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Haemoptysis In Adolescent Patient Due To Major Aortopulmonary Collateral Arteries (Mapcas) Rupture

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Tetralogy of Fallot with pulmonary atresia and large major aortopulmonary collateral arteries in congenital heart disease is associated a high mortality. Early diagnosis of this can increase the opportunity for surgery and improve survival. A small portion of unoperated patients with PA-VSD can survive until adulthood and the arterial blood supply to the lungs, is provided by mapcas. Hemoptysis inthe adolescent patient often is secondary to tuberculosis or pneumonia and rarely rupture of major aortopulmonary collateral arteries (MAPCAs).

Keywords: MAPCAs rupture; congenital heart disease; TOF; hemoptysis.

ABBREVIATION

MAPCAs :Major aortopulmonary collateral arteries
PA-VSD :Pulmonary atresia- ventricle septal defect
TOF : Tetralogy of Fallot
CTA : Computed Tomographic Angiography
CBC : Complete blood count

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1. INTRODUCTION

Hemoptysis in cyanotic congenital heart disease is usually attributed to pulmonary infection, rupture of the hypertrophied bronchial artery, or coagulation disorders. Pulmonary atresia and ventricular septal defect (PA-VSD) belong to a group of congenital cardiac malformations and are usually associated with the presence ~~(~~MAPCAs~~)~~ which supply blood to the lungs to help the patient survive ~~s~~ in this situation. Aneurysmal dilatation of MAPCAs has also been described and may be associated with compression of adjacent structures, persistent pleural effusions, hemoptysis, and sudden death [1] We present here a case of TOF with pulmonary atresia with aneurysmally dilated aortopulmonary collateral causing hemoptysis due to MAPCAs rupture.

2. PRESENTATION OF CASE

The male patient is 26-year-oldcame to the hospital with hemoptysis of about 50ml. He has a medical history of congenital heart disease, without previous hemoptysis. Examination revealed circumoral cyanosis, acrocyanosis, clubbing fingers, holosystolic murmur heard maximally at the lower left sternal border and apex, heart rate was 80bpm, blood pressure was120/80mmHg, respiratory rate was 20 bpm, pulse oxymetry on the upper limb was 85% and 86% on the lower limb. ECG showed sinus rhythm and complete right branch bundle block (Fig. 1). CBC with Rbc was 6.37x 10^6/l, Hgb was 19.9 g/dl, Hct was 65%, Platelet was 167f/l. Chest x-ray showed right side aortic arch, increased pulmonary vascularity (Fig. 2). Transthoracic echocardiography showed aortic overriding VSD with d= 25mm, bidirectional shunt, right ventricle hypertrophy, pulmonary valve atresia (Fig. 3). CTA showed pulmonary valve atresia, left lung was supplied by MAPCAs from the aortic arch (Fig. 4a), the right lung was supplied by MAPCAs originating from the thoracic aorta (Fig. 4b). Aneurysm and rupture of MAPCAs on the right side result in hemoptysis (Fig. 5).

3. DISCUSSION

In a 2019 study using 2010-2014 data from birth defects surveillance systems across the United States, researchers estimated that each year about 550 babies in the United States are born with pulmonary atresia. In other words, about 1 in every 7,100 babies born in the United States each year are born with pulmonary atresia. The causes of heart defects, such as pulmonary atresia, among most babies are unknown. Some babies have heart defects because of changes in their genes or chromosomes. Heart defects also are thought to be caused by a combination of genes and other factors, such as the things the mother comes in contact with within the environment, or what the mother eats or drinks, or certain medicines she uses [2].

The timing of entry into the operative sequence is an important role to help the child to survive, younger patients are most likely to respond with the growth of the native pulmonary arteries sufficient well to allow full repair. Later referral of patients may result in a missed opportunity for maximal native pulmonary artery development after central shunting with severe pulmonary hypertension and inverted shunting. Poor outcomes in patients referred late for surgical therapy may also reflect an unfavorable selection bias.. We continue to recommend that patients enter the operative sequence by 6 months of age for elective intervention but patients who have profound cyanosis or congestive heart failure should enter earlier [3] Overall, the optimal treatment of this entity is still controversial. Some studies showed most pulmonary atresia with VSD and MAPCAs could have complete repair with single-stage with lower mortality [4].

