Additional openings of the coronary sinus and associated anomalies

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Abstract

The coronary sinus normally opens into the right atrium through a single orifice. Past research studies have described various anomalies of the coronary sinus but there are fewer reports on multiple orifices of the coronary sinus. The present study reports two additional orifices of the coronary sinus opening into the right atrium and associated anomalous vessels. The presence of multiple orifices may be clinically important during any catheterization and cardiac surgeries and for proper interpretation of angiographic studies.

Key words: multiple, orifices, coronary sinus, right atrium, posterior vein.

Introduction

The coronary sinus begins at a point where the oblique vein of the left atrium joins the great cardiac vein [1]. The coronary sinus lies within the atrioventricular groove and majority of the veins of the heart except the anterior cardiac veins drain into it [1]. The coronary sinus opens into the right atria in between the orifice of the inferior vena cava, fossa ovalis and the right atrioventricular opening and the opening is guarded by a valve.

Past research studies have defined numerous variations of the coronary sinus but there is a paucity of literature on the presence of multiple openings of the coronary sinus into the right atrium. The present study reports two additional orifices of the coronary sinus opening into right atrium and an associated anomalous vessel. There was an abnormal branch of the left coronary artery on the posterior aspect of the left ventricle which was accompanied by a large dilated posterior vein of the left ventricle. Such an anomalous heart with multiple openings of the coronary sinus and dilated vessels on the posterior aspect of the left ventricle has not been reported in any research study to date.

The presence of anomalies of the coronary sinus may be important during catheterization and cardiac surgeries. Knowledge of the presence of double posterior veins of the left ventricle is also important to check any erroneous interpretation of angiographic studies.

Case report

During routine cadaveric dissection of the heart, we detected anomalous openings of the coronary sinus in a 45-year- old male cadaver who died of

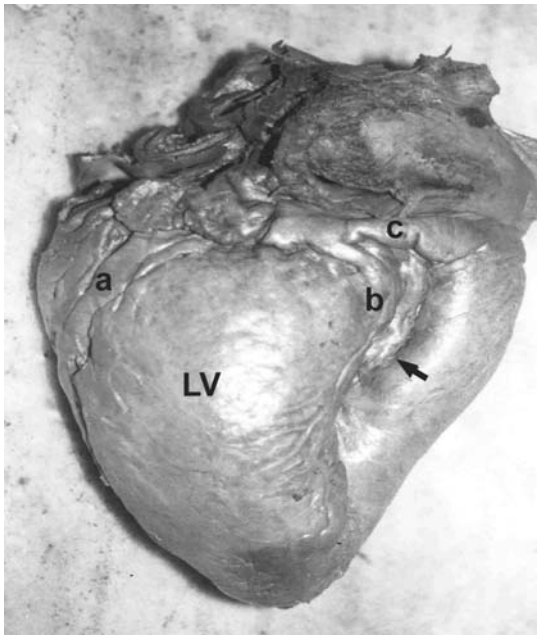

Figure 1. Photograph of specimen of the heart showing: a – anomalous branch arising from the left coronary artery, b – posterior vein of the left ventricle, c – coronary sinus, LV – left ventricle (posterior surface), the deep groove is shown with arrow

anemia. The right atrium along with the openings of the coronary sinus were displayed, appropriate measurements and photographs were taken (Figures 1 and 2).

Observation

There were two additional openings of the coronary sinus (B and C in Figure 2) other than the normal one (A in Figure 2). A probe passed through all the three openings, led into the coronary sinus, thereby confirming that they were the openings of the coronary sinus. The two openings were situated below the normal opening. The coronary sinus (C in Figure 1) was found to be dilated and tortuous. An anomalous blood vessel arising from the left coronary was found to descend on the posterior surface of the left ventricle. A dilated posterior vein of the left ventricle (b in Figure 1) was observed. This vein drained into the coronary sinus. There was a peculiar deep groove (marked with an arrow in Figure 1) on the posterior aspect of the left ventricle, through which the vein traversed.

