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Case Report Open Access

Coronary Bronchial Artery Fistula on MDCT

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Abstract

Coronary artery anomalies occur in less than 1% of the general population. Multidetector computed tomography has emerged as the modality of choice in the diagnosis of these anomalies with the advent of multi-detector rows and 3D reconstruction. Delineation of the coronary anatomy and the extra cardiac abnormalities helps in institution of appropriate therapy. We report a case of coronary artery anomaly of termination which is an extra cardiac termination into bronchial arteries in which the conservative management of fistulae was instituted due to multiplicity of the fistulae.

Keywords: Coronary artery anomaly; Termination anomaly; Coronary bronchial fistula

Introduction

Coronary artery anomalies [CCA] are congenital abnormalities which are rarely encountered in the healthy individuals incidentally in about 0.3-1% [1]. These are classified as anomalies of origin, course and termination. Anomalies of origin are a high take off, multiple ostia, single coronary artery and origin of coronary artery from the non-coronary sinus. Myocardial bridging, duplication of the arteries are the anomalies of the course. Coronary artery fistula, coronary arcade and extra cardiac termination are classified as anomalies of the termination [2]. Coronary artery anomalies may also be classified as hemodynamicaly either significant or insignificant. Anomalous origin of coronary artery from pulmonary artery, anomalous origin of the coronary artery from the non-coronary sinus with an inter-arterial course, deep myocardial bridging and coronary artery fistula are the hemodynamicaly significant anomalies [1].

Coronary artery fistula is a type of termination anomaly in which one or more coronary arteries will terminate into a cardiac chamber, artery or vein with connection bypassing the myocardial capillary bed. The over-all incidence is about 0.05% to 0.25% based on catheter angiography [3]. In this article, we report a case of coronary bronchial fistula in which branches of the right coronary artery and left circumflex artery have a fistulous communication with bronchial arteries with no underlying pulmonary pathology, hitherto not documented in the literature. Coronary bronchial fistula is one of the rarest coronary anomalies of termination detected in about 0.18% of patients undergoing coronary angiography [4].

Multidetector computed tomography [MDCT] is considered to be the modality of choice for the delineation of the coronary anomalies although echocardiography, catheter angiography and magnetic resonance imaging have been used to evaluate the coronary artery anomalies. MDCT helps in accurate delineation of coronary artery origin, course and termination; thus helps in therapeutic decision making and appropriate institution of the treatment [3].

Case Report

A 55 year old hypertensive male patient presented with chest pain with symptoms suggestive of atypical angina and giddiness to our hospital. He had an episode of haemoptysis 10 years ago; however no major haemoptysis was present at the presenting time. Patient was subjected to Transthoracic Echocardiography on Philips iE33 X matrix machine which was found to be normal. Patient did not consent for a stress test. Hence, Digital Catheter Angiography was performed on Philips Allura Xper FD20 machine to rule out obstructive coronary artery disease. Coronary arteries were normal; however fistulous communication was noted between the atrialbranch of left circumflex artery and left bronchial artery (Figure 1a-1c). Another fistulous communication between the conus and posterior lateral ventricular branches of the right coronary artery with the hypertrophied right bronchial arteries was also visualised (Figure 1d-1f).

To delineate the coronary and fistulous communications completely and to rule out possible lung pathology, Coronary CT

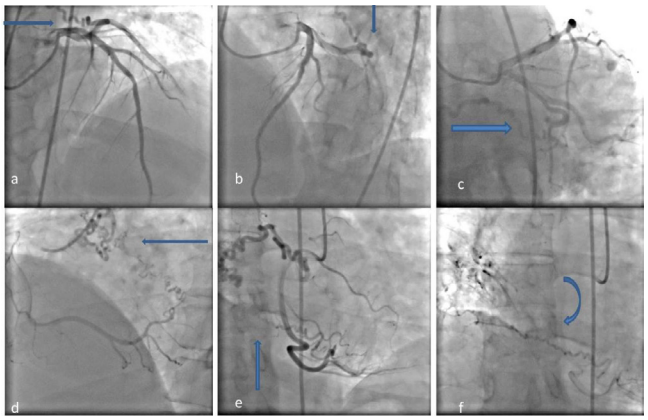

Figure 1: Digital catheter angiography – Cannulation of the left main coronary artery reveals normal LMA, LAD and LCX, tortuous vessel from atrial branch of the left circumflex artery (arrow –a, b, c). Cannulation of the right coronary artery reveals multiple tortuous vessels from the conus and posterior lateral ventricular branches extending to right hilar branches (arrow –d, e, f).

