

Single Coronary Artery; Extremely Rare Coronary Anomaly Successfully Treated Surgically in Young Adult Male

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Abstract

Single coronary artery arising from aortic root, is a rare congenital anomaly. A 30-year-old male presented with acute myocardial infarction (MI) complaining of chest pain and raised troponin levels. Emergency angiography showed no coronary lesions but both left and right coronary arteries arising from single ostium. Patient was operated electively and perioperative findings confirmed the diagnosis of single coronary artery, as left coronary artery after taking origin from right sinus of valsalva runs through the septum, before dividing into left anterior descending and circumflex branches. The single coronary ostium opened with a slit like incision over the course of left main coronary, making the size of ostium three to four times bigger than the native one. In addition left internal mammary artery was harvested and grafted to the left anterior descending branch distally. Patient made successful recovery. Four months follow up dobutamine stress echo showed no inducible ischemia.

Introduction

Coronary artery anomalies are rare but their true incidence is not known. Anomalous origin of coronary artery with subsequent course between the great vessels is another rare anomaly. They cause myocardial ischemia of varying degree and sudden cardiac death. The significant fatality rate of this anomaly, many are diagnosed at the post-mortem and surgical correction reports are rare.

Case Report

A 30-year-old male presented in accident & emergency department with acute atypical chest pain with no past history of any medical or surgical problem. ECG changes, raised troponin-T and cardiac enzymes levels confirmed the diagnosis of acute myocardial infarction. Emergency angiogram showed single coronary artery, free of any disease, arising from the right sinus of valsalva of aortic root. Coronary CT angiogram further clarified the anatomy of the coronaries. Reasonably long left mainstem running intramurally into the septum and behind the pulmonary artery divides into the left anterior descending and circumflex branches (Figure 1).

Patient was treated medically initially and surgery was planned electively. After standard pre-operative workup, patient was opened through midline sternotomy. Surgical technique for the coronary artery repair consisted of standard cardiopulmonary bypass and heart was arrested with cold blood cardioplegia. The aorta was transected just above the level of sinotubular junction. There appeared to be a significant narrowing at the origin of left main coronary because of acute take off angle. A modification of the standard repair of the anomalous left main coronary artery was therefore undertaken by incising the right coronary sinus over the course of left main as far as possible extending up to more than a centimetre. In doing so the narrowing at the origin of the left main was corrected by opening the ostium 3-4 times bigger than the native size.

Figure 1: Coronary CT angiography showing anomalous origin of both coronary arteries from single opening through the aorta. Left main coronary artery (LM) travelling behind the pulmonary artery (PA) divides into left anterior descending and circumflex branches while right coronary artery (RCA) runs through its normal course.

The picture below (Figure 2) taken during surgery show (on the left) the creation of new ostium and hence correction of acute take off angle, which was the presumably cause of ischemia. To keep the slit-like incision wide open, the two intimal edges stitched together on both sides with 7/0 prolene (on the right). The aorta was repaired with end to end anastomosis. In addition, the left internal mammary artery (LIMA) was grafted to left anterior descending coronary artery branch. Patient postoperative recovery was uneventful staying in sinus rhythm with no ECG changes and was discharged home well on fifth postoperative day. At the interval of six months dobutamine stress echo test carried out which showed no evidence of any inducible ischemia.

Figure 2: On the left, the single right ostium is opened along the left main artery while on the right; both endothelial surfaces are stitched back on each side to keep the opening wide open.

Discussion

A single coronary ostium is extremely rare and reported incidence is 1 in 2250 coronary angiograms. The clinical significance of this relatively rare coronary anomaly where left coronary artery arises from the right coronary artery was first reported in 1974. A study of 13-autopsy finding demonstrated a high frequency of sudden death related to this a not so minor coronary anomaly. The anomalies of the left coronary artery can be classified by the course taken in between the aorta and the pulmonary trunk in route to the left side of the heart and the prognostic factor is the course of coronary artery arising from the aorta. Interarterial course of left coronary artery causes serious risk to the person like angina, syncope, myocardial infarction and sudden cardiac death. Rarely abnormal myocardial perfusion and life threatening arrhythmias are reported with coronary artery anomaly patients. Taylor et al. reported very high sudden death rate 82 % in patients with the anomalous left main coronary artery with the interarterial course. There are reported cases of interarterial type anomalous left anterior descending (LAD) with angina at rest which disappeared with LIMA to LAD bypass graft. Previous studies, similar to our case, have shown that most of the patients with this kind of anomaly were young male patients while women and elderly patients were less common.

Different surgical approaches have been described previously which include the use of long saphenous vein graft or internal mammary graft, unroofing of the intramural part of the coronary artery resulting in modified orifice shape and location, reimplantation into the correct sinus of the aorta, and main pulmonary artery translocation. In this particular case the surgical technique which is used is the modification of the unroofing approach as the left coronary artery was not intramural but running into the septum, hence this repair is not mentioned anywhere before. In summary this is a rare coronary anomaly but increased awareness may potentially promote early diagnosis in the young population especially in physically active young adults.

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