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A Rare Case of an Atypical Ascending Aortic Pseudoaneurysm Co-Occurring with Type A Aortic Dissection: A Challenging Diagnosis

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Ascending aortic pseudoaneurysm; Type A aortic dissection; Perioperation transesophageal echocardiography; Pericardial tamponade

1. Abstract

1.1. Background: An ascending aortic pseudoaneurysm is a life-threatening disorder and commonly occurs in the patients treated with cardiac or aortic surgery.

1.2. Case Presentation: Herein we reported a patient presented with atypical ascending aortic pseudoaneurysm co-occurring with type A aortic dissection. Pseudoaneurysm was highly suspected by intraoperative perioperation transesophageal echocardiography (TEE) and confirmed by surgery.

1.3. Conclusions: The patient presented with ascending aortic pseudoaneurysm, which was an atypical and challenging subset that necessitated quick diagnosis and intervention to prevent rupture. The presence of a mass lesion with both echo-free and hypoechogenic characteristics, along with localized pericardial effusion, raised a high suspicion for pseudonaeurysms in this case.

2. Introduction

Pseudoaneurysms, with incidence generally reported under 4% in the literature, are relatively rare [1, 2], but life-threatening and associated with significant mortality [2, 3]. Pseudoaneurysms are common vascular abnormalities that usually arise from a defect in the arterial wall [4]. Blood leaks through the defect wall into the surrounding tissue, leading to a persistent communication between the originating artery and the adjacent cavity [5].

Conventional angiography is a diagnostic tool commonly employed to identify pseudoaneurysms; however, other noninvasive imaging techniques can also be valuable in their detection. Pseudoaneurysms can emerge from diverse causes and manifest in various locations throughout the body, exhibiting different types and sizes. In this report, we present a case involving an atypical pseudoaneurysm co-occurring with aortic dissection suspected by ultrasound and confirmed by surgery.

3. Case Representation

A 64-year-old male patient was referred to the emergency department of our hospital due to severe chest pain for 10 hours. The patient had a history of hypertension for 5 years with irregular antihypertensive therapy. He had no history of surgery and trauma. After admitted to our hospital, computed tomography angiography (CTA) was performed and DeBakey type-A aortic dissection was observed. There was a well-defined mass lesion measuring 25 x 20 mm in the ascending aorta. The CTA images also revealed pericardial effusion or hemopericardium. Laboratory data showed an elevated D-dimer and fibrinogen degradation product (FDP) level of 6.03 mg/L and 11.5 mg/dL, respectively. The patient had slightly impaired liver and renal function. Antinuclear antibodies (ANA), immunoglobulin G (IgG), and complement component 3 (C3) were in the normal range.

Perioperation transesophageal echocardiography (TEE) showed (MPA) (Figure 1). We, however, did not observe Doppler color flow in the mass. We noticed that moderate pericardial effusion was dominantly anterior to the two ventricles (Figure 2). Additionally, TEE showed that the intimal flap did not completely block the

coronary artery. There were no indications of aortic regurgitation or abnormal regional wall motion. Unfortunately, the size of pericardial effusion gradually increased compared with the preoperative transthoracic echocardiograpy after median sternotomy. The left ventricle had very small size, with end-diastolic dimension of only 16 mm (Figure 2A). The right atrial systolic collapse that the true lumen and false lumen were separated by a mobile in timal flap in dilated ascending and descending aorta. TEE demonstrated an echo-free and hypoechogenic mass with size of 15 x 20 mm, proximal to ascending aorta and main pulmonary artery and right ventricular diastolic collapse presented (Figure 2B). Hemodynamic instability occurred at low blood pressure of 76/56 mmHg. The mass lesion was suggested as a pseudoaneurysm based on the atypical findings from the ultrasound.

The blood clots were surgically removed from the pericardial cavity. Ascending aorta and aorta arch replacement combined with Frozen Elephant Trunk procedure was performed with cardiopulmonary bypass (CPB) support. Intraoperative findings confirmed the presence of pseudoaneurysm on the ascending aorta proximal to MPA, co-occurring with aortic dissection (Figure 3).

