areas of infarction). On CT, schwannomas have a heterogeneous appearance with cystic degeneration secondary to infarction and are found in the paravertebral region or along the courses of intercostal nerves [3]. On very rare occasions, schwannomas could arise from the cardiac branches of the vagus nerve or the cardiac plexus [4]. In this case, the tumor was large and its origin from the nerve fibers could not be identified. However, considering the site of the tumor, it is possible that the tumor originated from the cardiac plexus.

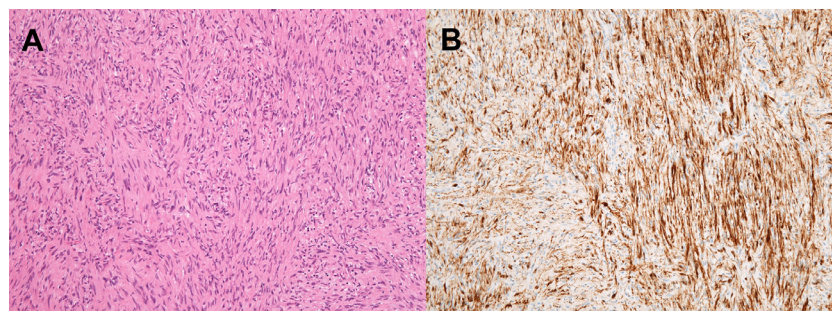


Fig. 4 – Photomicrograph shows proliferation of spindle cells arranged in palisading pattern (original magnification $\times 10$; hematoxylin-eosin staining). (B) Immunohistochemistry shows positive staining for S-100 (original magnification $\times 10$; IHC for S-100).

There was massive bleeding due to neovascularization of the tumor. Previous reports have described perioperative bleeding in cases of mediastinal schwannoma [5].

Chemotherapy and radiation therapy have not been reported to be effective, and excision is the only treatment method. Although very rare, there is a possibility of malignant transformation and compression symptoms due to the re-growth of the tumor; consequently, careful follow-up of this patient is required.

Three-dimensional CT coronary angiography is useful to diagnose myocardial infarction due to compression of the LMCA by a mediastinal tumor. Details of the mass such as its size and position obtained by CT are useful in planning surgery.

Patient Consent

Patient consent has been obtained.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.radcr.2021.01.005](https://doi.org/10.1016/j.radcr.2021.01.005).

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