Research Paper

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

Laws of Impossibility of Codominance or Balanced Coronary Arterial Pattern

Medical Science

KEYWORDS : Coronary artery, posterior interventricular artery, Crux of heart, Codominance, No dominance

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ABSTRACT

Coronary arteries and their branches were dissected in 300 human hearts in order to look for codominance or balanced coronary arterial pattern if any. It was observed that codominance or balanced coronary arterial pattern was not existing in any human heart. Following laws of codominance or balanced coronary arterial pattern were created by Dr. Keshaw Kumar on the basis of results obtained.

1. Crossing of crux by both the coronary arteries in a heart is impossible.

2. Presence of right and left posterior interventricular arteries running in the posterior interventricular sulcus of a heart is impossible.

3. Anastomosis between both the coronary arteries at the crux of a heart is impossible.

INTRODUCTION

In the past codominance or balanced coronary arterial pattern has been reported in 34% human hearts by Schlesinger, M.J. (1940)[1] in 19.09% human hearts by Caval canti ; J.S. et.al. (1995)[2], in 4% human hearts by Bezbaruah N.K. (2003)[3] and in 11.43% human hearts by Hirak Das et.al. (2010)[4]. Present study was conducted to observe the existence of codominance or balanced coronary arterial pattern in population of Allahabad District situated in Uttar Pradesh State of India and also to create the laws of impossibility of codominance or balanced coronary arterial pattern on the basis of results obtained.

MATERIAL AND METHODS

During the last 10 years, 300 human hearts procured from dissection room cadavers were preserved in 10% formalin. Coronary arteries and their branches were dissected by taking the help of dissecting imcroscope. Criteria applied for determining the existence of codominance or balanced coronary arterial pattern was the presence of two posterior interventricular arteries one arising from right coronary artery and the other arising from left coronary artery at the crus of heart and running in the floor of posterior interventricular sulcus towards the apical notch.

OBSERVATIONS

It was observed that out of 300 human hearts studied, in not even a single human heart two posterior interventricular arteries were present one arising from right coronary artery and the other arising from left coronary artery to show the existence of codominance or balanced coronary arterial pattern. 249 human hearts (83%) showed right coronary arterial dominance and 51 human hearts showed left coronary arterial dominance. Crux of heart was crossed always by dominant coronary artery. Posterior interventricular artery arose only from dominant coronary artery. In right coronary arterial dominance the anastomosis between coronary arteries was present on left side of the crux of heart while in left coronary arterial dominance anastomosis between coronary arteries was present on right side of the crux of heart. Anastomosis between right and left coronary arteries was never present at the crux of heart.

Table- I

Percentage of coronary arterial patterns

Coronary arterial patterns	Percentage
Right coronary arterial dominance	83%
Left coronary arterial dominance	17%
Balanced or codominance	NIL

Table- II

Coronary arterial anastomosis

Site of anastomosis	Number of hearts
Left side of crux	249
Right side of crux	51
At the crux	NIL

Table- III

Commencement of posterior interventricular artery

Commencement	Number of hearts
From right coronary artery	249
From left coronary artery	51
From both the coronary arteries	NIL

DISCUSSION

Results obtained in present study resemble with the results obtained by James T.N. (1961)[5], Kalpana R. (2003)[6] and Keshaw Kumar (2008,1990,2012)[7,8,9] who did not find the codominance or balanced coronary arterial pattern in any human heart. Findings of 83% right coronary arterial dominance and 17% left coronary arterial dominance in present study are similar to findings of Keshaw Kumar (2008,1990, 2012)[7,8,9].

Hirak Das et. al. (2010)[4] reported codominance or balanced coronary arterial pattern in 11.34% human hearts in which they claimed the presence of two posterior interventricular arteries one arising from right and the other arising from left coronary artery. In support of their claim they produced fig-3 published by them on page 189 in vol. 59(2) of Journal of Anatomical Society of India. But careful examination of above mentioned fig-3 clearly revealed that right and left coronary arteries before reaching the crux of heart continued downwards towards the apex of heart as right and left posterior ventricular arteries running on the right and left side of posterior interventricular sulcus which was devoid of any artery running in its floor due to absence of posterior interventricular artery and this type of coronary arterial pattern is known as "Coronary Arterial Nodominace" put forth by Keshaw Kumar (2008)[7].

Posterior interventricular sulcus is situated on diaphragmatic surface of heart extending from crux to apical notch. Any artery which is not running in the floor of posterior interventricular sulcus cannot be named as posterior interventricular artery but Hirak Das et.al. (2010)[4] due to some misunderstanding observed and named the posterior ventricular arteries as posterior interventricular arteries which was not proper. In view of the above coronary arterial pattern reported by Hirak Das et.al. (2010)[4] in 11.34% human hearts was actually of "Coronary Arterial Nodo-

miance " type put forth by Keshaw Kumar (2008)[7] and not of co-dominance or balanced type as was claimed by Hirak Das et.al. (2010)[4].

Not only Hirak Das et. al (2010)[4] but also Schlesinger, M.J. (1940)[1], Cavalcanti, J.S. et.al. (1995)[2] Bezbaruah, N.K. (2003)[3] and Allwork, S.P. (1987)[10] due to same misunderstanding observed and named the posterior ventricular arteries as posterior interventricular arteries, therefore, the codominance or balanced coronary arterial pattern noticed by them was actually of "Coronary Arterial Nodomiance" type put forth by Keshaw Kumar (2008)[7].

Anastomosis between both the coronary arteries is present either on right or on the left side of the crux of heart but never at the crux of heart because whenever right or left coronary artery reaches the crux it always crosses the crux of heart. Purpose of crossing of crux by right or left coronary artery is only to give rise posterior interventricular artery at the crux. Without giving rise to posterior interventricular artery the crossing of crux by right or left coronary artery is not permitted by nature. Therefore right or left coronary artery can not cross the crux of heart without giving rise to posterior inventricular artery.

Function of posterior interventricular artery is to supply blood to the posterior 1/3 portion of invertricular septum for which only one posterior interventricular artery is needed and required, therefore, only one coronary artery is permitted by nature to cross the crux of heart. Two posterior interventricular arteries or neither needed nor required to supply blood to posterior 1/3 portion of interventricular septum, therefore, crossing of crux by both the coronary arteries is not permitted by nature.

Because neither both the coronary arteries can cross the crux of heart nor two posterior interventricular arteries can be present in the floor of posterior interventricular sulcus, therefore, existence of codominance or balanced coronary arterial pattern is impossible in nature.

On the basis of results obtained in the present study following facts are concluded as following laws to impossibility of codominance or balanced coronary arterial pattern.

- Crossing of crux by both the coronary arteries in a heart is impossible.
- Presence of right and left posterior interventricular arteries running in the posterior interventricular sulcus of a heart is impossible.
- Anastomosis between both the coronary arteries at the crux of a heart is impossible.

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