The Coronary Angiographic Analysis of 16573 Patients for Coronary Artery Origination and Course Anomalies

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Purpose
Coronary artery anomalies may be abnormalities of the origin, course or structure of the epicardial coronary arteries. An anomalous origin of one or more coronary arteries is detected in about 0.16—1.3% of patients undergoing coronary angiography.

Coronary artery anomalies are present at birth, but relatively few are symptomatic. Although generally benign in character, some coronary artery anomalies are associated with more serious clinical outcomes, such as congestive heart failure, arrhythmia, myocardial infarction, syncope and sudden death.

Coronary artery anomalies are a diverse group of congenital disorders whose manifestations and pathophysiological mechanisms are highly variable. The most of the coronary artery anomalies are discovered as incidental findings during coronary angiography.

The greatest challenge is to identify the abnormality and determine its clinical relevance so that appropriate treatment can be instituted. Unrecognized coronary anomalies may lead to errors in clinical diagnosis and surgical problems. When planning coronary angioplasty on anomalous coronary arteries, there is an even greater need to accurately define the origin and course of these vessels.

In this study, we analyzed the coronary angiograms to determine the frequency and types of coronary artery origination and course anomalies in our centre.

Methods
The database of our cardiac catheterisation laboratory was reviewed. All patients who underwent coronary angiography from November 2001 to January 2011 were included. The catheterisation reports were analyzed, and those with anomalous coronary arteries were selected for further assessment. Angiograms were reviewed by two cardiologists, who reached a consensus on the origin and course of the anomalous coronary arteries.

The anomalous origin and course of coronary arteries were assessed. The origin from noncoronary sinus of vasa saliva, separate ostium of left anterior descending (LAD) and circumflex (Cx) arteries in left sinus of vasa saliva (LSV), separate origin of conus or right ventricular branch in right sinus of vasa saliva (RSV) were not included in anomalous coronary artery group.

Results
Among the 16573 (11273 male, mean age 60 years) patients who underwent coronary angiography, 48 (0.29%) patients had coronary arteries with anomalous origin and course. The mean ages of these 48 patients were 61.4 years and 33 (68%) were male. The indication for arteriography was evaluation of coronary artery disease in all the patients.

The origin of Cx artery from the right coronary artery (RCA) or RSV was the most common anomaly (Figure 1a). In 28 (58.3%) patients, Cx artery had anomalous origin. In 17 of these patients Cx artery originated from RCA, in 11 patients Cx artery originated from separate ostium in RSV.

The single coronary artery was present in 6 (12.5%) patients (Figure 1b). Single coronary ostium was located in LSV in all of the patients. The RCA originated from LAD artery in 3 patients and RCA originated from Cx artery in the remaining 3 patients.

The left coronary artery originated from RSV in 5 (10.4%) patients with a separate ostium(Figure 1c).

The LAD artery originated from RCA or RSV in 5 (10.4%) patients (Figure 1d). In 4 patients, LAD artery originated from RCA and in only 1 patient, LAD artery originated from RSV.

The RCA originated from LSV in 3 (6.2%) patients (Figure 1e). The RCA originated from an ectopic ostium in ascending aorta in 1 (2.1%) patient (Figure 1f).

<table>
<thead>
<tr>
<th>Coronary Anomaly</th>
<th>Number of patients (n=48)</th>
<th>Angiographic incidence (%)</th>
<th>Anomaly incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anomalous origin of Cx artery from RCA/RSV</td>
<td>28</td>
<td>0.169</td>
<td>58.3</td>
</tr>
<tr>
<td>2. Single coronary artery</td>
<td>6</td>
<td>0.036</td>
<td>12.5</td>
</tr>
<tr>
<td>3. Anomalous origin of LCA from RSV</td>
<td>5</td>
<td>0.030</td>
<td>10.4</td>
</tr>
<tr>
<td>4. Anomalous origin of LAD from RCA/RSV</td>
<td>5</td>
<td>0.030</td>
<td>10.4</td>
</tr>
<tr>
<td>5. Anomalous origin of RCA from LSV</td>
<td>3</td>
<td>0.018</td>
<td>6.3</td>
</tr>
<tr>
<td>6. Anomalous origin of RCA from ectopic ostium in ascending aorta</td>
<td>1</td>
<td>0.006</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Conclusion
In our series, coronary artery origin and course anomalies were found in 48 of 16573 (0.29%) patients and this is in agreement with 0.6—1.3% incidence as reported in different series. More men than women had anomalous coronaries, possibly because more angiograms were done in male patients.

The most common anomaly was Cx artery origination from RCA or RSV. This is consistent with the previous reported series. There are reports of chest pain, myocardial infarction and sudden cardiac death related to coronary anomalies in the literature. The origin of the left coronary artery from the contralateral sinus or artery, with subsequent passage between the aorta and right ventricular outflow tract has been clearly shown to be a dangerous lesion. Other anomalies which can lead to these events include single coronary artery, anomalous coronary origin from pulmonary artery, coronary artery fistula and atresia of coronary ostium.

The exact recognition and diagnosis are important and need to be specialized in coronary angiographic techniques and other imaging modalities. Angiographic recognition of these vessels is important because of their significance and applied importance in patients undergoing coronary angioplasty or cardiac surgery.

Extensive collaboration between individual cardiologists and institutions are necessary for proper management and follow up of this rare group of patients.

Declaration of interest: None declared.