Anomalous origin of the right coronary artery with interarterial course: red flag or innocent bystander?

Albuquerque F.¹; De Araujo Goncalves P.²; Marques H.²; Ferreira A.²; Freitas P.²; Lopes P.¹; Goncalves M.¹; Dores H.²; Cardim N.²

¹Hospital Santa Cruz, Carnaxide, Portugal
²Hospital da Luz, Lisboa, Portugal

Funding Acknowledgements: Type of funding sources: None.

Background: Anomalous origin of the right coronary artery (right ACAOS) with interarterial course (IAC) has been associated with increased risk of sudden cardiac death (SCD). Widespread use of coronary computed tomographic angiography (CCTA) has led to increasing recognition of this condition, even among healthy individuals. This study sought to examine the prevalence, anatomical characteristics and outcomes of right ACAOS with IAC in patients undergoing CCTA for all-indications.

Methods: We conducted a retrospective analysis of consecutive patients referred for CCTA at one tertiary hospital between January 2012 and December 2020. Right ACAOS patients with IAC were analyzed for cardiac symptoms (anginal chest pain, syncope, aborted SCD) and long-term outcomes were evaluated for myocardial infarction, ischemic test results, revascularization procedures and all-cause or cardiovascular (CV) mortality. CCTAs were reviewed for proposed high-risk features (ie., take-off angle, length and severity of proximal narrowing, intramural course, interarterial length) and concomitant coronary artery disease (CAD). Association between high-risk features was analyzed. Long-term outcomes were evaluated.

Results: Among 10,928 patients referred for CCTA during the study period, we identified 28 patients (0.3% prevalence) with right ACAOS and IAC. Mean age was 55 ± 17 years, 64% were male and 11 (39.3%) presented cardiac symptoms. During a median follow-up of 44.1 ± 31.8 months, there were no CV deaths and only 1 patient (3.65%) underwent surgical revascularization. Baseline characteristics and CCTA findings are presented in figure 1.

Conclusion: Right ACAOS and IAC is an uncommon finding, with an observed prevalence of 0.3%. CCTA provides excellent anatomical characterization of anomalous vessels, including suggested high-risk features. In a population of asymptomatic patients who survived this condition well into adulthood, the risk of events was very low and medical follow up might be a reasonable option.

Abstract Figure.

Table 1 - Baseline characteristics of the patients with right coronary artery anomalous origin and an interarterial course

| Characteristic                      | All patients (n=28) |
|------------------------------------|--------------------|
| Age, years, mean ± SD              | 55 ± 17            |
| Male, n (%)                        | 18 (64.3)          |
| Hypertension, n (%)                | 18 (65.3)          |
| Hyperlipidemia, n (%)              | 17 (60.7)          |
| Diabetes mellitus, n (%)           | 5 (17.9)           |
| Current or prior smoker, n (%)     | 2 (7.1)            |
| Family history early CAD, n (%)    | 5 (17.9)           |
| Known CAD, n (%)                   | 3 (10.7)           |
| Prior cardiac testing, n (%)       | 1 (3.6)            |
| Invasive angiography               | 1 (3.6)            |
| Myocoronary perfusing imaging      | 2 (7.1)            |
| Exercise treadmill test            | 11 (39.2)          |
| Cardiac MRI (not eval)             | 0 (0.0)            |
| Stress echocardiogram              | 0 (0.0)            |
| Stress MRI                         | 0 (0.0)            |
| Reason for initial eval + CTA      | 13 (46.4)          |
| Asymptomatic                       | 3 (10.7)           |
| Progressive eval                    | 2 (7.1)            |
| Positive non-invasive test         | 12 (42.9)          |
| Cardiovascular symptoms, n (%)     | 11 (39.3)          |

Table 2 - Characteristics of right ACAOS with IAC on CCTA

| Characteristic                   | n (%) |
|----------------------------------|-------|
| Proneal vessel morphology        | 18 (64.3) |
| *Skin-like (50% narrowing)       | 10 (35.7) |
| Length of narrowing, mm          | 18.6 ± 7.0 |
| Intramural course, mm            | 12.4 ± 5.0 |
| *Acute take-off angle < 45°, n (%)| 22 (78.6) |
| Intramural segment, n (%)        | 19 (67.9) |
| *Pericardial fat                  | 9 (32.1) |
| Take-off site above STI, n (%)   | 18 (64.3) |
| Take-off type                     |       |
| Separate ostia                   | 22 (78.6) |
| Shared ostia                     | 5 (17.9) |
| Branch vessel                    | 1 (3.6) |
| Any CAD: > 50% stenosis, n (%)   | 3 (10.7) |

*High risk features according to published literature.
