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Commentary

Anomalous coronary artery arising from opposite sinus of Valsalva

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Anomalous coronaries are frequently encountered during the course of performing coronary angiogram. The prevalence varies from 0.6%-1.3%. We discuss here about the anomalous origin of coronary artery from the opposite aortic sinus as this by far is the commonest variant encountered. The other anomalies like coronary artery fistula, myocardial bridge and separate origin of left anterior descending and circumflex haven't been discussed as they are either too rare or are not associated with the risk of sudden cardiac death. There has been profound increase in data to this respect as major institutes have published their data clarifying now the diagnostic and management algorithm in dealing with it. Anomalous origin of coronary artery has significant clinical implications due to its association with myocardial ischemia, lethal arrhythmia and even sudden cardiac death.

Key words: Coronary angiogram, anomalous coronaries, myocardial ischemia, lethal arrhythmia

INTRODUCTION

Anomalous coronaries are frequently encountered during the course of performing coronary angiogram. The prevalence varies from 0.6%-1.3% (Yamanaka, et al. 1990, Angelini, et al. 2007). We discuss here about the anomalous origin of coronary artery from the opposite aortic sinus as this by far is the commonest variant encountered. The other anomalies like coronary artery fistula, myocardial bridge and separate origin of left anterior descending and circumflex haven't been discussed as they are either too rare or are not associated with the risk of sudden cardiac death (Phadke, et al. 2020). There has been profound increase in data to this respect as major institutes have published their data clarifying now the diagnostic and management algorithm in dealing with it (Lanjewar, et al. 2021, Garg, et al. 2000). Anomalous origin of coronary artery has significant clinical implications due to its association with myocardial ischemia, lethal arrhythmia and even sudden cardiac death.

Types

ACAOS is classified into four predominant groups by Angelini et al. (Angelini, et al. 2007).

1. Anterior or prepulmonic course: anterior to the pulmonary trunk or the right ventricular outflow tract

2. Interarterial course: between the pulmonary artery and the aorta

3. Septal course: through the interventricular septum

4. Retro aortic course: Runs posteriorly between the aortic root and the left atrium.

These may also be classified as per their origin

1. Anomalous origin of right coronary artery from left aortic sinus.

2. Anomalous origin of circumflex from right aortic sinus.

3. Anomalous origin of left main from right aortic sinus.

The concerns over the course of time have been with the interarterial course also called 'malignant' course which is associated with increased sudden cardiac death rates. Rates of malignant course vary from 5 to 15 percent in various observational studies. (Yamanaka, et al. 1990, Garg, et al. 2000).

Clinical Presentation: Myriad presentations ranging from being completely asymptomatic, to angina and myocardial infarctions and rarely sudden cardiac death. Most people are found incidentally during angiograms and may have non-involved coronary artery disease (Lanjewar, et al. 2021).

Diagnostic modalities: While often discovered during an invasive coronary angiogram a CT angiography (CTA) is essential in establishing the origin and the course. CTA better delineates the anatomy, origin and course, especially the malignant course wherein the artery lies between the aorta

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and pulmonary artery. Although circumflex origin from right aortic sinus does not have a malignant course, CTA was still performed to rule out intramural course and a slit-like ostium. (Lanjewar, et al. 2021).

Manangement: There are no guidelines about management of malignant course of coronary artery. Post CTA those with inter-arterial course of RCA with no significant stenosis and/ or symptoms can be subjected to stress MPI test to confirm non-inducibility of ischemia before being managed medically; those who have any reversible ischemia or any family history of SCD should undergo complete revascularization in the form of CABG.

On the other hand, interarterial course of LCA must undergo cardiac surgery and should not be stressed. Rest of the patients may be closely followed up and managed medically.

PCI is not a reasonable option in interarterial course with stenosis as it may be associated with risk of stent fracture due to compression by the great arteries analogous to a myocardial bridge.

For non-malignant course, when the patient is symptomatic or asymptomatic with significant stenosis and inducible ischemia on stress testing, PCI or CABG may be performed according to standard guidelines (Lanjewar, et al. 2021).

Patients with non-malignant course and insignificant stenosis may be regularly followed up clinically and by stress test. We have proposed a treatment algorithm for management of ACAOS (Figure 1).

