Case report

A unique presentation of anomalous posterior intercostal veins, hemiazygos vein and left superior vena cava

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ABSTRACT

The venous anomalies of thorax are common, but the only drainage of 1st and 2nd posterior intercostal veins on both sides into the internal vertebral venous plexus with no communication to the azygos system is reported for the first time. The common hemiazygos vein is singular receiving all the posterior intercostal veins on the left from 4th to the 11th with subcostal on the left side. This vein drains into azygos on the right. It also connects on the cranial end via an anomalous vein to the Left SVC. This anomalous vein also receives the left 3rd posterior intercostal vein. On the right, the azygos system is normal.

Keywords: Left SVC; hemiazygous vein; posterior intercostal vein.

CASE REPORT

Multiple anomalies were observed in the drainage pattern of the venous system of the thoracic wall and heart during dissection. There was a communication between left brachiocephalic vein to the coronary sinus, most possibly left superior vena cava (SVC) / Left oblique vein (Fig. 1). The inferior hemiazygos is absent, with the 4th to 11th and subcostal veins on left side draining into a common hemiazygos vein, which crosses at the level of T5 to join the azygos vein on the right. The upper end of this vein communicates into the anomalous left SVC and the third posterior intercostal vein connected to this anomalous vein. The left first and second posterior intercostal veins entered separately into the intervertebral foramen and terminated into the intervertebral plexus (Figs. 2 and 3). The azygous system on the right was normal.

A - Left Superior Vena Cava
B - Communication between Left Superior Vena Cava & Hemiazygous Vein
C - Coronary Sinus
D - Left Brachiocephalic Vein

Fig 1: Left superior vena cava

A - Left Superior Vena Cava
B - Communication between Left Superior Vena Cava & Hemiazygous Vein
C - Hemiazygous Vein
D - Left 3rd Posterior Intercostal Vein

Fig 2: Anomalous vein between left superior vena cava and hemiazygous vein

A - Left Superior Vena Cava
B - Communication between Left Superior Vena Cava & Hemiazygous Vein
C - Hemiazygous Vein
D - Left 1st Posterior Intercostal Vein
E - Left 2nd Posterior Intercostal Vein

Fig.3. Anomalous left posterior intercoastal veins

DISCUSSION

In the embryo, the venous system is in the form of three systems, vitelline, umbilical and cardinal systems. In the thorax, the supracardinal veins result in the formation of intercostal veins and join the posterior cardinal veins. The left supracardinal vein forms the hemiazygous system, which retains only the median anastomoses to the right and loses its connection with posterior cardinal vein. The right, which forms the azygous vein, connects with superior caval vein, which is a derivative of anterior cardinal vein, hence losing its connection with posterior cardinal vein. This superior caval vein, which forms the future SVC, drains into the right atrium via right common cardinal vein.

The left anterior and common cardinal veins, along with part of sinus venosus regresses, remaining as left superior intercostal vein and oblique vein of left atrium respectively. The oblique vein of left atrium hence drains into coronary sinus, which is derived from left sinus horn. As this happens, the right common cardinal forms the right brachiocephalic vein and the communication between right and left anterior cardinal veins is retained as left brachiocephalic vein.

In 0.3 – 0.5% of population, the left anterior cardinal vein persists alone as single left SVC or with the right vein as persistent left double SVC (1). The left SVC persistence is seen in 4% of cases with congenital anomalies of heart (2-4). The left brachiocephalic vein will be smaller or absent in the presence of left SVC in 65% of anomalies (4,5). But, in our case, we had a normal sized left brachiocephalic vein. The drainage of the venous blood into the coronary sinus has lot of hemodynamic implications. The enlarged coronary sinus is documented to reduce the size of left atrium and impede the blood flow of the mitral valve (6). Persistent left SVC is also documented to exist with atrioventricular septal defects and double outlet right ventricle (7). In our case report, no associated such anomalies were found. Shock, myocardial infarction and even cardiac arrest can occur when cardiac catheterisation is attempted in cases having persistent left superior vena cava (8,9). Hence, the importance and the awareness of such an anomaly are of utmost importance.

However, anomalies were seen in the drainage pattern of the posterior intercostal veins on the left side. Though there are articles to state the anomalous drainage of azygos system of veins, the absence of communication of posterior intercostal veins with the azygos system of veins have never been documented till now. The embryological regression of communication has not been documented which has an evolutionary significance and needs to be looked for in future case studies. The clinical significance of the communication between the internal vertebral venous plexus and the posterior intercostal veins is that of providing warmth to the spinal cord. The later draining the brown adipose tissue of the body wall, retain more warmth and hence supply the same to the spinal cord. Histological differences too are visible in the posterior intercostal veins that which connect to the internal vertebral venous plexus (10). This case, has nil communication of 1st and 2nd posterior intercostal veins with the hemiazygos system on the left side.

The venous connections of the internal vertebral venous plexus (IVVP) with the other veins of the body are documented well in humans in the lumbar region only (11). This connection of posterior intercostal veins only into the IVVP and not into the azygos system in the thoracic region adds to the above statement and opens new avenues for the discussion on thermoregulatory mechanisms of the spinal cord.

The presence of left SVC with a narrowed ostium in its entry into coronary sinus, leads to many technical problems during the catheterisation of venous system of heart, in procedures like pacemaker or defibrillation leads. SVC syndrome leading to shock and inflammatory reactions resulting in myocardial infarction should be also kept in mind (12, 13). Many a times, the coronary sinus may drain into the left brachiocephalic vein via the persistent left SVC. In case of ligation of the anomalous vessel, venous hypertension and myocardial infarction can occur. The presence of anomalous draining of posterior intercostal veins is of interest and a new finding that needs to be known and documented. This unique pattern of drainage has a historical and clinical significance for all cardiovascular surgeons. This case is one of its kind, very rare along with multiple anomalies, gives us reasons to go back to embryology, clinical significance and physiological interest in the maintenance of warmth for the spinal cord as well.

CONFLICT OF INTEREST

There was no need for ethical clearance as this is an incidental finding. No conflicts of interest.

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