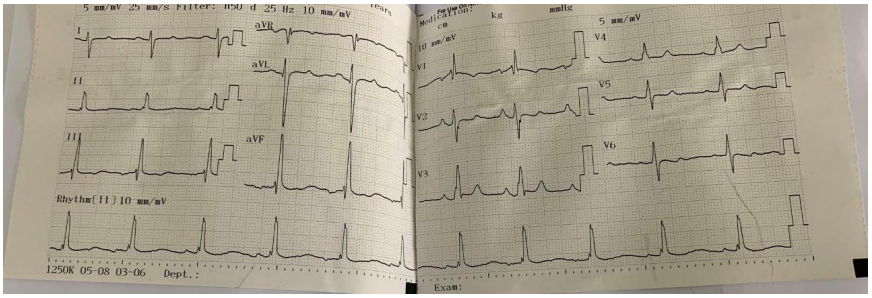

Fig. 1. Electrocardiogram showed sinus rhythm and right branch bundle block

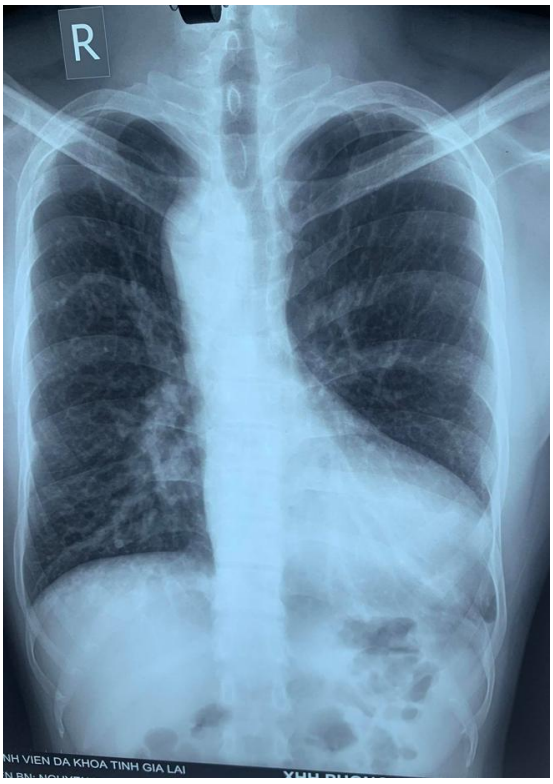

Fig. 2. Chest x-ray showed right side aortic arch with increased pulmonary vascularity

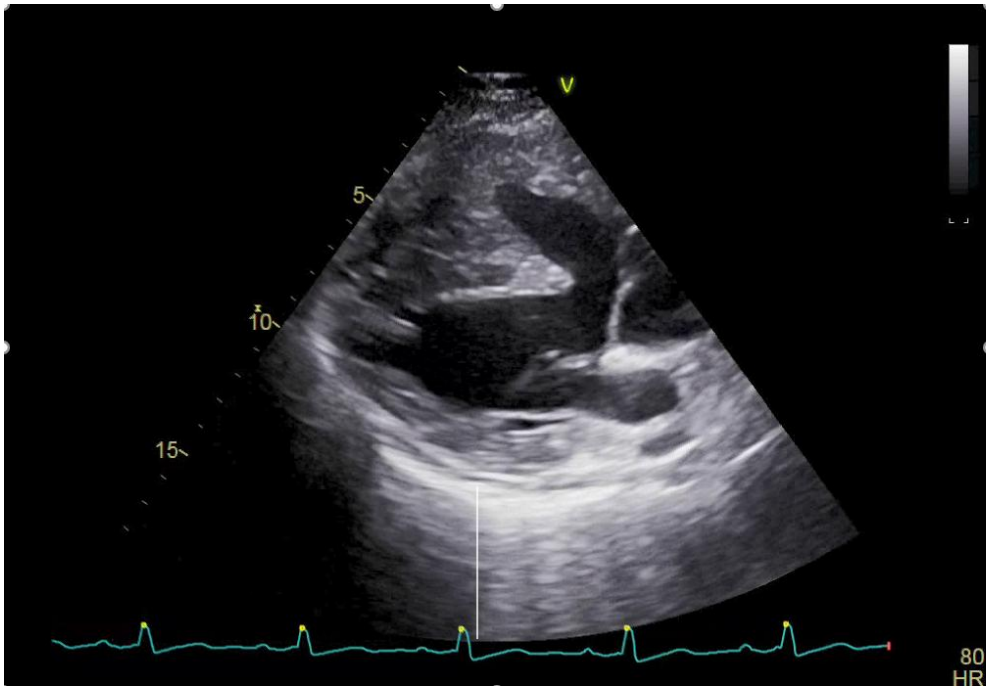

Fig. 3. Transthoracic echocardiography showed aortic overriding VSD with d= 25mm, bidirectional shunt, right ventricle hypertrophy

