Research Paper

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Great Dominance of Right Coronary Artery— Discovery of a New Coronary Arterial Pattern

Medical Science

KEYWORDS : Coronary Artery, Coronary Sulcus, Circumflex Branch, Heart.

Dr. Keshaw Kumar Department of Anatomy M.L.B. Medical College Jhansi (U.P.) India.

ABSTRACT

288 human hearts obtained from cadavers were dissected in order to search for a new coronary arterial pattern. Only in 2 hearts right coronary artery not only crossed the crux of heart but also travelled the entire length of coronary sulcus on the back of the heart and did not anastomose with the circumflex branch of left coronary artery which neither crossed the left surface of heart nor reached the back of the heart. Dr. Keshaw Kumar named it great dominance of right coronary artery which was a new coronary arterial pattern discovered by Dr. Keshaw Kumar.

INTRODUCTION

Ahmed et.al. (1972)[1] introduced a new conception of coronary artery preponderance. Allwork (1980, 1986)[2,3] described three types of coronary arterial patterns- right dominance, left dominance and balanced circulation. Allwork (1987)[4] mentioned ectopic and aberrant origins of coronary arteries and also the presence of a single coronary artery. Ayer and Rao (1957, 1958)[5,6] as well as Jain and Hazary (1958)[7] observed the dominance of either the right or left coronary artery in man and domestic or laboratory animals. Flamm et al. (1968)[8] noticed the anomalous origin of left coronary artery from the pulmonary artery. Ogden (1970)[9] discussed congenital anomalies of coronary arteries. Omar (1977)[10] showed a new parameter for the study of coronary artery predominance. Ott et.al. (1978)[11] studied an anomalous origin of circumflex artery from right pulmonary artery Roberts et.al. (1982)[12] reported a right coronary artery originating from the the left sinus of Valsalva Schlesinger (1940)[13] used to indicate the areas of the heart supplied by each coronary artery and for the first time gave the term "dominant." Smith (1950)[14] described a single coronary artery in a review. Keshaw Kumar (1989)[15] reported anomalous course and branches of human coronary arteries. Keshaw Kumar (1990)[16] discussed comparative anatomy of coronary arteries in mammals. Keshaw Kumar (1994)[17] observed duplication of branches in human coronary arteries. Keshaw Kumar (2006)[18] reported anterior interventricular artery replacing left coronary artery with absence of arterial anastomosis in human heart. Keshaw Kumar (2008)[19] studied coronary arterial patterns in coronary heart disease. Keshaw Kumar (2012)[20] proved that codominance or balanced circulation is an impossible coronary arterial pattern.

Present study was conducted to search for the presence of a new coronary arterial pattern if, any, in the human heart.

MATERIAL AND METHODS

288 human hearts procured from cadavers were preserved in 10% formalin. Coronary arteries were dissected to find out any new coronary arterial pattern.

OBSERVATIONS

While dissecting the coronary arteries in human hearts obtained from cadavers, only in 2 out of 288 hearts was the circumflex branch of the left coronary artery found to deviate taking a course inferior to the coronary sulcus and to terminate as a marginal branch running along the left border of the heart for some distance (fig.1). Neither did it reach the back of heart nor anastomosed with the circumflex branch of the right coronary artery.

The circumflex branch of the right coronary artery crossed the crux of the heart to travel along the entire coronary sulcus on the back of the heart and terminated in the left ventricle (fig-2). Before the termination of its circumflex branch, the right coronary artery continued as a posterior ventricular branch which ran parallel and left to the posterior interventricular sulcus on the diaphragmatic surface of the left ventricle and ended in the left ventricle before reaching the apex of the heart.

Travelling in the coronary sulcus, the circumflex branch of the right coronary artery gave a collateral branch when it reached the back of heart (fig-3). This branch also ran in the coronary sulcus lying inferior to the circumflex branch and terminated in the right ventricle near the crux of the heart (fig.4).

A very slender posterior interventricular branch commenced from the right coronary artery at the crux, travelling in the posterior interventricular sulcus, and terminated at the junction of its posterior two thirds and anterior one third by anastomosing with the thicker anterior interventricular branch (fig.4). The latter ran in the anterior interventricular sulcus, after arising from the left coronary artery near its ostium, and crossed the apical notch to reach the diaphragmatic surface of the heart (fig.2).

As the right coronary artery not only crossed the crux but also ran along the entire coronary sulcus behind the heart and as it gave not only a posterior interventricular branch but also a posterior ventricular branch, it was a case of great predominance of the right coronary artery.



Fig. 1. Left lateral view of human heart. 1 = Circumflex branch of left coronary artery.



Fig. 2. Anterior view of human heart. 1 = Right coronary artery; 2 = anterior interventricular branch of left coronary artery



Fig. 3. Right lateral view of human heart. 1 = Circumflex branch of right coronary artery; 2 = collateral branch of right coronary artery; 3 = right coronary artery



Fig. 4. Posterior view of human heart. 1 = Circumflex branch of right coronary artery; 2 = collateral branch of right coronary artery; 3 = posterior interventricular branch of right coronary artery; 4 = posterior ventricular branch of right coronary artery

DISCUSSION

The deviation of the circumflex branch of the left coronary artery taking a course inferior to the coronary sulcus resembled the deviation described by Jain and Hazary (1958)[7] in buffalos, goats, sheeps and dogs, although prior to the present study in human coronary arteries this type of deviation had not been observed by any worker. The deviation observed in this case by the author indicated the evolution of the human being from the quadrupeds.

Previous workers observed that the circumflex branch of the right coronary artery anastomosed with the circumflex branch of the left coronary artery either on the left or right side of the crux of the heart (Ayer and Rao, (1987)[5] Ahmed et. al. (1972)[1] Jain and Hazary, (1958)[7] Omar, (1977)[10] Allwork, (1986, 1987)[3,4] Schlesinger, (1940)[13]. In contrast, in the present case the circumflex branch of the right coronary artery, after crossing the crux of the heart, travelled along the entire length of the coronary sulcus on the back of the heart and did not anastomose with the circumflex branch of the left coronary artery. This type of pattern of a human coronary artery had been observed by the author for the first time. Till now the posterior ventricular and collateral branches of the right coronary artery were noticed neither in humans nor in other mammals by various workers.

Very thin posterior interventricular and thicker anterior interventricular branches showed that most of the interventricular septum was supplied by the left coronary artery and only a small part of it was supplied by the right coronary artery.

Allwork (1987)[4] described that intramural bridging was present in the anterior interventricular branch when the left coronary artery is predominating, but in the present case, although the right coronary artery greatly predominated, intramural bridging was observed in the anterior interventricular branch of the left coronary artery.

In the present study, the commencement of a nodal artery from the right coronary artery at the crux supported the view of Allwork (1986, 1987)[3,4] that the nodal branch arose from the predominating artery.

The commencement of the right and left coronary arteries from the anterior aortic and left posterior aortic sinus, respectively, had been observed by the author. The same had also been observed in normal cases by the previous workers.

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