Congenital coronary anomalies in Iraqi adult population

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Summary:

Background: Geographic variations in the incidence of different congenital coronary anomalies are well known, but infrequently studied in the Iraqi population. Recognition of coronary anomalies is important in patients undergoing coronary arteriography; coronary interventions and cardiac surgery. Variation in the frequency of primary congenital coronary anomalies may possibly have a genetic background.

Patients and methods: Three thousand adult patients underwent diagnostic coronary angiography at two cardiac centers in Baghdad between January 2003 to March 2006. Their angiographic films were reviewed by at least two experts in coronary angiographic study.

Results: Among 3000 adult patients who underwent diagnostic coronary angiography, 28 (0.93%) patients (16 males, 12 females) had anomalous coronary artery. The mean age was 46±8 years (range from 28-73 years). Twenty four patients (85%) had anomalies of origin and distribution, while the remaining four (15%) had coronary artery fistulae. Abnormal origin of the left circumflex was the most common anomaly, seen in 17 (60%) patients. Coronary artery fistula was seen in four patients; from the left anterior coronary artery to the pulmonary trunk in two cases and from the right coronary to the pulmonary trunk in the other cases. Left main stem was absent in four cases (15%). While abnormal origin of the right coronary artery from the left circumflex was seen in two cases. Abnormal origin of the right coronary artery from the pulmonary artery was seen in just one case (3.5%). Atherosclerotic plaques in the anomalous artery were seen in four cases (15%) much less than overall case of coronary artery disease in those who underwent coronary angiography (60%).

Conclusion: Isolated congenital coronary anomalies in adults is rare and there does not appear to be an increased risk for development of atherosclerosis in anomalous coronary arteries.

Key words: Coronary anomalies, angiography, congenital

Introduction:

Primary congenital anomalies of the coronary arteries occur as isolated anomalies and are not necessarily associated with other types of congenital heart disease (1). These could be haemodynamically significant by leading to abnormal myocardial perfusion, while haemodynamically insignificant anomalies are principally those of abnormal aortic origin or distribution of coronary arteries, and myocardial perfusion is usually not altered in these individuals.

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Widespread application of coronary arteriography has resulted in more frequent detection of patients with anomalous coronary arteries, and their clinical significance is becoming better appreciated (2,3,4,5,6,7,8,9).

Unrecognized coronary anomalies may lead to errors in clinical diagnosis and surgical problems in mitral or aortic valve replacement it might cause compression of the anomalous left circumflex (LCX) artery from right coronary artery (RCA). When planning coronary angioplasty on anomalous coronary artery, there is an even greater need to accurately define the origin and course of these vessels. Certain anomalous coronary arteries are associated with sudden cardiac
death (left anterior descending artery (LAD) if originated from RCA and pass between the left ventricular outflow tract and the right ventricular outflow tract), myocardial infarction and anginal syndrome (2,3,4,5,6).

Angiographic recognition of coronary anomalies prior to cardiac surgery is of great importance. Surgical problems may follow if an anomalous vessel is excluded from perfusion during cardiopulmonary bypass or if the surgeon unwittingly incises the anomalous vessel (10). Failure to recognize them can also lead to inadequate or prolonged procedures. During valve replacement surgery, the ostium of the anomalous vessel can be inadvertently obstructed or the anomalous vessel may be compressed along its course by a valvular prosthesis (11, 12,13,14,15,16).

Also accurate identification of origin and course of anomalous coronaries is mandatory before planning coronary interventions (13,14), so that an appropriate guiding catheter, wire advancement and balloon systems may be selected.

Primary congenital coronary anomalies are detected in about 0.6-1.3 of adult patients undergoing coronary arteriography (2,4,6,7,8,9). Geographic variations in the frequency of different coronary anomalies are well known (7,17,18,19,20,21).

The aim of this study is to estimate the incidence and type of the primary coronary anomalies detected during routine coronary arteriography of adult, show the gender difference in Iraqi adult patients.

Patient and methods

In this cross-sectional study we reviewed the data of two cardiac catheterization laboratories; The Iraqi Center for Cardiac Diseases and Ibn-Albitar Hospital for Cardiac Surgery from January 2003 to March 2006.

Inclusion criteria: those underwent coronary angiographic study because of anginal symptom or in preparation for surgery

Exclusion criteria: those who have congenital coronary anomalies in the setting of congenital heart diseases or have total occluded coronary arteries.

Results

Patient population

The study included 3000 patients who underwent diagnostic coronary angiography during the study period. The indication was evaluation of coronary artery disease in all patients. Age from 28 to 73 years.

Incidence

Twenty eight cases out of 3000 patients (0.93%) in our angiographic population had congenital coronary anomalies. There were 16 (53.4%) males and 12 (46.6%) females. The mean age was 46 ±8 years. (range from 28-73 years) see table 1. There were 24 (85.7%) patients with anomalies of origin and distribution, while 4 (14.3%) had coronary artery fistulae.

Classification

Figure one shows the different types coronary anomalies in our angiographic populations and their distribution.