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angiography was performed on Philips, Ingenuity Low dose 128 slice CT scanner. 80ml of 350mg I/ml non-ionic contrast injected through a Dual head Medrad pressure injector at a flow rate of 5.5ml/sec, using 120 kV, 476mAs, 0.8mm slice thickness, pitch 0.2, rotation time 0.4 milliseconds with ECG synchronization and retrospective gating with a large field of view and increased cranio-caudal coverage. Presence of Chronic lung disease and thoracic mass was ruled out and complete delineation of the fistulae was established. Coronary arteries were normal. Vascular communications were also seen between the right bronchial arteries and the right internal mammary artery (Figures 2a, 2b and 3a). There were two right bronchial arteries arising from the aorta at the level of D5-D6 vertebral level measuring 6mm and 4mm respectively (Figure 3b). The left bronchial artery though normal in calibre, had fistulous communication with the atrial branch of the left circumflex artery (Figure 2c). The right internal mammary arteries and intercostal arteries were hypertrophied in their proximal aspects (Figure 2d and 2e). A left bronchial artery was seen arising from the aorta [1.5 mm] at the D5 vertebral level. The right bronchial arteries were seen to course along the retro-esophageal, peri-esophageal, retro-tracheal, right para-tracheal and pre-tracheal region and had fistulous communications with the branches from the right coronary artery. Multiple ectopic bronchial arteries [<2 mm] were seen arising from the arch and descending thoracic aorta (Figure 3c) and coursing along the oesophagus. The coronary bronchial communications are

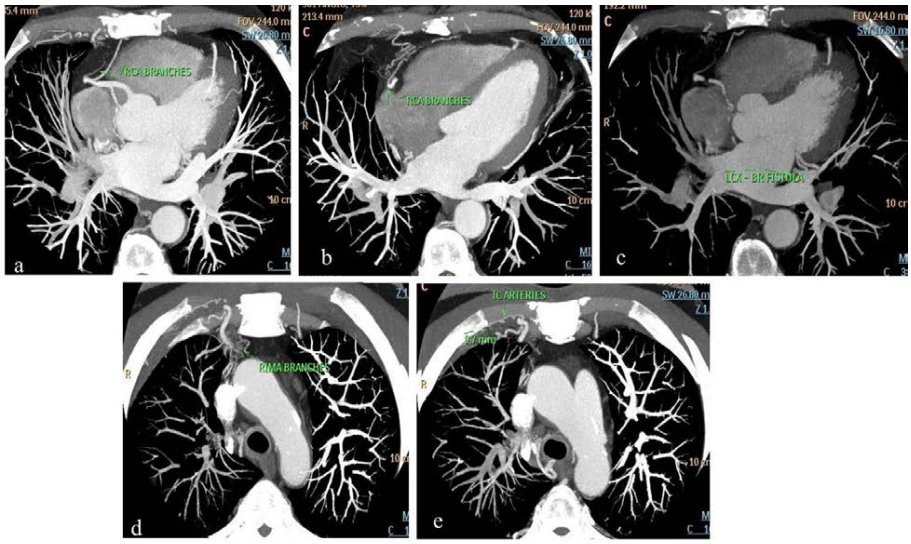

Figure 2: Coronary CT angiography thick slab maximum intensity axial images showing fistulae arising from the right coronary artery (arrow –a, b) fistulous tracts between the atrial branch of the left circumflex artery and the bronchial artery (c). Multiple tortuous fistulous vascular channels arising from the Right internal mammary artery and hypertrophied intercostal arteries and thickened pleura are seen (arrow- d, e).

