ANATOMIC VARIATIONS

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Multiple variations in the azygos venous system: a preaortic interazygos vein and the absence of hemiazygos vein

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Abstract Multiple variations of the azygos venous system were detected during routine dissection. The hemiazygos vein was underdeveloped. On the left side of the thorax, posterior intercostal veins between the 8th and 11th intercostal spaces and the subcostal vein drained into the azygos vein independently. In addition, the posterior 4th, 5th, 6th and 7th intercostal veins united and formed two superior and inferior trunks. The superior common trunk, at the level of the T4 vertebra, crossed the vertebral column obliquely, lying anterior to the aorta and posterior to the esophagus, opening into the azygos vein at the level of the T4 vertebra. The other structures in this part were normal. There were different courses of the azygos vein system. This variation is important in mediastinal surgery and also in the interpretation of radiographs.

Keywords Azygos vein · Variation · Posterior intercostal veins · Vena cava

Introduction

The posterior intercostal veins run together with the posterior intercostal arteries and are 11 in number on each side of the thorax. On both sides of the thorax, the 1st posterior intercostal vein drains into the brachiocephalic vein directly. On the left side, the 2nd and 3rd and sometimes the 4th posterior intercostal veins unite to form the left superior intercostal vein. This vein also drains into the brachiocephalic vein. The veins from the 4th (or 5th) to the 8th intercostal spaces end in the accessory hemiazygos vein, the remaining veins from the lower three spaces in the hemiazygos vein. On the right side, all posterior intercostal veins drain into the azygos vein [9]. All these posterior intercostal veins, on the left and right sides, drain into their main veins by passing under the aorta. If one of these structures crosses over the aorta, this may cause misinterpretation of radiographs [2, 3, 5, 8]. The azygos venous pattern of the thoracic portion is subject to wide variations [1, 2, 7, 9]. In one study performed on 200 bodies, the rate of the variations observed in the azygos vein was 26% [3]. Such variations are considered to occur during embryological development [6]. These types of variations are important in surgical, radiological and clinical situations.

Case report

The following variations were encountered during routine dissection of the posterior thoracic wall of a 60-year-old male cadaver
The hemiazygos vein was underdeveloped. On the left side of the thorax, the posterior intercostal veins, between the 8th and 11th intercostal spaces and the subcostal vein, drained into the azygos vein independently. The first posterior intercostal veins on both sides drained into the brachiocephalic vein. The left 2nd and 3rd posterior intercostal veins united and drained into the brachiocephalic vein. The posterior 4th, 5th, 6th and 7th intercostal veins united and formed two superior and inferior trunks separately. The superior common trunk at the level of the T4 vertebra crossed the vertebral column obliquely, lying anterior to the aorta and posterior to the esophagus and opened into the azygos vein at the level of the T4 vertebra. The inferior common trunk at the level of T7 vertebra crossed the vertebral column lying posterior to the aorta and opened into the azygos vein at the level of the T7 vertebra. The azygos vein lay on the midline and drained into the superior vena cava. All remaining structures in the posterior mediastinum of the cadaver were normal.

Discussion

Many variations have been reported in the formation and distribution of the azygos venous system [1, 2, 7, 9]. In a study based on 200 bodies, the rate of variations observed in the azygos vein was 26% [3]. The hemiazygos and accessory hemiazygos veins were incomplete in 15% of individuals. In such cases, the posterior intercostal veins on the left side of the thorax may drain into the azygos vein independently [4].

Recent reports identify the variable positions and courses of the veins related to the azygos system. In one of them, the hemiazygos veins passed to the right side of the body crossing over the aorta [5]. In another, a persistent left superior vena cava was found. The right