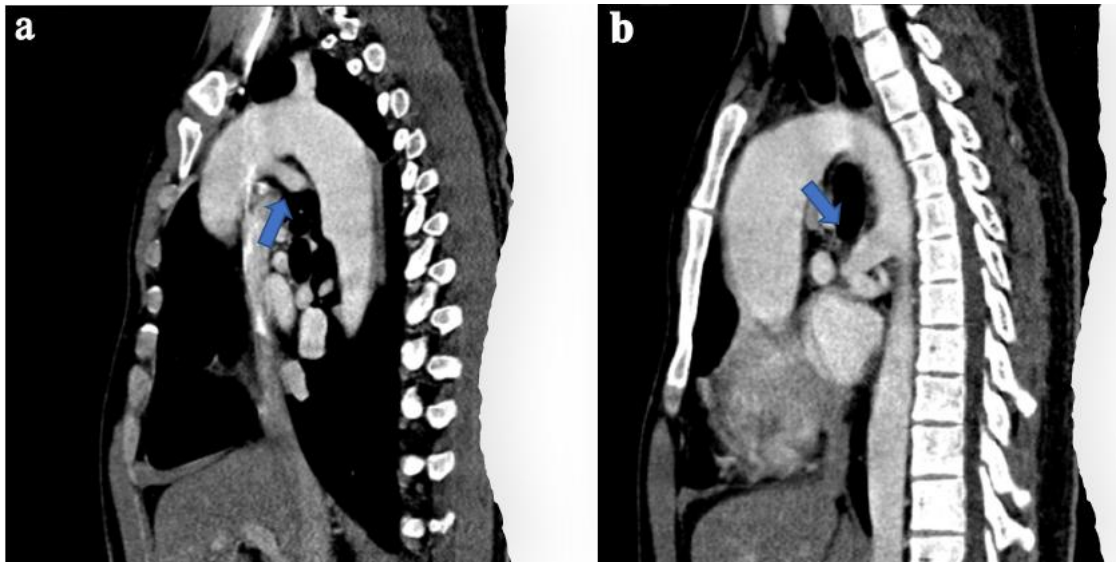

Fig. 4. CTA showed pulmonary valve atresia, left lung was supplied by mapca from aortic arch (figure 4a), right lung was supplied by MAPCAs of the thoracic aorta (figure 4b) (blue arrow)

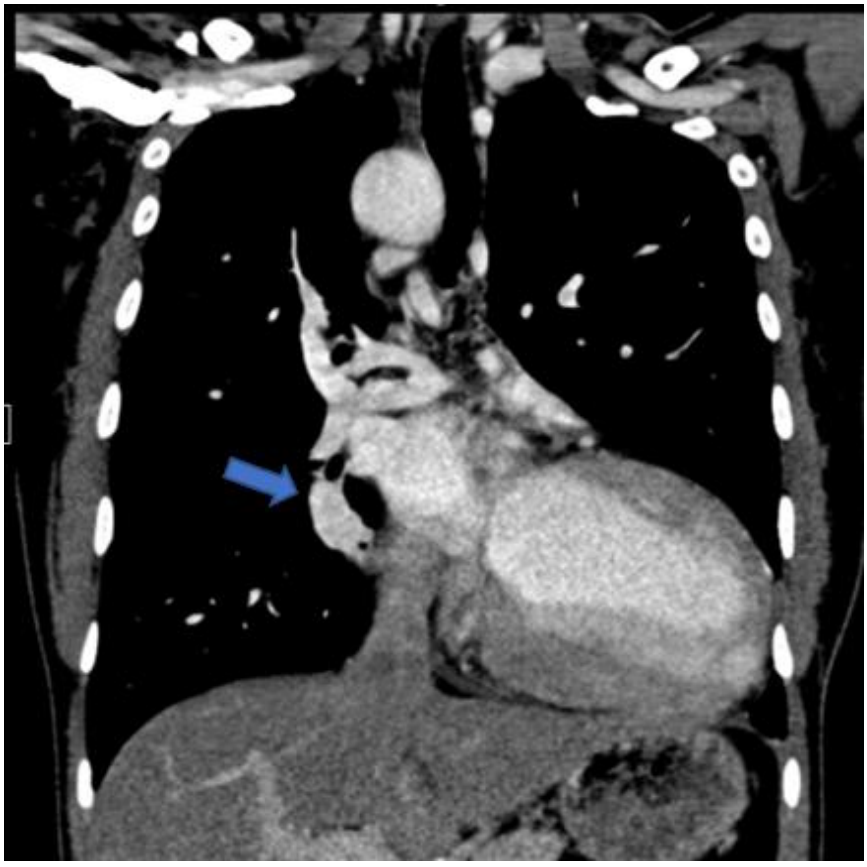

Fig. 5. CTA showed aneurysm and rupture of mapca on the right side resulingt in hemoptysis (blue arrow)

Endovascular management plays a vital role in the preoperative embolization of MAPCAs and can be life-saving in cases of massive hemoptysis. Major aortopulmonary collateral arteries are large systemic collateral arteries; usually originating from the descending thoracic aorta (70%), the branch of the aortic arch (15–20%), and the ascending aorta (10–15%) [5]. Percutaneous closure of APCs has been described as an adjunct to surgery with the use of mechanically detachable coils. Few cases of elective occlusion of larger vessels with a variety of devices have also been described. The embolization procedure may involve the risk of device migration, non-target embolization, lung infarction, and recanalization. Endovascular management can be life-saving in some cases of massive hemoptysis [6].

4. CONCLUSION

Screening and early detection of congenital heart disease play an important role in accessing early treatment to improve mortality. The patient was admitted to the hospital because of hemoptysis in a young person with signs of congenital heart disease, so we should think of MAPCAs rupture. Aneurysmal dilatation of MAPCAs in patients with PA-VSD may give rise to life-threatening hemoptysis due to its rupture and may even lead to death. Endovascular interventions only improve symptoms, as well as control bleeding but do not improve the prognosis.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline patients consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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