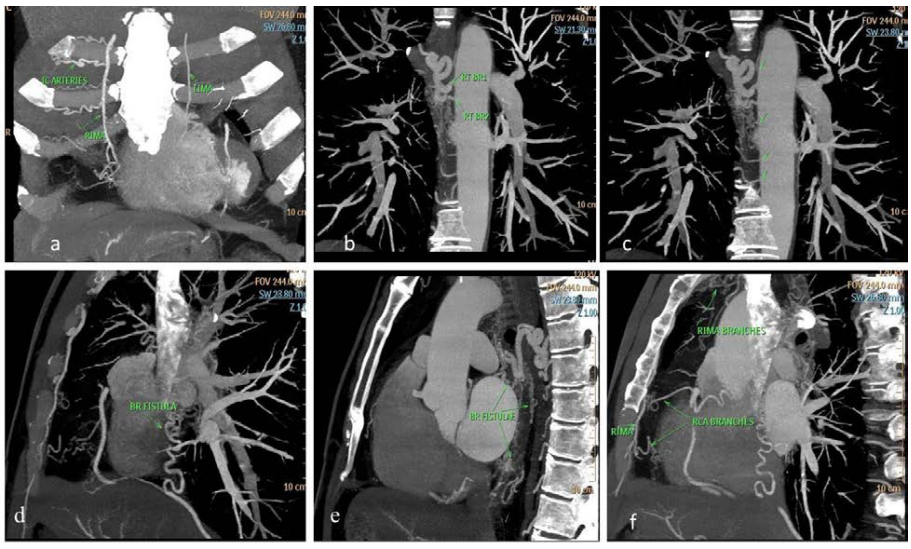

Figure 3: Coronary CT angiography thick slab maximum intensity coronal images showing branches of the right internal mammary artery (arrow-a) and origin of orthotopic right bronchial arteries (arrow-b) multiple smaller branches arising from the descending thoracic aorta suggestive of ectopic bronchial arteries (arrow-c). Sagittal images show multiple tortuous vascular channels suggestive of coronary bronchial fistulae (arrow-d, e) and multiple branches arising from the right coronary artery and right internal mammary artery (arrow-f).

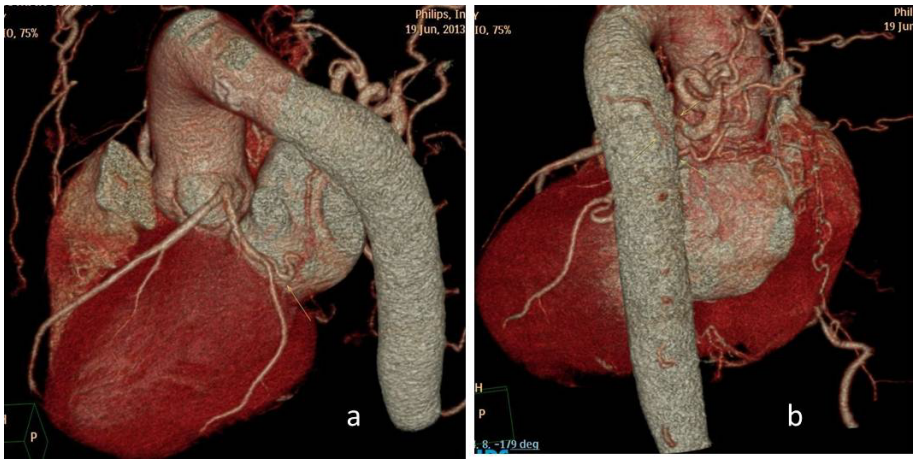

Figure 4: Coronary CT angiography - Volume Rendered images showing fistulous tract between the atrial branch of the left circumflex artery and the hypertrophied bronchial artery (arrow-a) and origin of the orthotopic bronchial arteries from the descending thoracic aorta, the right bronchial arteries are hypertrophied and left bronchial artery is normal in caliber (arrow-b).

well depicted in the sagittal images (Figure 3d-3f). Volume rendered images help in better depiction the fistulae and their complexity (Figures 4a and 4b). Conservative management was adopted in view of multiplicity of the fistulae and possible compromise of the coronary blood flow if interventional treatment were to be instituted. The patient is asymptomatic for haemoptysis since 6months from the initial presentation and is on follow up.

