CASE REPORT

A challenging case due to uncommon aberrancies

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SUMMARY

A 71-year-old man was referred to a rapid access chest pain clinic by his general practitioner. He presented with a 6-month history of twice weekly central chest pain lasting 2–3 min with walking and exertion, relieved with rest or co-codamol tablets. After initial investigations and a positive myoview scan, he was listed for an elective coronary angiogram. Unfortunately, the procedure was abandoned due to unclear course of the guide wire and a possible aberrant aortic course. Further non-invasive tests were arranged to clarify the anatomy of the vessels. After getting a clear idea of the aberrancies, coronary angiogram was replanned, and the patient underwent successful angiography with angioplasty to one of the coronary arteries, without any complications.

BACKGROUND

Coronary angiograms can be a real challenge due to the anomalous and aberrant course of the vessels. Prior knowledge of the normal vascular anatomy and its aberrancies is mandatory when dealing with any complications, including an unusual course of guidewires and catheters. An interventionist should expect variations at the access site, through the course of the vessel and/or at the origin of the coronary arteries.

We discuss the aberrancies in the course of the aorta and the origin of its main branches. In this case, an initial attempt to get the diagnostic angiogram via standard right femoral access was unsuccessful due to the extremely rare and unusual course of the aorta. The procedure was abandoned and CT angiogram performed to delineate the anomalies and clarify the course of the aorta; this proved very beneficial in planning the subsequent successful coronary angiogram.

CASE PRESENTATION

A 71-year-old man was referred to a rapid access chest pain clinic by his general practitioner. He presented with a 6-month history of twice weekly central chest pain lasting 2–3 min with walking and exertion, relieved with rest or co-codamol tablets. Medical history included hypothyroidism, hypertension and diet controlled type 2 diabetes mellitus. He had a family history of ischaemic heart disease; his father had died of myocardial infarction at the age of 69 years. He was an ex-smoker with a 20–30 pack year history; he consumed 35 units of alcohol per week. Medications included aspirin 75 mg once daily (OD), levothyroxine 150 µg, ramipril 10 mg OD, bendroflumethiazide 2.5 mg OD, Calcichew D3 forte and rabeprazole 10 mg OD. He was intolerant to statins and ezetimibe.

On examination, the patient weighed 105.2 kg, had a body mass index of 33, blood pressure of 139/84 mm Hg and his heart rate was 101 bpm. Cardiovascular and chest examinations were unremarkable.

ECG showed first degree heart block, with PR interval of 212 ms. Exercise tolerance test was performed using Bruce Protocol. The patient exercised for 5 min and 59 s, reaching a heart rate of 136 bpm (88% of the target heart rate); his blood pressure rose to 146/88 mm Hg with Duke score –19. The exercise test was terminated because of difficulty in breathing. Twenty-four hour tape showed sinus rhythm throughout with borderline first degree heart block.

INVESTIGATIONS

Myoview scan showed normal left ventricular ejection fraction of 55% with normal wall motion. There was a fixed inferior defect, probably related to an artefact. However, there was also some evidence of reversibility involving the apical and septal regions, consistent with a degree of myocardial ischaemia.

Angiography was attempted via the right femoral artery. On advancement, the guide wire passed very much to the right side of the heart, and it was thought that there was a large thoracic aneurysm. On handheld injection, it appeared that the aorta crossed from left to right in front of the heart and then back to the midline. The procedure was discontinued as the coronary catheters would not properly reach their destination.

To clarify the anatomy and course of the aorta, a CT angiogram of the aorta was performed, which showed a right-sided aortic arch (figure 1A) with the innominate and left common carotid arising to the right of the trachea, but the left subclavian vessel arising to the left as the arch/descending aorta come across to the left; further down the aorta it again kinked to the right before passing through the diaphragm at a normal position (figure 1B). The remainder of the great vessel anatomy looked unremarkable.

Figure 1 (A) Right-sided aortic arch (red arrow) in relation to the trachea (brown arrow). (B) Descending thoracic aorta (red arrow) loops to the right before crossing the diaphragm.

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Figure 2 (A) Aortogram showing right-sided ascending aorta and aortic arch (black arrow) with innominate artery (brown arrow) arising to the right of the trachea (green arrow). (B) Low origin of the left subclavian artery (white arrow) to the left of the trachea (green arrow).

Coronary angiogram was then reattempted through the right radial artery. An aortogram confirmed the right-sided aortic arch and clear origin of the brachiocephalic (innominate) artery from the right-sided aortic arch and to the right of the trachea (figure 2A). The left subclavian artery was shown to originate quite lower down from its normal level of origin, from the lower arch/descending aorta as it crossed to the left (figure 2A, B).

TREATMENT

The patient underwent successful angioplasty to the left anterior descending artery.

OUTCOME AND FOLLOW-UP

The patient was discharged without any complications.

DISCUSSION

A right-sided aortic arch with an aberrant left subclavian artery is a rare congenital anomaly reported to occur in 0.05% of the population.¹ Previous cases of a right-sided aortic arch with an aberrant left subclavian artery have been reported,² but we report a rare case of right-sided aortic arch with the innominate (brachiocephalic) and left common carotid artery arising to the right of the trachea, while the left subclavian artery arises to the left of the trachea and, further down the thoracic descending aorta, again kinks to the right before traversing the aortic diaphragmatic orifice.

The embryological explanation of these aortic arch anomalies is most likely that they are due to unilateral disappearance of the fourth and, exceptionally, the third branchial arches.³

The majority of cases of a right-sided aortic arch are asymptomatic, and the diagnosis is usually made incidentally during investigations for other reasons.¹ In some cases, they are associated with increased risk of neurological events,⁴ or aneurysms.¹

It is of utmost importance for clinicians to be aware of aortic arch anomalies, and vascular and cardiothoracic surgeons should consider anatomic factors when selecting endovascular treatment, stenting or repair of aneurysms in right-sided aortic lesions with right innominate and carotid artery to the right of the trachea. Also, as in our case, awareness of these anomalies is imperative to help the interventionist in selecting coronary catheters and planning the route of access for coronary angiograms/angioplasties.

Learning points

- ▶ Vascular complications can be avoided through knowledge and anticipation of vessel anomalies.
- ▶ Non-invasive imaging should be arranged for clarifying anomalies and planning subsequent invasive procedures.
- ▶ In patients with acute myocardial infarction and aortic aberrancies, where an angioplasty is urgently indicated, an aortogram is a helpful guide to delineate the aorta and its main branches.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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