AZYGOS VEIN ANEURYSM AND THROMBOSIS SIMULATING A MEDIASTINAL MASS

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ABSTRACT
Azygos vein aneurysm and thrombosis are rare. It resembles a mediastinal mass that can be seen by chest radiograph, computed tomography, and magnetic resonance imaging. This case describes an elderly woman with a mediastinal mass due to azygos vein aneurysm and thrombosis. She was diagnosed by non-invasive procedures. The etiology of the azygos vein aneurysm was portal hypertension secondary to liver cirrhosis. Re-canalization was established by non-invasive management.

Keywords: Azygos vein, Aneurysm, Thrombosis, Mediastinal mass
INTRODUCTION

Although subjects with azygos vein aneurysm and thrombosis is generally asymptomatic, thus, they rarely develop chest discomfort [1,2]. This condition is usually an incidental finding on chest X-ray (CXR), chest computed tomography (CT) scan and chest magnetic resonance imaging (MRI) scan [2]. Although it is rare and it is unlikely to be complicated, it is mandatory to verify the diagnosis as azygos vein aneurysm and thrombosis simulates mediastinal masses [3].

In this article, it relates the first Saudi case with portal hypertension secondary to liver cirrhosis that was found to have azygos vein aneurysm and thrombosis, which did not need any invasive management.

CASE REPORT

A sixty-three year old female patient was admitted to King Abdulaziz University Hospital (KAUH) with one month history of progressive generalized edema that became associated with shortness of breath and vague chest pain. She was a known case of uncontrolled diabetes type two, hypertension, chronic liver disease secondary to hepatitis C, hypothyroidism and morbid obesity. On the physical examination, oxygen saturation was 89% on room air, generalized edema, equal air entry with fine basal crepitations and a normal heart sound. Although, she had a massively distended abdomen with some tenderness over the right upper quadrant, the clinical signs of ascites could not be elicited. The provisional diagnosis was anasarca secondary to liver cirrhosis versus pulmonary edema and congestive heart failure.

Laboratory tests showed some derangement in the liver function test with low albumin level of 19 g/L, high blood sugar, and both, her total cholesterol level and low density lipoprotein (LDL) were high. Chest radiography (CXR) was suggestive of pulmonary edema with cardiomegaly *, while the ultrasound abdomen showed hepatomegaly with fatty liver and minimal ascites that was not amenable for tapping. Echocardiography was requested, and showed an ejection fraction of 78%, left ventricular dysfunction of grade I, good systolic function, sclerosed aortic valve with mild aortic regurgitation and aortic stenosis. The rest of the valves were intact and there was a raised pulmonary arterial systolic pressure (PASP) of 44 mmHg (in old and obese patients the upper limit of PASP was found to be 40 mmHg) [3]. Therefore, anasarca was mostly related to hypoalbuminemia secondary to liver cirrhosis.

Patient was given Human Albumin, Furosemide and deep venous thrombosis prophylactic dose of low molecular weight heparin (Enoxaparin).

On the second day of admission, the patient developed a sudden exacerbation of her shortness of breath. Pulmonary embolism was suspected as patient scored 9, according to Wells criteria [4]. The spiral CT scan of the chest was performed and showed no evidence of pulmonary embolism, pleural effusion or pneumothorax. The azygos vein was found to be enlarged with a thrombosis that involves the azygos vein extending to the proximal part of the superior vena cava (SVC) which was not clear on CXR (Fig. 1, 2).

Patient was kept on prophylactic dose of subcutaneous low molecular weight heparin (enoxaparin) to prevent possible complication due to the impaired liver function. In addition, a follow up chest CT scan was performed after ten days to indicate whether the therapeutic dose of enoxaparin was really need. The repeated chest CT scan showed re-canalization of the thrombosed and dilated azygos vein (Fig. 3).

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* cardiomegaly: an enlarged heart

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**Figure 1. CECT chest, October 2010; intermediate window: Axial image at pulmonary trunk bifurcation: Contrast and un-opacified blood mixing in the patent SVC (Red arrow). Distended azygos vein with thrombus (Black arrow).**

**Figure 2. CECT chest; intermediate window: Oblique Sagittal reformation: Contrast and un-opacified blood mixing in the proximal S.V.C. (Red arrow). Distended azygos vein with thrombus (Black arrow).**
The patient was discharged on the prophylactic dose of enoxaparin and oral furosemide. At the clinic, on follow up, the patient was stable with no shortness of breath, no new complaints and no change of the azygos vein size was observed on follow up CXR.