Our Experience: At KEM Hospital Of the 8500 patients- 6100 men (72%) and 2400 (28%) women- 74 (0.87%) had anomalous origin of coronary artery from the opposite aortic sinus. The mean age was 57 ± 12 years (age range: 32-73 years). Anomalous right coronary artery from left sinus of Valsalva was the commonest anomaly (51 patients, 68.9%) with four having an interarterial course and the rest had retroaortic and inter- ventricular course. The origin of the left coronary artery was normal in all the cases. The next commonest anomaly is origin of circumflex artery from right aortic sinus (21 patients, 28.4%) with all of them following a retroaortic course. They had a normal distribution. The left anterior descending arose from the left coronary cusp in all these patients two patients (2.7%) had LCA arising from the right aortic sinus. One of them had an interarterial and the other one had a retroaortic course with normal distal distribution. Malignant course: Five (6.7%) patients were found to have a malignant course, four of whom had an anomalous RCA arising from left aortic sinus. All four were subjected to stress perfusion imaging and three had reversible ischemia so they were subjected to CABG. One patient had no reversible ischemia on stress MPI and was managed medically. One patient had LCA arising from right coronary aortic sinus and was subjected to CABG without stress imaging (Lanjewar, et al. 2021).

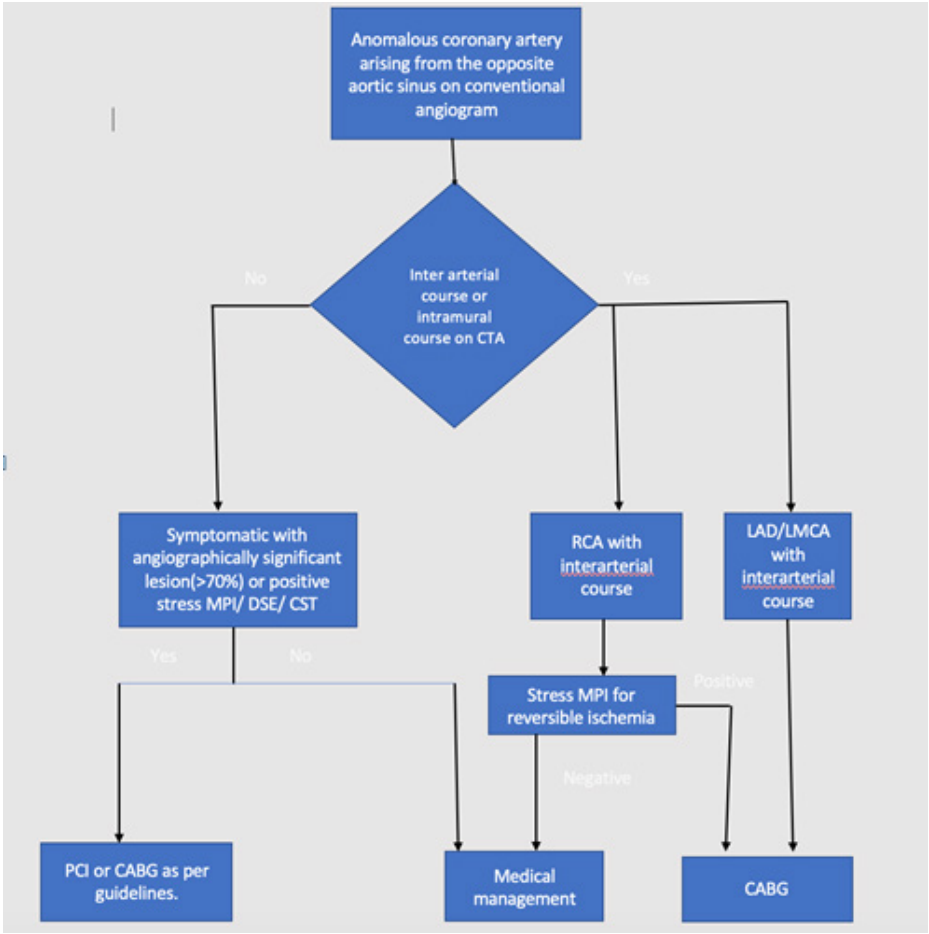

Figure 1. Proposed management algorithm of anomalous coronary arteries and their management. (**Abbreviations:** CTA: CT Angiography; MPI: Myocardial Perfusion Imaging; DST: Dobutamine Stress Test; CST: Cardiac Stress Test; PCI: Percutaneous Coronary Interventions; CABG: Coronary Artery Bypass Grafting: RCA: Right Coronary Artery; LAD: Left Anterior Descending; LMCA: Left Main Coronary Artery).

PCI in anomalous coronary artery: Significant disease in the anomalous coronary artery is amenable to stenting provided malignant course is ruled out.

However, it is challenging as the essence lies in the skill of the operator and right selection of the hardware and sometimes use of an additional wire in order to derive adequate support (Uthayakumaran, et al. 2014).

CONCLUSIONS

Anomalous coronary arteries present a management conundrum and needs proper work up and delineation so that those with increased risk of sudden cardiac death may be identified and treated adequately. Those without malignant course can be managed conservatively with adequate safety.

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