

A CASE OF BILATERAL SUPERIOR VENAE CAVAE WITH A CLOSED CORONARY SINUS

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During the routine dissection of a cadaver a left superior vena cava was noticed passing into the coronary sinus. This condition is not uncommon, but further dissection showed that the coronary sinus ended 1 cm. from the wall of the right atrium. Inspection of the right atrium showed no opening for the coronary sinus and the wall between the opening for the inferior vena cava and the tricuspid orifice was smooth.

A more complete dissection showed the following details of anatomy.

Passing downwards from the proximal end of the left innominate vein was a left superior vena cava. It started about 2 cm. from the junction of the left internal jugular and subclavian veins, and, passing in front of the hilum of the left lung, across the back of the left atrium, it entered the left end of the coronary sinus. At this point the great cardiac vein entered the left superior vena cava from below, and this was the point at which the left superior vena cava was assumed to become the coronary sinus. The length of the left superior vena cava was 11 cm. The left superior intercostal vein and superior hemiazygos vein drained into the left superior vena cava through a common channel 5 cm. long. This common channel opened into the left superior vena cava 1.5 cm. from its beginning.

The coronary sinus passed in the usual way from left to right in the posterior atrioventricular groove. Its tributaries from the ventricular wall were normal. As it was followed to the right its diameter increased from 0.7 cm. at its left end to a maximum of 1.5 cm. The diameter then rapidly decreased again until 1 cm. from the wall of the right atrium the coronary sinus ended. Its terminal part was conical in shape. Into the apex of the cone opened two or three small veins, of which one was the middle cardiac vein. No connexion could be found between the closed right extremity of the coronary sinus and the right atrium. The right superior vena cava was present and normal in all respects, as were the

inferior vena cava and pulmonary veins. No other congenital abnormality was found in the heart.

THE EMBRYOLOGY

Hutton (1915) suggested two possible embryological causes for this abnormality: (1) Fusion between the coronary segments of the left and

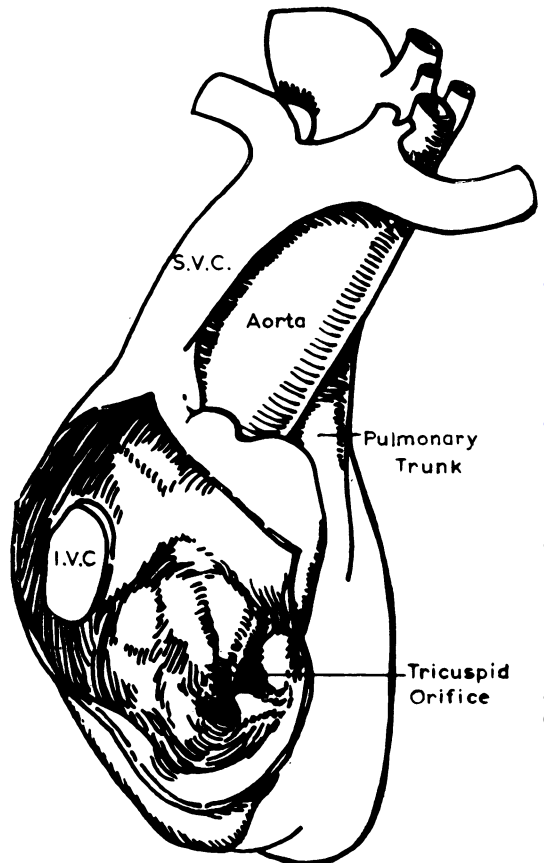


FIG. 1.—The right atrium has been opened to show the smooth wall between the opening for the inferior vena cava and the tricuspid valve.

right venous valves; and (2) an unusually large Thebesian valve which eventually fused with the margins of the opening of the sinus.

A large part of the right horn of the sinus venosus is incorporated into the right atrium, and if the right and left venous valves then fused this would seal off the opening of the left horn of the sinus venosus into the right atrium, i.e., the opening of the coronary sinus.

Hutton goes on to point out that the closure must have occurred after the formation of the cross channel between the two anterior cardinal

Hutton's explanation as to how the condition arises seems to fit all the conditions found here. He thought the first of the two possibilities given to be the most likely. As the coronary sinus ended 1 cm. from the wall of the right atrium it would seem to be a better explanation than the alternative one. Fusion of a thin Thebesian valve to the coronary sinus orifice seems less likely to give this 1 cm. gap than the apposition and fusion of two venous valves. Hutton's suggestion as to the time at which the fusion occurs does not necessarily apply. He argued that because the coronary sinus became closed off the left superior vena cava persisted. However, the rarity of the condition could be explained on the supposition that when the coronary sinus became closed off the foetus survived because the left duct of Cuvier and the anterior cardinal vein had persisted.

Blood draining into the closed coronary sinus must pass into the right side of the heart by a devious route. It must pass back up the left superior vena cava, into the left innominate vein, and into the right atrium through the right superior vena cava. This should have no effect on the patient. There is, however, one point which is worth mentioning. Miller, Inmon, and Pollock (1955), in their discussion of left superior vena cava and the relationship to cardiac operations, suggest that if a left superior vena cava is found which is connected to a left innominate vein and the normal superior vena cava is present, then the left superior vena cava can be ligated. They make no mention of a closed coronary sinus. It will be seen that if the left superior vena cava is draining a closed coronary sinus, death may follow ligation.

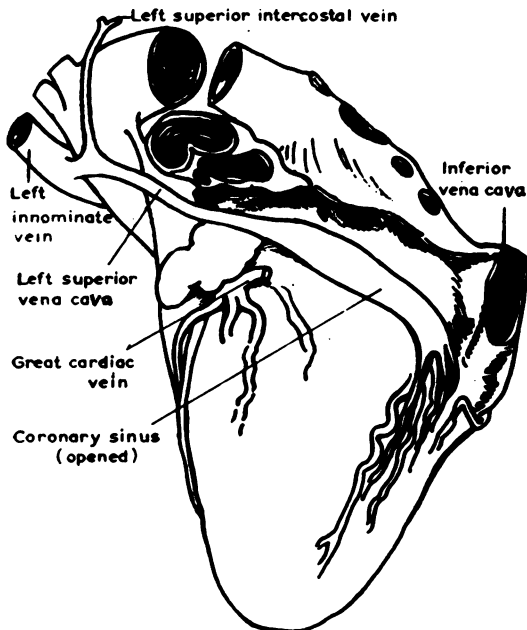


FIG. 2.—A view of the back of the heart showing the left superior vena cava entering the coronary sinus. The coronary sinus can be seen ending at the point where several small cardiac veins enter it.

veins and before the continuity of the left anterior cardinal vein and the left duct of Cuvier was obliterated. Thus when the coronary sinus became closed off from the right atrium the left superior vena cava persisted in order to maintain the venous drainage of the heart.

DISCUSSION

A search of the literature shows that there have been 10 previous reported cases of a left superior vena cava draining a closed coronary sinus. Prows (1943) recorded the last case and he reviewed the literature back to the first recorded by Le Cat in 1738.

SUMMARY

A case of bilateral superior venae cavae with a closed coronary sinus is recorded.

The embryology of this condition is discussed.

Caution should be exercised when a left superior vena cava is ligated in case it is draining a closed coronary sinus.

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