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Cardiac Veins of Mammals

Anatomy

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ABSTRACT

Hearts of human, buffalo, pig, goat and dog (25 of each) were procured from various sources and preserved in 10% formalin. Cardiac veins were dissected to observe their commencement, course, termination and tributaries in all these mammals. In goat, small cardiac vein was absent and small venules drained right atrium and venticle into right atrium separately. In buffalo, pig and dog small cardiac vein ran into coronary sulcus with the circumflex branch of right coronary artery to open into right atrium separately. Only in human small cardiac vein drained into right extremity of coronary sinus. Marginal vein travelling the left border of heart from apex to coronary sinus was present only in goat. Only in dog middle and great cardiac veins were formed by union of venae comitantes of posterior interventricular and anterior interventricular arteries respectively near the coronary sulcus. In rest of the mammals middle cardiac vein travelled in posterior interventricular sulcus and great cardiac vein in anterior interventricular sulcus. In all the mammals studied great cardiac vein opened into left extremity of coronary sinus. In human and buffalo, middle cardiac vein opened into coronary sinus near its right extremity while in pig, goat and dog it opened into right atrium near the right extremity of coronary sinus. In all the mammals studied coronary sinus was present between left atrium and ventricle on the back of heart and commenced as continuation of great cardiac vein to open into right atrium near the crux of heart.

Introduction

A number of studies have been done on coronary arteries but very few on cardiac veins. Gregger De Dewaled (1938)[1] showed the effect of occlusion of coronary veins on dynamics of coronary circulation of dog. Fauteuxm (1946)[2] tried surgical treatment of angina pectoris by ligating great cardiac vein. Ratajezyk Pokalskol (1974)[3] described the cardiac veins in man and domestic pig. James (1974, 1978)[4,5] observed anatomy of coronary arteries and veins. Keshaw Kumar (2000)[6] Compared anatomy of cardiac veins in mammals. Subject of cardiac veins in different mammals forms a rather neglected field. Therefore, present study was conducted to study the anatomy of coronary sinus and its main tributaries i.e. great cardiac vein, middle cardiac vein and small cadriac vein in different mammals.

Material And methods

Hearts of adult human, buffalo, pig, goat and dog (25 of each) were procured from various sources to be preserved in 10% formalin. Cardiac veins were dissected taking the help of dissecting microscope. Commencement course, termination of cardiac veins was studied observing their relation with different branches of coronary arteties.

Observations

1. Coronary Sinus:

Its length varied from 5 to 6 cm. in buffalo (fig. 3) while in human (fig. 5), pig (fig. 7), goat (fig. 13) and dog (fig. 11) its length was about 2 cm. Its opening into right atrium was not guarded by any valve except in human. In all the mammals i.e. human (fig. 5), buffalo (fig. 3), pig (fig. 7), goat (fig. 13) and dog (fig. 11) it commenced as continuation of great cardiac vein and lied between the left atrium and left ventricle on the back of heart. In human (fig. 5) and buffalo (fig. 3) coronary sinus opened into right atrium between the opening of inferior venacava and right atrioventricular orifice while in pig (fig. 7), dog (fig. 11) and goat (fig. 13) it opened into right atrium near the crux of heart.

2. Great Cardiac Vein:

In human it commenced at the apex of heart (fig. 4) while in buffalo (fig. 1), pig (fig. 6) and goat (fig. 12) it commenced at the apical notch. In dog only the great cardiac vein was formed by union of venae comitantes of anterior interventricular artery near the junction of anterior interventricular sulcus with the coronary sulcus (fig. 9). In pig (fig. 6) and goat (fig. 12) it lied lateral to anterior interventricular artery while in buffalo it lied medial to anterior interventricular artery (fig. 1). In dog it was not related to anterior interventricular artery and in place of it venaecomitantes were present (fig. 9). In human it lied superficial to anterior interventricular artery (fig. 4). Only in buffalo the great cardiac vein crossed from medial to lateral side lying ventral to anterior interventricular artery in the proximal 1/3 of anterior interventricular sulcus to reach on the lateral side of artery (fig. 1). In coronary sulcus the great cardiac vein lied superior to circumflex branch of left coronary artery in buffalo (fig. 1), pig (fig. 6) and dog (fig. 9). In human, great cardiac vein lied superficial to the circumflex branch of left coronary artery (fig. 4) while in goat great cardiac vein lied deep to the circumflex branch of left coronary artery (fig. 14). In all the mammals, great cardiac vein drained into left extremity of coronary sinus draining the right ventricle, left ventricle and left atrium (fig. 3, 5, 7, 11 and 13).

