Aortic perforation as a complication of percutaneous coronary angiography

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Summary Aortic perforation during coronary angiography is a rare but potentially lethal complication. We present the case of a 75-year-old man who sustained an aortic perforation at the sinus of Valsava during coronary angiography being carried out in preparation for percutaneous coronary intervention (PCI). This clinical emergency was initially managed by pericardiocentesis with a pigtail catheter, despite subtle evidence shown by the image of coronary perforation or aortic perforation. Emergency pericardiotomy was performed and active bleeding was found from the sinus of Valsava. We successfully repaired the perforation using a direct tensionless suture. This case suggests that aortic perforation can be missed if there is only a subtle contrast jet in the angiography, and emergency surgical intervention will then become mandatory.

1. Introduction

Procedure-induced coronary dissection or perforation is a rare but well-known complication, and the incidence varies between 0% and 0.15%. A search of the PubMed, MEDLINE, and Muse databases found no previous reports of aortic perforation as a complication of percutaneous coronary angiography. It is difficult to detect aortic perforation if the angiogram shows no obvious leakage of contrast medium. However, an "unreasonable" massive pericardial effusion sufficient to cause cardiac tamponade following percutaneous coronary angiography may be an important clue. We report here a patient who sustained aortic perforation during percutaneous coronary angiography in preparation for PCI, and whose life was saved by emergency surgical intervention.

2. Case report

A 75-year-old man with coronary artery disease (CAD) and status/post (s/p) stenting of the right coronary artery (RCA) 7 years previously, complained of chest tightness on effort for some months. He was admitted to our hospital with
a provisional diagnosis of unstable angina. Coronary angiography revealed near-total occlusion in the mid-distal left anterior descending (LAD) artery. The patient refused surgical intervention, so percutaneous coronary intervention (PCI) was performed via the right radial artery to treat the LAD lesion. We used a 6Fr Amplatz left 2 (AL2) short-tip guiding catheter and coronary angioplasty guide wire (Runthrough NS, Terumo, Tokyo, Japan). During the catheterization, the patient’s blood pressure suddenly dropped to 60/30 mmHg. Emergency advanced cardiac life support (ACLS) by fluid challenge, using inotropic agents and intubation, was undertaken, and as a result blood pressure returned to the normal range. The angiogram showed no evidence of contrast leakage but the contractility of the heart was poor. A transthoracic cardiac echocardiogram revealed massive pericardial effusion and cardiac tamponade. We initially carried out pericardiocentesis with a pigtail catheter under echocardiographic guidance; this was followed by emergency surgical intervention. During surgical pericardiotomy, we found that blood was spurting from a 0.1 cm perforation, at the sinus of Valsava adjacent to the left coronary artery orifice (Fig. 1). We performed direct suture repair with a Teflon pledget and off-pump coronary artery bypass graft (CABG) from the aorta to the left anterior descending artery, and diagonal branch by a sequential method using a saphenous vein graft. After the operation was uneventful, and the patient was discharged after extubation and to date has remained free of symptoms (Fig. 2).

3. Discussion

Aortocoronary dissection or perforation is an extremely rare complication of coronary angiography or intervention. To our knowledge, no report of aortic perforation complicating coronary angiography has been published in English.

Recognized risk factors for coronary perforation include: (1) old age; (2) female sex; (3) vessels with a complex coronary abnormality [such as severe calcification, tortuosity of the vessel, extreme angulation, bifurcation, chronic total occlusion, ostial lesion, American College of Cardiology/American Heart Association (ACC/AHA) type B or C lesion]; (3) prior coronary artery bypass grafting (CABG);

Figure 1 A 0.1 x 0.1 cm perforation of the aorta (black arrow) at the sinus of Valsava status/post suture repair with a Teflon pledget.

(4) high balloon-stent ratio, high inflation pressure and distal location of the guide wire; (5) use of devices like hydrophilic-coated wire, stiff wire.1,2 However, the exact mechanisms or risk factors predisposing to aortic perforation during coronary angiography or intervention remain to be established.

Our patient had two risk factors for perforation, namely old age and severe calcification. The possibility of damaging the aortic wall could not be completely ruled out, although a soft-tip guiding catheter and wire were used. The relationship between the guiding catheter and incidence of aortocoronary perforation is controversial; some authors mentioned such catheters as the internal mammary artery (IMA) catheter, and multipurpose catheter, and pointed out that an Amplatz catheter might cause dissections during catheter manipulation,3,4 whereas some reports demonstrated that JR catheters were more frequently implicated in dissection.3 Furthermore, it has been reported that with the use of hydrophilic-coated guidewires, perforations occurred in 50% of patients, whereas the perforation rate with the use of intermediate and standard guidewires, floppy-tip guidewires and RotaWire floppy guide wires was 14%, 29% and 7%, respectively.2

There are no evidence-based guidelines to assist the operator in treating catheter-induced aortocoronary dissection or perforation. Several factors influence the selection of treatment strategies, and the options include conservative management, stenting, and surgical intervention. Dunning et al5 mentioned that surgery should be performed promptly in conditions such as extension of aortic dissection beyond 40 mm from the coronary cusp, dissection-related acute myocardial infarction, acute aortic regurgitation, or cardiac tamponade. Few aortocoronary dissections would seal off spontaneously.

4. Conclusion

Aortic perforation or dissection during PCI is a rare but life-threatening complication. Careful selection and manipulation of catheters and the utmost attention to high-risk patients are important to avoid such a complication. Aortic perforation could be missed if the angiography shows no obvious contrast leakage. Therefore the cardiologist should
always keep in mind the possibility of this complication while performing coronary angiography or intervention. If “unreasonable” massive pericardial effusion occurs, surgical intervention should be immediately undertaken.

References