1. Anomalous left circumflex coronary artery

Anomalous left circumflex coronary artery was the commonest coronary anomaly and was present in 17 (56.1%) patients with angiographic incidence of 0.53%. It originated from the right sinus in 15 patients (fig. 2) and from the right coronary artery in 4 patients. Its initial course was retro aortic in all cases. Peripheral distribution was normal in all cases. The left anterior descending coronary artery in all of them originated from a separate ostium in the left sinus and had a normal distribution.

2. Absent left main stem coronary artery

Absent left main stem coronary artery was present in 4 patients (14%) with angiographic incidence of (0.0013%). The left anterior descending coronary artery and the left circumflex coronary arteries arose from two separate ostia from the left coronary sinus with a normal peripheral distribution. See fig (3).
3- Anomalous right coronary artery

Anomalous right coronary artery was present in two (7.1%) patients with angiographic incidence of (0.00066%). It originated from the left circumflex coronary artery. The final distribution was normal. The origin and distribution of the left coronary artery was normal in all these cases. (fig 4)

4- Coronary artery fistulae

Coronary artery fistulae were present in four (14%) patients with angiographic incidence of 0.13%. In two of them the fistula was present between the left anterior descending coronary artery and the pulmonary artery (fig. 5) and the remaining was present between the right coronary artery and the pulmonary artery

5- Anomalous origin of the RCA from the pulmonary artery

Anomalous origin of the right coronary artery from the pulmonary artery was present in only one case (0.03%). (fig 6)

Coronary artery disease in anomalous coronaries

The incidence of atherosclerotic coronary artery disease in patients with coronary anomalies was about 30% (eight patients), six of them had the left circumflex originated from the right coronary artery. The lesion involving the native coronary (right coronary artery) in most of them. The remaining patients had absent left main stem and had the lesion limited to the left anterior descending coronary artery.

Discussion

We found an overall incidence of 0.93% among patients undergoing diagnostic coronary arteriography; this is in agreement with 0.6-1.3 % incidence as reported in different studies [2, 4, and 9]. More men than women had anomalous coronaries, possibly because more angiogram were done in male patients. However, it is to be noted that we have not included patient with congenital heart disease and patient with common innocuous variation in the coronary arterial pattern (high or low take off of coronary arteries). these variations have been included in a few studies [8,9], while excluded in others [6,7,22].

The commonest anomaly in our study was anomalous origin of the left circumflex artery 57% (17 patients). Only Topaz et al. [7] have finding in disagreement with our study and depict that anomalous origin of the right coronary artery was the most common cause but he had included also patients with congenital heart diseases. All other reports [6, 22, and 23] had similar finding in placing the anomalous left circumflex as the most common anomaly. The course of left circumflex coronary artery was retro aortic as reported in all other previous studies [6-9, 22, 23].

The second commonest anomaly in our study was coronary artery fistulae 14% (four patients) this was in agreement with Cleveland clinic study [8]. We encountered only four patients with fistulae. There was not a single patient with this anomaly in the Hungarian series of primary congenital anomalies [9]. However Topaz et al. reported an 11% incidence of these anomalies in there studies but associated congenital anomalies were present in 44% of patients [7]. We didn’t encounter any patient with anomalous origin of the left anterior descending coronary artery from the pulmonary trunk as compared with Topaz et al [7], but instead we have one case with abnormal origin of the RCA from the pulmonary artery

A few studies [8,9] which included the absent left main stem coronary artery in there studies have shown a greater incidence of this anomalies as compared with our study this is possibly because of our small sample size.

Involvement of the anomalous coronaries in atherosclerosis is at best controversial, previous studies have reported a greater degree of atherosclerotic involvement of the anomalous left circumflex artery, especially in its proximal segment, and it is suggested to be due to its retroaortic course [27]. But in our study, only about 30% of these patients had evidence of atherosclerosis (significant stenosis involving the proximal right coronary artery) this is in agreement with Topaz et al [7]. Our study was in agreement with others in that there is no predisposition for atherosclerosis of the proximal anomalous coronary artery [7, 27].
Table 1
The major types of congenital anomalies

<table>
<thead>
<tr>
<th>Anomalies of coronary origin and distribution</th>
<th>Number of Patients</th>
<th>Angiographic incidence(%) 3000 cases</th>
<th>Anomaly incidence(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anomalies of coronary origin and distribution</td>
<td>24</td>
<td>0.80</td>
<td>85.72</td>
</tr>
<tr>
<td>Coronary artery fistulae</td>
<td>4</td>
<td>0.0013</td>
<td>14.28</td>
</tr>
<tr>
<td>Total coronary anomalies</td>
<td>28</td>
<td>0.93</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 1
DISTRIBUTION OF THE TYPES OF CONGENITAL ANOMALIES

1=anomalous origin of LCX from RCA
2 = absent LMS
3= anomalous origin of RCA from LCX
4=coronary fistulae
5=anomalous origin of the RCA from the pulmonary trunk

Fig 2
Anomalous origin of the left circumflex artery from the right coronary sinus
Fig 3
Absent left main stem artery

Fig 4
anomalous origin of the RCA from the LCX
Fig 5
Coronary artery fistula

Fig 6
Origin of the right coronary artery from the pulmonary artery
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