3. Middle Cardiac Vein:

Middle cardiac vein commenced near the apical notch on diaphragmatic surface of heart in buffalo (fig. 3), pig (fig. 7) and goat (fig. 13). In human middle cardiac vein commenced near the apex of heart on the diaphragmatic surface (fig. 5). Only in case of dog, middle cardiac vein was formed by union of venaecomitantes of posterior interventricular artery in the proximal part of posterior interventricular sulcus (fig. 11) although these venae comitantes of posterior interventricular artery commenced at the apical notch and ascended upward in the posterior interventricular sulcus. Middle cardiac vein ended in the coronary sinus near its right extremity in human (fig. 5) and also in buffalo (fig. 3) where it crossed the coronary sulcus superficial to the circumflex branch of right coronary artery. In case of pig (fig. 7), goat (fig. 13) and dog (fig. 11) middle cardiac vein opened separately into right atrium in close proximity to the opening of coronary sinus. In all the mammals middle cardiac vein received tributaries draining right and left ventricles on the diaphragmatic surface of heart (fig. 3, 5, 7, 11 and 13).

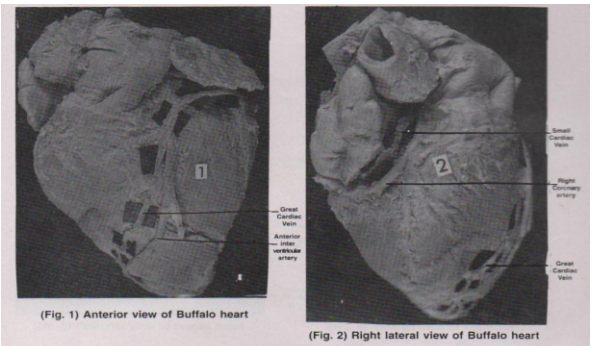
4. Small Cardiac Vein :

Small cardiac vein commenced near the commencement of right coronary artery from anterior aortic sinus in buffalo (fig. 1), human (fig. 4), pig (fig. 6) and dog (fig. 9) and ran in the coronary sulcus. In case of goat small cardiac vein was absent (fig. 12) and small veins draining the right atrium and ventricle opened into right atrium separately. In coronary sulcus, small cardiac vein lied cranial to the circumflex branch of right coronary artery in buffalo (fig. 2) while in pig (fig. 8) and dog (fig. 11) small cardiac vein lied caudal to the circumflex branch of right coronary artery. Only in human small cardiac vein lied superficial to the circumflex branch of right coronary artery (fig. 5). Small cardiac vein opened into right atrium in buffalo, pig ad dog on right side of the crux of heart at variable distance e.g. 2 cm. in case of buffalo (fig. 3) and 1 cm. in case of pig (fig. 7) and dog (fig. 11). Only in human small cardiac vein opened into

right extremity of coronary sinus (fig. 5). In human (fig. 5), buffalo (fig. 3), pig (fig. 7) and dog (fig. 11) small cardiac vein received tributaries draining right atrium and ventricle.

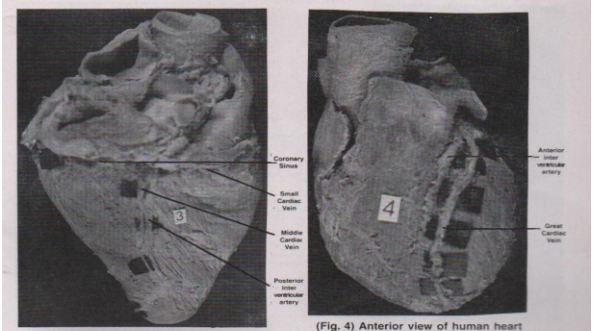
5. Marginal Vein:

Marginal vein was present only in goat (fig. 14). It commenced near the apex of heart and ran along the left border of heart to open into coronary sinus (fig. 13) receiving tributaries from the left ventricle.



