**CASE REPORT**

Anomalous origin of the circumflex artery and patent foramen ovale: a rare cause of myocardial ischaemia after percutaneous closure of the defect

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A 35 year old man with a history of transient ischaemic attack and atrial septal aneurysm underwent percutaneous closure of a patent foramen ovale (PFO) with a transcatheter device. After the procedure the patient developed effort angina not present previously. Transoesophageal echocardiography confirmed the absence of residual shunt but showed an abnormal linear image running behind the aortic root. Magnetic resonance imaging detected an anomalous origin of the circumflex coronary artery from the right coronary sinus. The anomalous artery was located between the aortic root and the PFO closing device, causing coronary insufficiency. This report describes a rare complication of transcatheter PFO closure.

Coronary anomalies are a relatively rare condition that may be encountered in about 1% of the general population. Sudden death, the most threatening manifestation of coronary anomalies, can be encountered in a small proportion of young, otherwise normal people but the incidence increases greatly in competitive athletes. The clinical consequences of the coronary anomalies vary depending on the type of abnormality present. Anomalous origin of a coronary artery from the opposite sinus of Valsalva is reported on the type of abnormality present. Anomalous origin of the left circumflex artery and patent foramen ovale (PFO) is a potentially important cause of systemic embolism. This procedure has been reported to have a short term complication rate of about 10% of cases. These include embolisation of the device and air embolism during the procedure. Less frequent complications are infection, pericardial effusion, and thrombus formation. This case shows that the occluder may compress an anomalous coronary artery and cause myocardial ischaemia. This patient had a very low probability of coronary artery disease and therefore coronary angiography was not performed before the procedure. It should be stressed, however, that even conventional coronary angiography may not be the best method to detect and evaluate coronary anomalies.

**DISCUSSION**

We report a rare, previously unreported complication of PFO closure and cause of myocardial ischaemia. This case also describes a rare cause of myocardial ischaemia in a patient with an anomalous origin of a coronary artery.

Transcatheter percutaneous closure of PFO is an increasingly common procedure performed in industrialised countries to correct a potentially important cause of systemic embolism. This procedure has been reported to have a short term complication rate of about 10% of cases. These include embolisation of the device and air embolism during the procedure. Less frequent complications are infection, pericardial effusion, and thrombus formation. This case shows that the occluder may compress an anomalous coronary artery and cause myocardial ischaemia. This patient had a very low probability of coronary artery disease and therefore coronary angiography was not performed before the procedure. It should be stressed, however, that even conventional coronary angiography may not be the best method to detect and evaluate coronary anomalies.

While myocardial ischaemia can be observed almost invariably when the left main coronary artery originates from the right sinus of Valsalva, it appears as a less common complication when other arteries have an anomalous origin. An abnormal origin of the circumflex artery does not usually lead to any serious complications. However, in this case, after the placement of the percutaneous device, we found evidence for effort induced myocardial ischaemia. The most likely mechanism appears to be compression of the anomalous artery between the PFO occluder on one side and the aortic root on the other. Myocardial ischaemia was not present before the transcatheter procedure, thus eliminating the possibility of a previously undetected cause of ischaemia in this patient.

This case report highlights a possible complication not previously described of percutaneous PFO closure that should nevertheless be kept in mind because of the severe consequences it may have when it is not suspected. An abnormal
course of a coronary artery should be ruled out before placement of a device for percutaneous closure of interatrial septal defects.

Figure 1  Four levels of a three dimensional coronary magnetic resonance image are shown from the lowest level (upper left) to the highest (lower right). White arrows indicate the artefact cause by the patent foramen ovale occluder.

Figure 2  Magnetic resonance imaging. Turbo field echo, free breathing, three dimensional sequence on the short axis plane of the heart and positioned through the origin of the coronary arterial vessels. The black arrows highlight the anomalous course of the circumflex artery originating from the right coronary sinus. The anomalous vessel runs behind the aortic root and finally reaches its normal position in the left atrioventricular groove. Note also the normal site of origin of the right coronary artery.

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REFERENCES