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Treatment of Giant Left Atrial Diverticulum: A Case Report and Literature Review

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ABSTRACT

In this paper, we present a giant left atrial diverticulum (LAD) in a 10-year-old girl, whose three-dimensional (3D) image reconstruction was used to help diagnosis and surgical positioning. Previously reported cases were reviewed, and the clinical characteristics of this disease also was summarized to improve the diagnosis and treatment of LAD.

INTRODUCTION

Left atrial diverticulum (LAD) is a rare malformation. Its exact etiology is unclear, and it frequently is detected on routine chest x-rays without presentation of symptoms. The most useful treatment is surgical resection. This paper reports about a 10-year-old girl diagnosed with giant LAD, whose surgical resection ultimately was aided with three-dimensional (3D) image reconstruction.

CASE REPORT

A 10-year-old girl was presented to our institute with bronchopneumonia. Chest x-ray revealed enlargement of the cardiac silhouette. (Figure A) On echocardiographic evaluation, a large cystic cavity was seen communicating with the left atrial, compressing and displacing the left ventricle toward the right side. (Figure B) Furthermore, computed tomography angiography with 3D reconstruction imaging confirmed the diagnosis of left atrial diverticulum. (Figure C) To exclude the possibility of malignant tumors, PET-CT also performed before operation suggested the left atrial diverticulum did not increase in metabolism. (Figure D) An isolated left atrial diverticulum resection was performed without extracorporeal circulation. (Figure E) On pathology, the diverticulum was identified as myocardium with mild hyperplasia of interstitial fibrous tissue and a few inflammatory cell infiltrations. (Figure F) The patient was extubated after 4 hours of ventilation and had an uneventful recovery. Left atrial diverticulum is a rare malformation. The exact etiology still is unclear. Detailed preoperative examinations, particularly echocardiography and 3D image reconstruction, are a great help in the diagnosis and selection of surgical strategies.

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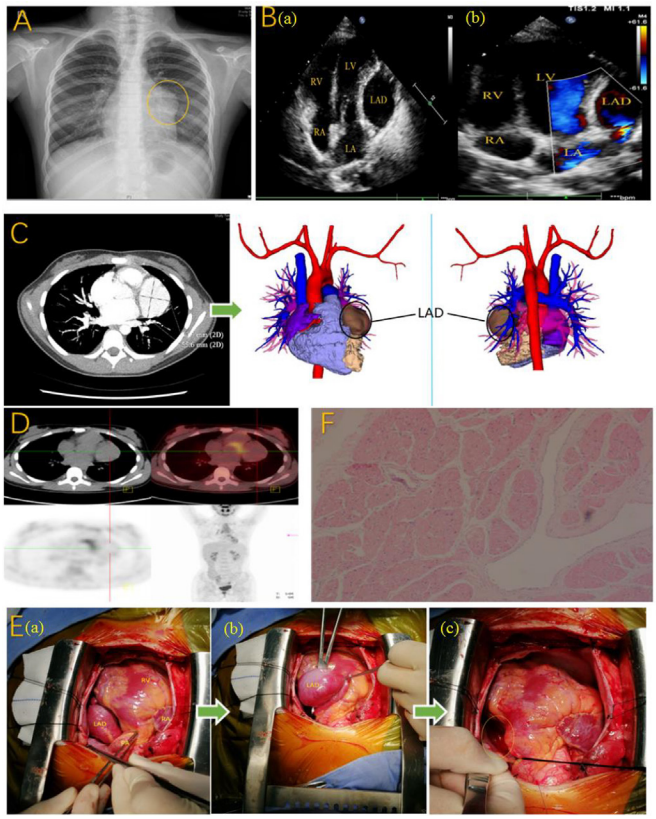
DISCUSSION

LAD is a rare malformation. Since the first report in 1938, there only have been 30 reports in the world [Gao 2011]. The exact etiology still is unclear. Only one case suggested a genetic predisposition, but this has not been confirmed [Jenni 1981]. It currently is believed the etiology of the left atrium diverticulum may be congenital and acquired. They are considered to be congenital if the diverticulum arise from focal areas of developmental weakness of the atrial wall [Shaher 1972], and acquired if it is secondary to atrial wall damage, such as rheumatic heart disease, tuberculosis, syphilitic cardiomyopathy or surgery [Chockalingam 2003; De Ponti 2013; Ding 2015; Halbertsma 2002].

LAD usually presents asymptomatic, as it frequently is detected on routine chest x-ray incidentally [Genc 2014]. For symptomatic patients, often concomitant mitral regurgitation, arrhythmias, thromboembolism, or compression of the surrounding structures has been described in patients with LAD [Hayashi 2013; Higashida 2018; Holda 2017; Nomura 2008; Tan 2014; Terada 2000]. In addition, atrial septal defect and ventricular septal defect also have been described in patients with LAD [Victor 1984]. Foale and Herzog proposed that echocardiography is a safe and effective method for diagnosing left atrial diverticulum]Foale 1982; Herzog 2009]. In addition, cardiac CT and multidetector CT also helps effectively confirm LAD [Abbara 2009; Patel 2013; Wan 2009].

As LAD usually does not become clinically apparent until complications such as cardiac arrhythmias and sudden death occur, early diagnosis and surgical excision is mandatory. Qiang Chen [Chen 2017] and Agematsu [Agematsu 2009] suggested that early surgical excision should be performed to decrease systemic thrombosis, renew the atrium normal shape, and improve cardiac function, no matter the presence of any symptoms. But Binder et al considered treatments only for symptomatic patients [Binder 2000]. Other management options that have been reported for such large diverticulum are anticoagulation with observation and heart transplantation [Lei 2014].

Although our patient was asymptomatic, surgical resection was performed without extracorporeal circulation because of the potential risk of thromboembolism and arrhythmia. The



A. Chest x-ray revealed enlargement of the cardiac silhouette. B. Two-dimensional echocardiogram (a) and doppler echocardiogram (b) showed the diverticulum. LA: left atrium; RA: right atrium; LV: left ventricle; RV: right ventricle; LAD: left atrial diverticulum. C. The diverticulum was approximately 42.9 mm×52.3 mm measured by Computed tomography angiography with three-dimensional reconstruction. Besies, 3D reconstructed image showed LAD position and adjacent structure. LAD: left atrial diverticulum. D. PET-CT suggested left atrial diverticulum no increase in metabolism. E. Operative photographs showing: (a) a large diverticulum from the lateral wall of the left atrium. (b) Ligation of the diverticulum along the neck and resected completely. (c) a cavity left after the diverticulum is removed. LA: left atrium; RA: right atrium; LV: left ventricle; RV: right ventricle; LAD: left atrial diverticulum. F. Histopathological appearance showing myocardium was identified in the wall of the diverticulum with mild hyperplasia of interstitial fibrous tissue and a few inflammatory cell infiltrations.

3D image reconstruction played an important role in diagnosing LAD and surgical positioning. This is the first such case worldwide. The patient had a good postoperative result.

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