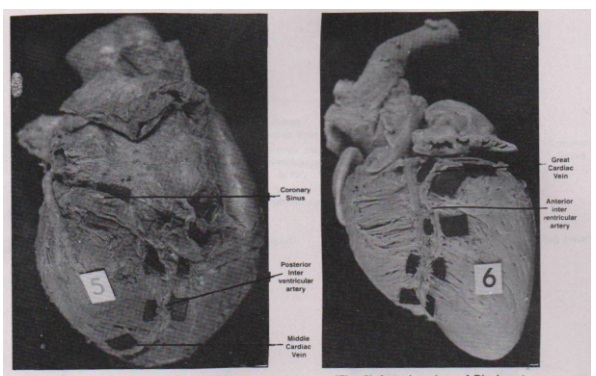
(Fig. 1) Anterior view of Buffalo heart

(Fig. 2) Right lateral view of Buffalo heart



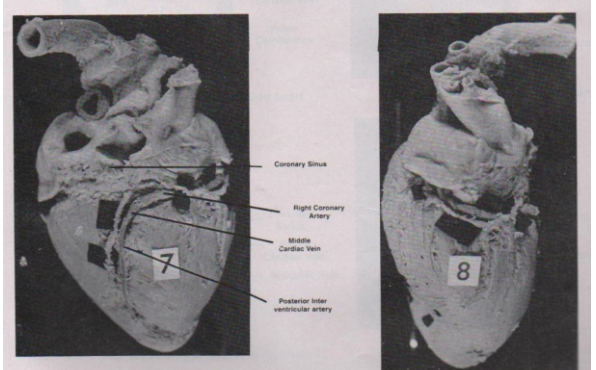
(Fig. 3) Posterior view of Buffalo heart

(Fig. 4) Anterior view of human heart



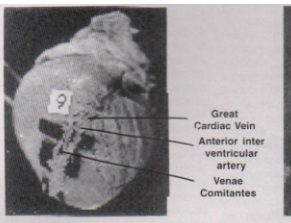
(Fig. 5) Posterior view of human heart

(Fig. 6) Anterior view of Pig heart

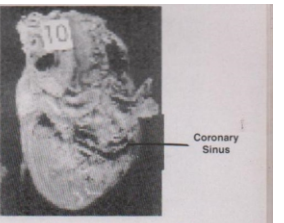


(Fig. 7) Posterior view of Pig heart

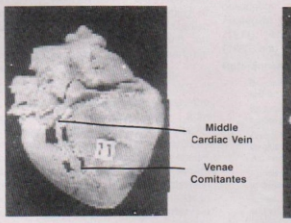
(Fig. 8) Right lateral view of Pig heart



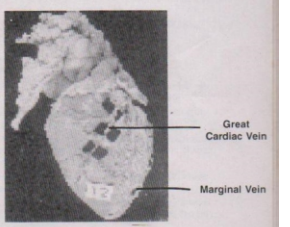
(Fig. 9) Anterior view of Dog heart



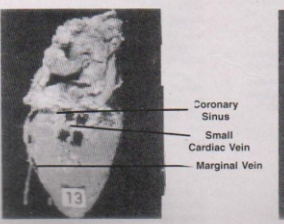
(Fig. 10) Left lateral view of Dog heart



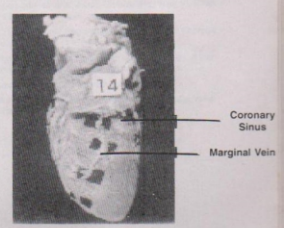
(Fig. 11) Posterior view of Dog heart



(Fig. 12) Anterior view of Goat heart



(Fig. 13) Posterior view of Goat heart



(Fig. 14) Left lateral view of Goat heart

Discussion

Last (1981)7 described that small cardiac vein was accompanied by marginal branch of right coronary artery but in present study in all the mammals studied small cardiac vein was accompanied by right coronary artery. Septimus Sisson (1961)8 observed that in dog right coronary artery was accompanied by two lesser cardiac veins while in present study in all the dogs studied right coronary artery was accompanied by single small cardiac vein. In present study it was noticed that in dog anterior and posterior interventricular arteries were accompanied by venae comitantes which united near the coronary sulcus to form great and middle cardiac veins respectively but Septimus Sisson (1961)8 did not report the venae comitantes of anterior and posterior interventricular arteries. Rest of the findings in the present study resembled with the description made by Greggor De Dewaled (1938)1, Fauteuxm (1946)2, Besmajian (1980)9, Hollinshead (1971)10, Ratajezik Pokalskol (1974)3, Williams et al (1980)11. James (1974, 78)4,5 and Keshaw Kumar (2000)6

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