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Research Paper

The study of anatomical variations of coronary arteries- A Case Report

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Abstract

There are numerous variations in pattern of coronary arteries reported by various authors in previous studies; however, in this study more types of variations are found. The right coronary artery arises from right aortic sinus and then run in right coronary sulcus and gives the right marginal artery and then runs in posterior right coronary sulcus and reaches up to crux and gives the posterior interventricular branch and also gives the two more branches which run on posterior surface of left ventricle in spite of making anastomosis with left circumflex artery at crux. Posterior interventricular artery reaches at apex of heart and anastomose with the anterior interventricular artery. The left coronary artery arises from left aortic sinus and runs in left anterior coronary sulcus and in sulcus it gives three branches one run in ant interventricular sulcus and other as diagonal artery. Anterior interventricular artery further gives one branch parallel to the artery which further divides in two more branches and supplies the anterior surface of left ventricle. The main anterior interventricular artery reach up to apex and anastomose with posterior interventricular artery. The circumflex artery runs in left anterior coronary sulcus and then runs on the posterior surface of left ventricle(in spite of left posterior coronary sulcus) runs near the left margin of posterior surface of left ventricle and anastomoses with the one branch of anterior interventricular artery near the apex.
Keywords: anatomical variations, coronary arteries, Myocardium.

Introduction

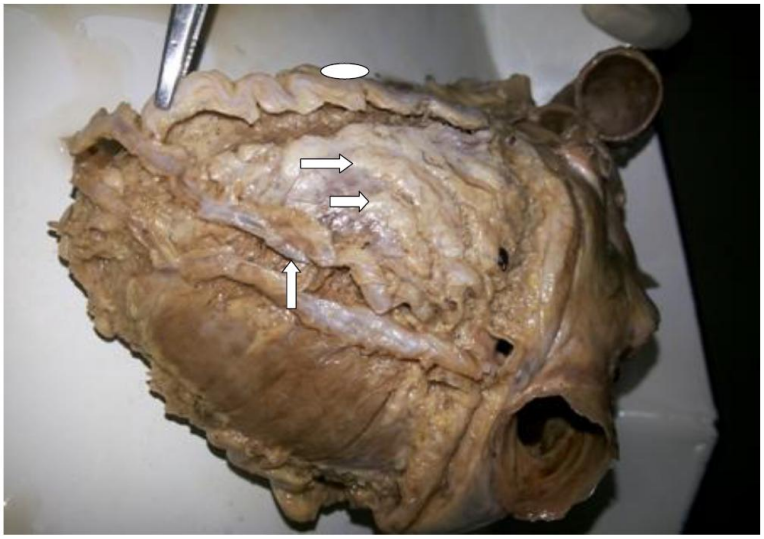
Incidence of anomalous coronary artery is more common in male than female [1]. Variation of coronary artery is rare and ranges from 0.3% - 1.3%. The variation depends on the topography and on race [1-6]. Myocardium of heart is supplied by a pair of coronary arteries which arise from the ascending aorta. As the arterial supply to the myocardium is very critical for the normal functioning of the heart, the variations which exist in its branches are gaining importance, more so, because of the angiographic procedures and the numerous bypass surgeries which are being done. Numerous data on the variations of the arteries have been reported, but still it is better to explore them further with respect to their clinical significance [8]. The important variations in the origin of the posterior interventricular artery (PIV) were studied, which was VERB from the right coronary in 80% and from the circumflex in 20% of the specimens which were studied [8]. Another author reported 2 PIV arteries in a balanced type of heart [9]. The anomalous course and the branches of the human coronary arteries were described in one research [10]. The circumflex (CX) anterior interventricular arose separately from the aorta in 1.82% of the specimens [11]. Occurrence of the dual left anterior descending coronary artery by using CT findings have also been reported [12]. Didio (1967) described that the arterial and the ventricular rami of the coronary arteries were identified by fine dissection in 54 adults, which had no communication across the coronary sulcus [13]. The largest anterior ventricular rami was observed to be the right marginal one [14]. The variation in the length and different types of terminations of the right coronary artery at the right margin, or at the crux were studied in 81 human hearts after the injection and in 88.8% hearts, it was found to terminate distal to the crux and was also long [15]. Reports on

abnormalities like both coronary arteries arising from the common stem, CX and AIV originating separately and AIV bifurcating into two branches have all been reported in the standard text books like Gray's Anatomy [16]. Existing review ofliterature suggests that anomalous coronary artery knowledge is mandatory for angiography and surgical interventions [6,7].

