SINGLE CORONARY ARTERY: A CASE REPORT AND REVIEW OF CURRENT LITERATURE

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ABSTRACT

We present a case of a single coronary artery where the right coronary artery (RCA) arose from its proximal part. This rare anomaly was detected during elective coronary angiography in a patient with suspected coronary artery disease. The single coronary artery originated from the left sinus of valsalva, giving rise to RCA proximally and distally dividing into left anterior descending (LAD), ramus intermedius and left circumflex (LCX) arteries. The anginal symptoms in this patient was attributed to a significant stenosis at the proximal LAD which was subsequently dilated by coronary angioplasty. To the best of our knowledge, this is the first reported case of angioplasty of LAD in an anomalous single coronary artery.

Keywords: *single coronary artery, percutaneous transluminal coronary angioplasty.*

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INTRODUCTION

Coronary artery anomalies are found in 0.6% to 1.6% of patients undergoing routine coronary arteriography[1]. The incidence of a single coronary ostium has been reported at 0.03% to 0.4%[4]. When a single coronary ostium occurs in the left sinus of valsalva, the anomalous right coronary artery originates as a branch of the left coronary artery. The RCA may originate from the left main coronary artery (LMCA) and proceed anterior or posterior to the pulmonary trunk, or may course posterior to the aorta as a continuation of the left circumflex artery[3].

The reported experience of percutaneous transluminal coronary angioplasty (PTCA) in lesions occurring in anomalous coronary arteries is very limited. Angioplasty in single coronary artery has previously been reported in only five cases so far[4-8].

CASE REPORT

A 45-year-old man was admitted in October 1993 for evaluation of coronary artery disease. His symptoms were suggestive of Canadian Cardiac Society class II angina. Three weeks prior to admission he experienced an episode of severe retrosternal chest pain. He had multiple coronary risk factors including hypertension, non-insulin dependent diabetes mellitus and strong family history of coronary artery disease. Electrocardiogram revealed Q waves in V1-V3 along with T wave inversion in L1, aVL, V1-V5. A treadmill exercise test was previously performed according to Bruce protocol. Exercise test was positive for coronary artery disease at moderate workload. A chest roentgenogram showed no cardiomegaly or pulmonary congestion. Coronary angiography was performed via the right femoral artery by Judkins technique. The left sinus of valsalva was cannulated with Judkins left 7F, 4 cm catheter. Right coronary artery (RCA), left anterior descending artery (LAD), left circumflex artery (LCX) and large ramus intermedius branches were visualised originating from the single coronary artery (Fig 1). The dominant RCA arose from the proximal part of the single coronary artery and turned downwards and medially. The proximal LAD revealed 90% eccentric stenosis. These findings were confirmed by taking multiple radiographic projections. The left ventricular angiogram revealed anterolateral hypokinesia with normal ejection fraction.

Subsequently, PTCA was performed to the LAD lesion for relief of his symptoms. The lesion was crossed by 0.014 inch phantom (USCI) wire and dilated with pronto (USCI) 3 mm/20 mm balloon. Dilatation were performed at 4 and 5 atmospheres of pressure for 3 and 5 minutes respectively. Following balloon dilatation, the LAD lesion was reduced from a luminal diameter stenosis of 90% to 10% (Fig 2). The

Fig 1 - Right anterior oblique caudal view showing a proximal 90% stenosis of the left anterior descending artery (LAD), the left circumflex (LCX), ramus intermedius (R) and right coronary artery (RCA) all arising as branches of single coronary artery.