**DISCUSSION:**

Dilated and thrombosed azygos vein simulates paratracheal masses[1] which are rare abnormality that are easily missed, and are uncertain whether it should or should not be resected[2]. As per our knowledge, no similar cases were reported in Saudi Arabia. This finding is relatively more common in patients with portal hypertension and liver cirrhosis as seen in our patient[5]. Other associations may include thrombosed splenic or portal vein, congestive heart failure, superior vena cava obstruction, obstructed or absent inferior vena cava (as in patients with azygos vein continuation), enlarged azygos node and mediastinal tumor[5]. Less common causes of azygos vein aneurysm are pregnancy, pericardial effusion, constrictive pericarditis, tricuspid insufficiency, arteriovenous fistula, traumatic azygos vein aneurysm, total anomalous pulmonary venous return to the azygos vein, and finally, it can be an idiopathic finding[5].

Azygos vein dilatation and thrombosis are usually asymptomatic[7], but symptoms in general depend on the size of the mass[2], when it becomes dilated, it may compress the right main bronchus or the right upper lobe bronchus and the superior vena cava[2]. In literature, there were some reports of associating chest pain with this condition, as occurred in this case. Their explanation was that thrombosis of the aneurysm may culminate into an inflammation with a resulting pleural effusion and pulmonary adherences, which subsequently can cause a vague chest pain[5]. In this case, it was uncertain if the shortness of breath and chest discomfort was secondary to the edema from the hypoalbuminemia alone, or the presence of the azygos vein aneurysm and thrombosis was implicated.

Diagnosis of such abnormality is important even if the patient was asymptomatic[7], as the mass caused by azygos vein aneurysm can never be differentiated from other mediastinal or paracardiac masses; therefore, further investigations are needed[8]. The CXR can incidentally show this abnormality which can be easily missed[2]. On admission, the azygos vein varix of this patient was initially missed on CXR. However, following the demonstration of the varix using contrast enhanced chest CT scan, the CXR was retrospectively analyzed, which revealed opacity at the trachea-bronchial angle that resembled the enlarged azygos vein (Fig. 4). Azygos vein in normal situations is so small; the only part of the azygos vein that can be seen in normal individuals by CXR is the portion that extends forward from the spine to enter the SVC. It is usually described as an oval, fusiform, or round peritracheal shadow situated between the right upper lobe bronchus and the right tracheal border[6]. The CXR in azygos vein aneurysm cases show a mediastinal paratracheal mass that resembles mediastinal tumors, lung tumors, bronchogenic cyst or lymphadenopathy[1]. It was reported that in cases of azygos vein aneurysm, frontal images of the chest radiograph

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**Figure 3.** CECT chest, November 2010; intermediate window: Axial image at aortic arch level. Contrast and unopacified blood mixing in the proximal SVC (Red arrow). The difference in the caliber of the distended azygos vein (Black arrow) with thrombus is very clear from the initial study.

**Figure 4.** Supine frontal chest radiograph, on admission: Opacity in the tracheo-bronchial angle that was concerning for a tumor/lymph-nodes.
may give an idea whether or not the mass was vascular. In the literature, vascular masses change in size with respiration (especially by valsalva maneuver) and on upright/supine view. This phenomenon is important as it helps in avoiding potentially hazardous invasive diagnostic procedures, such as fine-needle aspiration or mediastinoscopic biopsy in cases of venous varix. However, such phenomenon was not illustrated in this case. Other useful methods of diagnosis include CT scan, MRI and transesophageal echocardiogram.

A normal azygos vein on CT looks like a tubular longitudinal paravertebral (right lateral) structure that resembles an enlarged bulb before entering the superior vena cava. An enlarged azygos vein on CT can be differentiated from a primary or secondary neoplasm and lymphadenopathy by its characteristic location, tubular structure, smooth outline and homogeneous density. Fortunately, this typical description of the condition was seen in the diagnostic CT images of our patient (Fig. 1, 2). Dynamic CT scan usually suggests azygos vein aneurysm by showing a slowly enhancing paratracheal mass. When doubt remains, surgical exploration remains an option. Video-assisted procedures are usually helpful in such cases as they help in making an easy diagnosis and enable resection if needed.

Literature showed contradicting opinions regarding treatment. Some advised resection via thoracotomy or video-assisted thoracoscopic techniques in order to prevent the theoretical risk of rupture or the thrombosis of the aneurysm with its theoretical pulmonary thrombosis sequelae. Others thought that the mass may not need resection, since safe natural history can be the fate of such aneurysm, as was demonstrated in this case. The decision of resection versus non-resection depends on the size of the aneurysm and whether or not a spontaneous re-canalization was established. In this case study, the surgical solution was not considered, because of the patient’s co-morbidities. Following up is quite important, as azygos vein aneurysms may expand.

In summary, a mediastinal mass in a patient with portal hypertension secondary to liver cirrhosis may possibly be an azygos vein aneurysm. Usually it is asymptomatic, but still chest discomfort and pain may occur. It can be diagnosed by non-invasive procedures, such as chest CT scan. Treatment can be non-invasive and follow up on the patient is mandatory.

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