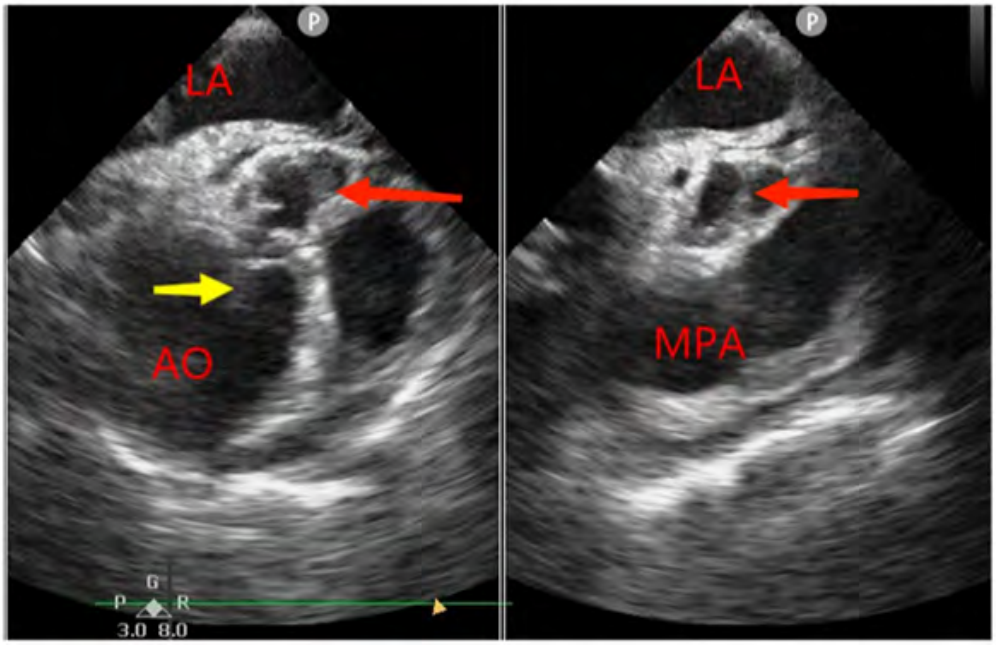

Figure 1: The mass lesion and aortic dissection in the biplane TEE images. The red arrows indicate the echo-free and hypoechogenic mass proximal to ascending aorta and main pulmonary artery. Yellow arrow shows an intimal flap in ascending aorta. LA: left atrium; AO: aorta; MPA: main pulmonary artery.

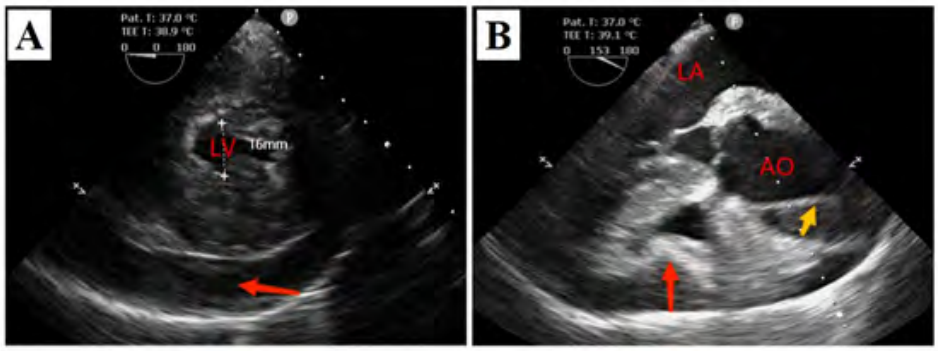

Figure 2: The pericardial tamponade in the TEE images. (A) The red arrow indicates moderate pericardial effusion. LV: left ventricle. (B) The red arrow indicates the right ventricular diastolic collapse. The yellow arrow shows intimal flap. LA: left atrium; AO: aorta.