Discussion

By definition, congenital coronary artery anomaly is an unusual morphologic feature seen in less than 1% of an unselected population as proposed by Angelini and colleagues [5,6]. It is reported that with conventional catheter angiography, these anomalies are accurately identified in only 53% [1]. They are hemodynamicaly significant with possible complications like steal from the adjacent myocardium, thrombosis, embolism, endocarditis, endarteritis, arrhythmias, cardiac failure and atrial fibrillation [7].

Coronary artery fistulae are mostly asymptomatic and occur in isolation. The symptoms depend on the size of the fistula and on the left to right shunting [8]. In extra cardiac termination anomalies communication exists between coronary artery and extra cardiac vessels like bronchial, internal mammary, intercostal, and esophageal branch of the aorta.

A coronary-bronchial fistula [CBF] is a rare congenital termination anomaly with an incidence as low as 0.08% to 0.61% [8]. These fistulae are associated with lung pathology like bronchiectasis or lung mass. In our case there was no such pathology could be localized and the patient was asymptomatic till 55 years. Although the right and left bronchial arteries originate directly from the ventral aspect of the descending thoracic aorta, most commonly only the paired left bronchial arteries do so, the right arising indirectly as branches of a right posterior intercostalartery (usually the 3rd) [9]. Cauldwell have described four classical types of the branching pattern of the bronchial arteries- Type 1- Two on the left and one on the right that presents as an intercostobronchial trunk (ICBT) (40% of cases); Type 2-one on the left and one ICBT on the right (21% of cases); Type 3-two on the left and two on the right (one ICBT and one bronchial artery) (20% of cases) [10]. There will be one bronchial artery on left and two on the right side (one ICBT and one bronchial artery) in type 4 (9% of cases). Our case describes a rarest type of bronchial anatomical branching pattern with a coronary bronchial fistula on right side with hypertrophied bronchial arteries and a fistulous tract with a normal orthotopic left bronchial artery.

Catheter-angiography is invasive and overlapping between a tortuous fistula and adjacent cardiovascular structures may hinder complete evaluation of these anomalies. With the advent of Coronary CT angiography, a relatively non-invasive technique, because of its high contrast and spatial resolution has made the complete delineation of the coronary arteries and bronchial arteries possible. Two-dimensional and colour Doppler echocardiography may help in demonstrating dilation of the affected coronary artery and on colour flow mapping may show the site of drainage, however; the detailed anatomy of the fistulae is not defined well on these modalities. Magnetic resonance imaging may also help in confirming the diagnosis, as the proximal coronary arteries or even the whole length of the fistula vessel may be seen [11].

Embolization can be safely done only after the anatomical relationships between the fistula and the surrounding structures are delineated completely which is possible with Coronary CT angiography. Closure of coronary-bronchial artery fistula is mainly indicated for patients with heart failure, myocardial ischemia, or high-flow shunting. Trans-catheter closure of these fistulae is now considered to be an effective and safe alternative to the surgery [12]. However; in our case, a conservative management was instituted as patient was asymptomatic and to avoid untoward compromise of the coronary blood flow as the fistulous tracts were present between the major coronary arteries and bronchial arteries.

Conclusion

Coronary artery anomalies remain asymptomatic and may be associated with devastating complications like myocardial ischemia and sudden death. Coronary arterial fistulae and extra cardiac termination are rare diverse group of termination anomalies with varied clinical importance. It is important to delineate and diagnose them; as it will lead to appropriate interventional or surgical therapy. Multidetector computed tomography is now considered to be the modality of choice to evaluate such complex coronary anatomy and their anomalies.

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