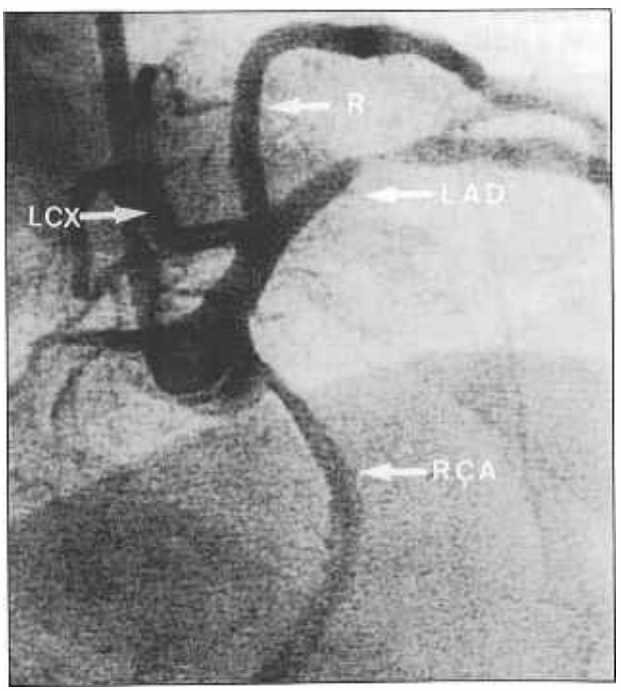

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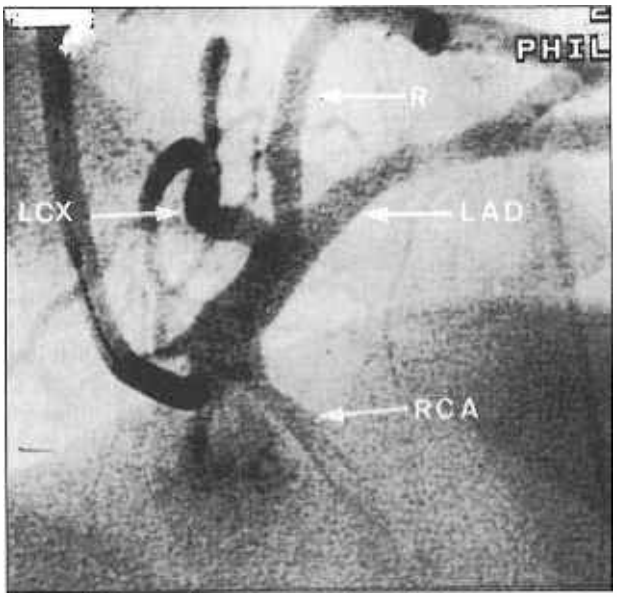
Fig 2 - Right anterior oblique caudal view after balloon angioplasty of the left anterior descending artery (LAD).



patient tolerated the procedure well and had no complications. He was discharged from hospital 3 days after PTCA.

DISCUSSION

A single coronary ostium from the aorta is a rare coronary artery anomaly. Coronary artery anomalies were found in 1,686 patients (1.3%) undergoing coronary arteriography at the Cleveland Clinic Foundation from 1960 to 1988. Out of 126,595 patients of this series, only 56 patients (0.04%) were detected to have single coronary artery[1]. Several authors have suggested various classifications for single coronary artery. The Lipton classification scheme is the most practical for angiographers. The anomalous coronary artery is first designated with R or L depending upon whether the ostium is located in the right or left sinus of valsalva. It is then designated as group I, II or III. Group I has an anatomical course of either a right or left coronary artery. Group II anomalies arise from the proximal part of the normal right or left coronary artery, and cross the base of the heart before assuming the normal position of the inherent coronary artery. Group III describes the anomaly where the LAD and LCX arise separately from the proximal part of the normal right coronary artery. RI pattern refers to the rare instance where the RCA perfuses the entire heart. The LI pattern occurs where the RCA is congenitally absent and LCX is markedly dominant. The RII and RIII anomalies correspond to ectopic origin of the left coronary artery from the right sinus of valsalva. In the LII anomalies, the RCA arises from the proximal portion of the left coronary artery. In most of the instances, the anomalous RCA originates from the LMCA[9]. Using these criteria the patient presented here corresponds to LII anomaly.

Congenital coronary anomalies may be associated with acute myocardial infarction, syncope, non-fatal ventricular fibrillation, exercise-related death and sudden death[10,11]. Anomalous vessels are thought to significantly alter myocardial perfusion through mechanisms different from those of atherosclerotic disease; on the other hand, they can develop typical atherosclerotic coronary artery disease[12]. It has been suggested that some of the ischaemia observed in patients of single coronary artery disease could be the result of a diminished vasodilatory response or in some instances compression of the anomalous arteries by the pulmonary artery and the aorta. Sudden death in young patients with single coronary artery has been reported and it has been hypothesized that coronary artery passing between the great vessels may be compressed, resulting in ischaemia[9]. The anginal symptoms in this patient was probably due to significant stenosis of the proximal LAD. Event-free survival of this patient into middle age suggest that the course of the anomalous vessel between the great vessels was not haemodynamically significant in this particular case. Surgical intervention was not considered in this case because the patient comes under Group LII single coronary artery variant. No serious clinical sequclae were recognised in this group of patients[1].

The anomalous coronary arteries are associated with a high incidence of congenital heart diseases but do not appear to be associated with an increased risk for development of coronary atherosclerosis[13]. The data from National Heart, Lung and Blood Institute Multicenter Coronary Artery Surgery Study (CASS) reveal that despite an increase in stenosis of the anomalous LCX, survival was not adversely affected. Although at 3 years there was a trend for poorer survival with an anomalous LCX, by 7 years there was no difference[12].

PTCA of a coronary artery anomalies presents technical challenges to the operator. PTCA of anomalous LCX arising from the right sinus of valsalva or RCA has been reported[14,15]. PTCA of an RCA arising from the left coronary sinus has also been described[16]. There is definite increased procedural risk when angioplasty is performed in a patient with a single ostium. Dissection of this ostium by the guiding catheter would have led to a catastrophic event. The first report of angioplasty in single coronary artery was published by Stauffer et al in 1991 and second report by Gibbs et al in 1993. In both reports the authors presented the successful PTCA of RCA in single coronary artery[4,5]. Successful angioplasty in single coronary artery presenting with acute myocardial infarction has recently been described by Rajagopal et al[7]. The case described here is the first of single coronary artery. The patient tolerated the procedure well and had no complication during and after the procedure.

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