

A LEFT SUPERIOR VENA CAVA DRAINING THE BLOOD FROM A CLOSED CORONARY SINUS

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THESE anomalies occurred in the cadaver of a white male drug addict, aged 77. The cause of death was given as pulmonary oedema.

The left superior vena cava (Fig. 1) extended from the left end of the coronary sinus to the left innominate vein at a point 1.5 cm. from the origin of the latter vessel. Its length was 11.5 cm. The diameter at the cephalic end was 3 mm., at the middle 4 mm., and the caudal end enlarged to a diameter of 7 mm.

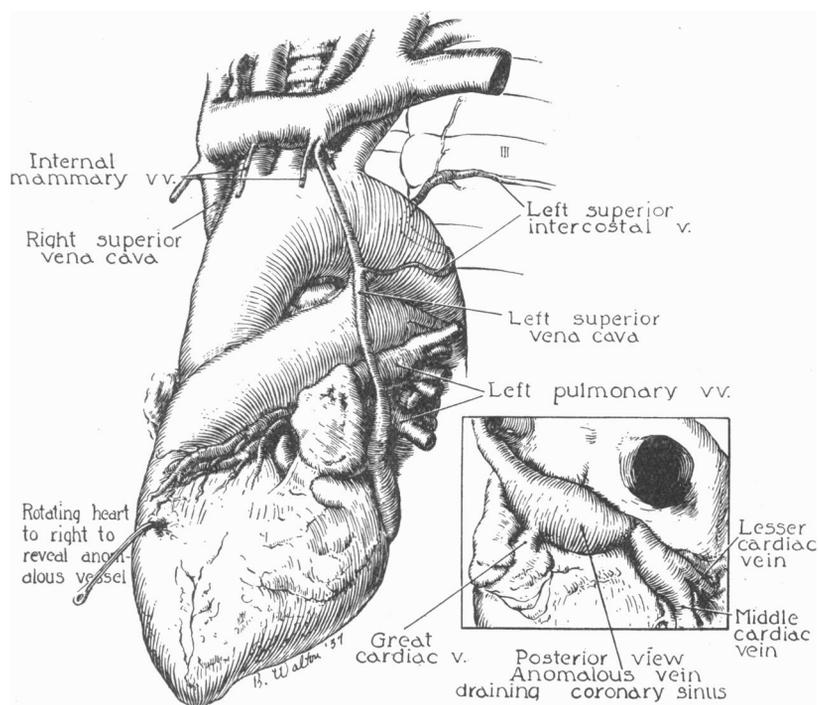


Fig. 1.

Two veins emptied into this vena cava in the upper part of its course. The higher vessel was small and terminated just below the junction of the left superior vena cava and the left innominate vein. Two small tributaries joined this vein. One of them drained the area immediately above the aortic arch between the left common carotid artery and the left subclavian vein. The other one was closely applied to the phrenic nerve. The lower of the two veins flowing into the anomalous vena cava drained the

second, third, and part of the fourth intercostal spaces. It was evidently the left superior intercostal vein. Anastomoses with the vena suprema were found and caudally the vein was continuous with the accessory hemiazygos vein. It terminated at the level of the upper part of the fourth thoracic vertebra.

Sections were made of the lower end of the left superior vena cava. The walls of this vessel resembled histologically that of any other vein of comparable size except for a layer of cardiac muscle which clothed it for about 1.5 cm. beyond the normal extent of the coronary sinus.

The coronary sinus, from its external appearance, seemed to be normal except for an increase in size and its connexion with the left superior vena cava. Upon examination of the inner surface of the right atrium no opening from the coronary sinus could be found. The sinus was dissected entirely free from the atrial wall. Histological preparations from sections of the atrial and sinus walls in the region usually occupied by the ostium of the sinus were made. These showed no scar tissue or other evidence of pathological conditions. Both areas had the normal characteristics of their respective tissues.

The presence of a left superior vena cava is not a rare anomaly. Beattie (1931) in presenting three cases of his own stated that the total number recorded was 175. Since that time Chlyvitch (1932), Kodama (1931), Seshachalam & Nagendran (1933), Papez (1938) and others have made additions which increase the total to 188 cases in man. Grant (1917) described a left superior vena cava in a cat. Chase & De Garis (1938) found a similar vessel in an orang-outang.

However, the absence of the opening between the right atrium and the coronary sinus is very infrequent, therefore the reporting of this case seemed justified. Le Cat (1738) was the first to record this type of variation in the vascular system. According to a quotation made by Marshall (1850) he found, in a child eight days old, the coronary veins united in a single trunk which, without entering the right auricle, emptied into the left subclavian vein.

Gruber (1885), Siding (1896), Nabarro (1902), Beyerlein (1914), and Harris *et al.* (1927) have described cases in which the blood flow in the coronary sinus and the left superior vena cava was reversed, due to the absence of an atrial opening from the sinus.

Hutton (1915) found a heart having a closed coronary sinus with an oval depressed area in the atrial wall of the sinus at the normal site of the opening between the sinus and atrium. The floor of this area had several pit-like markings. Opposite this region the inner surface of the atrium displayed a circular shallow depression which was also grooved and pitted. None of the pits formed a connexion between the sinus and atrium.

Peele (1932) presented a case in which the coronary sinus and right atrium communicated by a channel so small as to be judged inadequate to carry any large amount of blood.

One case, in a cat, of a superior vena cava sinistra carrying coronary blood was described by Grant (1917). Here the coronary sinus was found to be short and failed entirely to connect with the right atrium.

The presence of a left superior vena cava has been generally described as a persistence of the early embryonic left common cardinal vein.

Various causes have been ascribed to the formation of a closed coronary sinus. Beyerlein, according to Grant (1917), suggested two possibilities: closure as a result of endocardial inflammation, or, by mechanical means resulting from decreased pressure in the left superior vena cava after the formation of the left innominate vein and increased pressure in the right atrium from the inferior vena cava and right superior vena cava.

Hutton (1915) likewise makes two suggestions: that the septum between the sinus and atrium resulted from the fusion of the coronary parts of the right and left venous

valves, or fusion of a very large Thebesian valve with the edges of the opening from the sinus.

Hutton's latter suggestion may be the solution as to the way in which the sinus opening was closed in the case described in this paper. If so, the fusion must have taken place in a very early stage as no evidence of the union can be demonstrated histologically. The section of tissue removed from the site of the normal opening was carefully examined and was found to be structurally identical with other samples from the wall of the sinus.

SUMMARY

A case of a left superior vena cava and a closed coronary sinus with reversal of cardiac venous blood flow is described. A suggestion is made concerning the mechanism resulting in the closure of the opening between the right atrium and the coronary sinus.

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