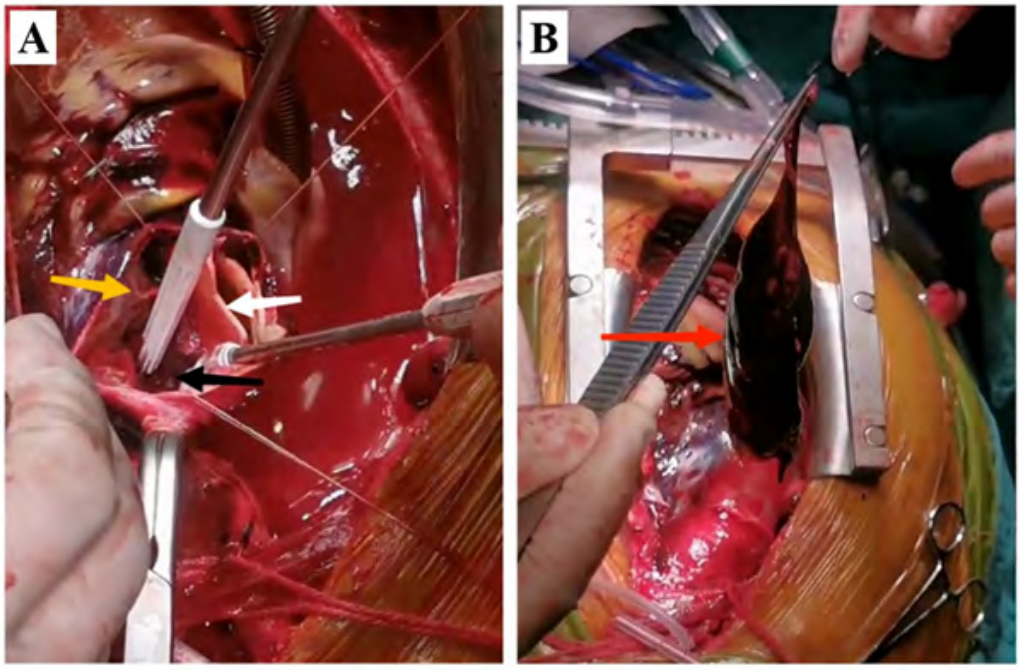

Figure 3: Intraoperative view. (A) An ascending aortic rupture with psedoaneurysm formation. Black arrow shows the ascending aortic rupture of psedoaneurysm. White arrow shows the intimal flap and yellow arrow shows adventitia of artery wall. (B) Red arrow indicates the removal of the blood clots in the pericardial cavity.

4. Discussion

Ascending aortic pseudoaneurysm is a rare but potentially fatal entity with inadvertent rupture that occurs most commonly after cardiac or aortic surgery [6-8]. Trauma, connective tissue disorder, inflammation, or infection also may predispose to the formation of pseudoaneurysms [9, 10]. A manifestation of the pseudoaneurysm is usually demonstrated by the narrow neck and bidirectional flow [11, 12].

In our case, the patient had no history of surgery and trauma. Laboratory data showed the patient had no features of infection and connective tissue disorder. The images revealed echo-free and hypoechogenic mass, and cardiac tamponade with localized pericardial effusion. The bidirectional blood flow from the neck within the pseudoaneurysm was not observed using TEE. The rupture of the pseudoaneurysm into the pericardium consequently resulted in cardiac tamponade after median sternotomy prior to the establishment of CPB.

Conventional angiography is the standard method for the diagnosis of pseudoaneurysm [13, 14]. Donor artery, the neck, and vascular supply, can be evaluated with angiography [15]. In our patient, the ruptured vessel walls were probably encapsulated by fibrotic tissue and the encapsulated lumens were completely sealed with the thrombus, leading to disappearance of typical manifestation of the pseudoaneurysm. Thus characteristic to-and-fro flow of the pseudoaneurysm could not be visualized by CTA. While, TEE findings with echo-free and hypoechogenic mass proximal to ascending aorta suspected pseudoaneurysm. Intraoperative findings further confirmed it. Although challenging for diagnosis of atypical pseudoaneurysm, the findings from supplemented with ultrasonography would benefit the prompt, accurate clinical diagnosis and for medical therapy.

5. Conclusion

In summary, the patient presented with ascending aortic pseudoaneurysm, which was an atypical and challenging subset that necessitated quick diagnosis and intervention to prevent rupture. The presence of a mass with both echo-free and hypoechogenic characteristics, along with localized pericardial effusion, can raise a high suspicion for pseudoaneurysm in this case.

6. Authors' Contributions

The conception and design of the research, drafting of the manuscript and final approval of the manuscript submitted are done by Jin Jin and Xian Luo. The revising of manuscript for important intellectual content is done by Ming-Liang Zuo and Qiu-Yi Chen. The analysis and interpretation of data are done by Qian-Hua Dong and Tao Yu.

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