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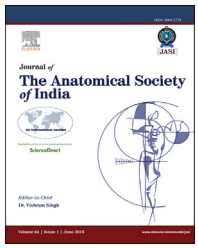

Original Article

Coronary artery dimensions in the Nepalese population

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ABSTRACT

Introduction: This study is an attempt to document normal dimensions of the coronary artery branches during life by using quantitative coronary angiography and compare them with international studies.
Method: Quantitative coronary angiography (QCA) of 100 patients undergoing evaluation of ischemic heart disease but found to be free of coronary artery disease. Measurement was done using catheter tip as a calibrating object.
Results: Out of 57% right dominant circulation 56.1% were of males and 44% of females. Left coronary dominance was seen in 17% of which 52.9% were male and 47% female, by contrast 26% subjects had co-dominant hearts with 61.5% male and 38.4% female. The mean diameter of the right coronary artery was significantly smaller ($p < 0.05$) in left dominant hearts as compared to that of dominant right. In contrast the mean diameter of the circumflex artery was significantly smaller ($p < 0.05$) in right dominant pattern as compared to that of patients with dominant left. Similarly the diameter of circumflex artery was significantly smaller in case of co-dominant type of circulation when compared to that of left coronary pattern of dominancy.
Discussion: The distribution pattern of coronary artery in the Nepalese population is distinct from that specified in the literature and the diameters of right coronary artery and circumflex artery are significantly influenced by the nature of dominance.

1. Introduction

At present there is no accessible document on normal coronary artery size in the Nepalese population. This population represents approximately 2% of the South-Asian population.[1] In this study the dimensions of the coronary artery branches during life was evaluated by using quantitative coronary angiography.

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In the 1960s, Sones and Shirey and subsequently Judkins, as cited in coronary artery surgery study (CASS)[2] reported effective means of radiographically visualizing the coronary circulation in subjects with coronary artery disease. CASS[2] classified the nomenclature of coronary anatomy and defined the criteria of dominance of coronary circulation. The criteria established by CASS[2] for dominance of vessels were used in this study. According to this, in right dominance the PD (posterior descending artery) takes origin from the RCA (right coronary artery) and no less than one branch extends beyond the PD in the atrioventricular groove, supplying posterolateral (PLV) branch to the inferior surface of the left ventricle. Distal circumflex artery in this scenario tends to be small or absent. In the case of left dominance the PD and PLV arteries arise from the CX (circumflex artery); the RCA in this situation is small whereas in co-dominant pattern of circulation the right coronary artery gives the posterior descending artery only (Figs. 1–3).

Many studies have been done in the past to determine the dimensions of coronary vessels and have been published in literatures with varying results.[3,4] Coronary artery is the major artery which supplies the heart muscles. The right coronary artery and the left main coronary artery derive their origin from the ascending aorta in its anterior and left posterior sinuses respectively. Some studies show variations in the number of openings in the aortic sinuses,[5] together with multiple ostia mostly seen in the anterior sinus.[6]

Comparison of diameters of vessels in relation to their dominance were studied in number of cases.[7] Ilia et al[8] compared the length of the left anterior descending artery with coronary dominance and found that in left dominance it frequently extended and wrapped around the apex. In addition, study showed a relationship of coronary dominance pattern and valvular heart disease.[9] It has been documented in angiographic studies that dominant left coronary arterial system is at greater risk during valvular replacement surgery.[10] These findings show the clinical implication and importance of the knowledge of dominance pattern of heart.

There is a broad divergence in the epidemiological records on the incidence and prevalence of cardiovascular disease in different countries. In the black population of the West Indies and Africa coronary heart disease is rare, but is comparatively frequent in the Indo-Asian population from the Indian subcontinent. Dhawan and Bray[11] in their study found that Caucasians had significantly larger total vessel diameter relative to the Asians. This observation has vital therapeutic implication concerning coronary intervention like coronary angioplasty (PTCA) and coronary artery by-pass grafting (CABG) in this ethnic group. For this reason an extensive study on the anatomic variations of coronary artery in the populations of the region is the necessity.

2. Materials and method

This study was conducted in Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal in the month of May and June of 2012. In this study 100 digital coronary angiograms were included of the patients who were 18 years and above undergoing coronary angiography for diagnostic purposes. There were 57 males and 43 females with mean age of 56.0 ± 10.8 year. In the study, normal appearing coronary angiograms with the catheter tip and artery in the center of the frame (minimizes Pincushion defect) and arteries apart from severe degree of tortuosity as classified in the work of Dodge et al[7] and without overlap were included. Patient's angiograms showing entire proximal occlusions or anomalous arteries and patients below 18 years of age were excluded.

Cannulation of the arteries was carried out by the Judkins technique with known dimensions (5F/6F) of catheters of Cordis-Corp Johnson & Johnson's. The contrast agent Optiray (350 ng I/ml) was used with 1 ml/kg body weight dosage. The digital arteriograms were obtained in the Philips Digital Cardio

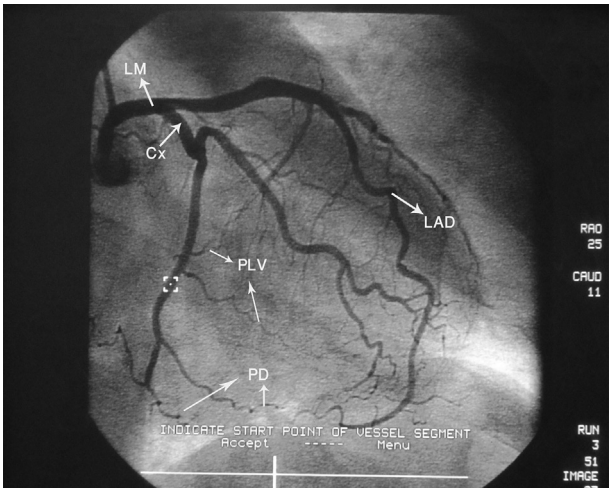

Fig. 1 – Displaying LCA in a left dominant pattern of coronary circulation. LM – Left main coronary artery, Cx – Circumflex artery, LAD – Left anterior descending artery, PLV – Posterolateral ventricular branch, PD – Posterior descending artery.

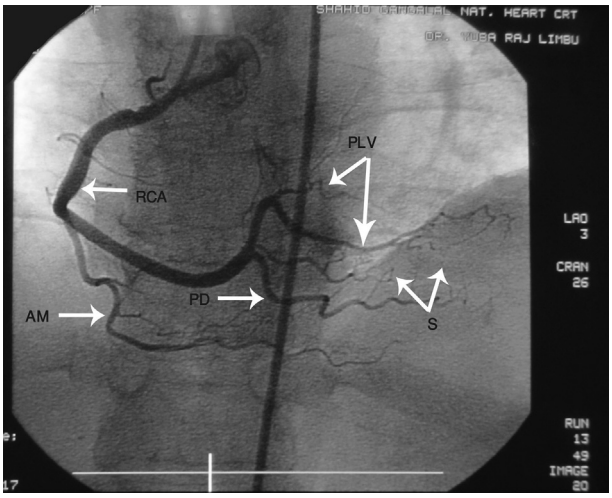

Fig. 2 – Displaying RCA in a right dominant pattern of coronary circulation. RCA – Right coronary artery, AM – Acute marginal artey, PD – Posterior descending artery, PLV – Posterolateral ventricular branch, S – Septal arteries.