Observations

All the branches had thick walls and tortuous courses. The right coronary artery crossed the crux and without anastomosing with the circumflex, descended on the posterior surface of the left ventricle as 3 parallel branches, one in posterior interventricular groove and two were on posterior surface of left ventricle.

The left coronary (LCA) was giving two terminal branches as usual, the anterior interventricular (AIV) and circumflex (CX) arteries. But the (AIV) – divided into 3 terminal branches. One of them reached up to apex and presented in anterior interventricular sulcus. 2nd AIV – further divided in two branches. 3rd artery ran as diagonal artery on left ventricle anterior surface. The circumflex artery was not seen in the left posterior atrioventricular groove, but it descended on the posterior surface of the left ventricle near left margin and did not anastomose with the right coronary artery, But instead, it anastomosed with the branch of anterior interventricular artery near apex.



Circumflex left artery near the posterior interventricular artery

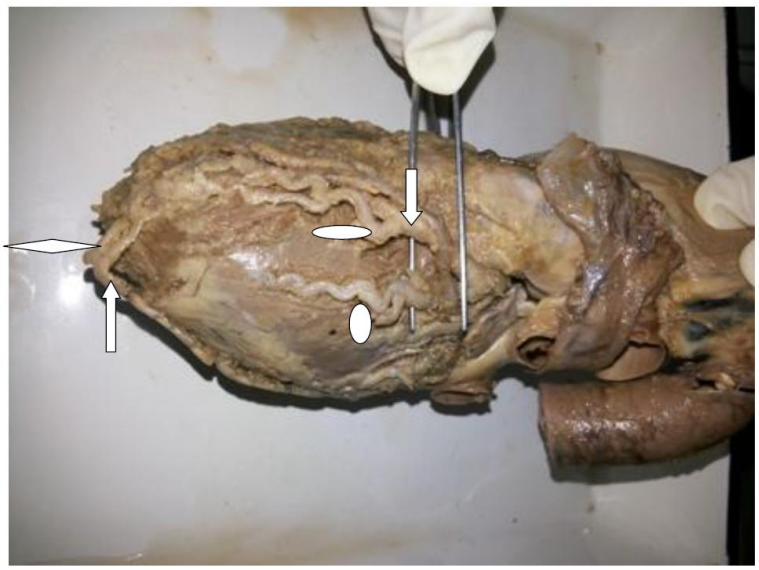
Terminal branches of right coronary artery

Posterior interventricular artery

Figure 1

Discussion

While analyzing and comparing the branching pattern in the existing variations, a maximum of 2 PIV branches have been reported so far[17], but in this case, 3 flanking PIV branches, all arising from the RCA, were seen. Out of three PIV arteries, one curved around the cardiac apex and anastomosed with AIV, a branches of the LCA and rest 2 branches ran on posterior surface of left ventricle. Anterior interventricular artery arose by the common stem and then trifurcated into the left diagonal and 2 anterior interventricular artery. So, as we reported, both the AIV and the PIV arteries were more than 2 in number in our specimens, unlike in other studies, where only one of them was reported to be duplicated[17].



Anterior interventricular artery

Parallel branch of anterior interventricular artery

Diagonal artery

Circumflex artery

Posterior interventricular artery parallel to circumflex artery anastomosis with Anterior interventricular artery

Figure 2

Circumflex artery

Posterior interventricular artery

Parallel branch of anterior interventricular artery & Anterior interventricular artery

Figure 3

A maximum of 2 AIV branches and only 3 PIV branches have been reported so far in the literature[18]. The RCA was shown to have 3 types of termination, at the crux, at the left margin, or at the right margin of the heart [12]. In this specimen, an entirely new type of termination was noticed. The two branches of RCA crossed the crux and without anastomosing with the Circumflex artery, was seen to descend and enter the posterior surface of the left ventricle, a type which has also not been described henceforth in the literature. As per the other reports, the Circumflex artery was described to terminate at the crux normally and to end by anastomosing with the RCA but in this case CX artery terminated near the apex by anastomosing with a branch of anterior interventricular artery. As any new anastomosis is said to be indicative of hypoxia, occlusive coronary artery disease, valvular disease of the heart and anemia [17], our finding is very significant, as these anastomoses help in detecting the anomalies if the investigative procedure is done with prior knowledge of such reports. Though a lots of variations was seen in previous studies by various researchers but our study showed a few additional one.

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