No other associated abnormality was detected. There was no evidence of any cardiac surgery.

Discussion

The obliteration of the left common cardinal vein occurs at around 10th week of gestation. There is gradual reduction in size of the left common cardinal vein and it forms the oblique vein of the left atrium [1]. The left horn and the body of the sinus venosus

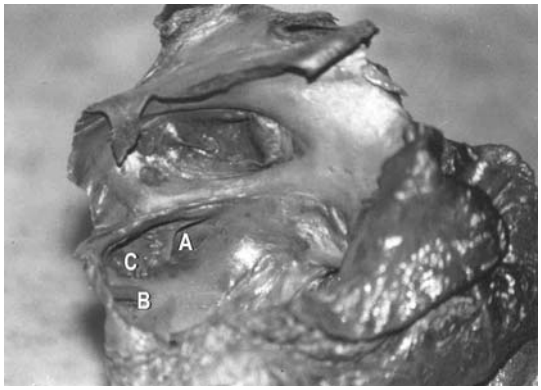

Figure 2. Photograph of the interior aspect of the right atrial chamber showing: A – main opening of the coronary sinus, B & C – two other openings below the main opening

persists as the coronary sinus [1]. We presume that additional openings may be as a remnant of the common cardinal vein, umbilical vein and the vitelline vein which are the tributaries of the left horn and they should normally regress but they might have persisted. There are also chances that the multiple openings may be related to any pathological change but admittedly, we did not have any significant clinical history to corroborate this fact.

There are few research studies which have documented the anomalies of the coronary sinus. A past research study had reported the opening of the coronary sinus to be atretic [2]. Such an anomaly may be an isolated one or associated with other cardiac malformations [2]. Interestingly, the reports of atresia of openings of the coronary sinus are associated with persistent left superior vene cava but in the present study we did not observe any left sided superior vene cave [3]. In the present case we did observe an associated anomalous branch of the left coronary artery and the dilated posterior vein of the left ventricle which was found to traverse a deep groove. It supports the views of earlier research workers that the coronary sinus is seldom the site of an isolated anomaly [2].

Ostial occlusion of the coronary sinus has been reported in past research studies [4]. The occlusion has been explained to be congenital in origin or as a result of endocarditis. The clinical implications for such occlusion are hindrances for cardiac catheterization and pacemakers [5].

An enlarged coronary sinus should always raise suspicion of blood flow from some anomalous source [2]. In the present case we observed a dilated coronary sinus and perhaps it was due to increased blood flow. The portion of the heart which was drained by the vein had a deep sulcus and was

hypertrophied. Perhaps there might have been a vascular compromised area drained by the two vessels. Enlargement of the coronary sinus have been reported in congestive cardiac failure and right atrial hypertension [2]. The enlargement may also be due to increased blood flow into the coronary sinus [2]. The increased blood flow results in troublesome effects during cardio pulmonary bypass [6].

The clinical significance of the multiple openings of the coronary sinus lies in the fact that many a time during cardiac catheterization, the tip of the catheter may be wrongly introduced into any of the openings. The presence of two openings means a large amount of blood flow which can alter the hemodynamics, thereby causing perturbations during surgical procedures [7]. Presence of two dilated vessels on the posterior aspect of the left ventricles may be confusing while interpreting any angiographic studies.

There are more reports on the studies of coronary arteries in comparison to the studies on the coronary venous system. An anatomical study as seen in the present case would surely be beneficial to cardiologists and perfusionists performing angiographic studies. There are fewer studies on the presence of multiple openings of the coronary sinus and it is only during catheterization that such anomalies are detected or they are incidental findings during anatomical dissection. In all cases of ischemic myocardium, perfusion of the coronary sinus and cardiac veins are attempted [8, 9]. The variations of the cardiac veins make reperfusion more difficult [8]. Correct anatomical knowledge of the coronary sinus and cardiac veins is necessary for successful arterilization or catheterization.

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