

Case report

Iatrogenic aortic dissection during coronary intervention

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Iatrogenic acute dissection of the ascending aorta following coronary angiography and percutaneous intervention is rare. Localized aortic dissections have been treated by sealing the entry with a coronary stent. Extensive dissections may require a surgical intervention.

We describe a coronary dissection with retrograde extension to the ascending aorta that occurred during angioplasty of the right coronary artery. The extensive dissection, which was limited to the ascending aorta, was successfully treated by stenting of the right coronary artery and monitoring the aortic dissection by means of transesophageal echocardiography.

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Introduction

Acute dissection of the ascending aorta during coronary angiography and percutaneous coronary intervention is a rare event¹⁻³. Frequently, these iatrogenic aortic dissections are a retrograde extension of the coronary dissection. Recently, a new classification including three classes was proposed to better identify the treatment and prognosis of this complication¹. Iatrogenic aortic dissections that are localized a few centimeters beyond the aortic valve may be treated by sealing the entry point by means of coronary stenting⁴⁻⁶.

Although relatively rare, an extensive dissection involving the ascending aorta with progression to the descending aorta may be life-threatening and requires urgent surgical intervention.

This report refers to a patient who experienced a catheter-induced dissection of the right coronary artery (RCA) with retrograde extension to the ascending aorta during a coronary interventional procedure. The patient was successfully managed by stenting the ostium of the RCA and monitoring the aortic dissection by means of transesophageal echocardiography.

Case report

A 48-year-old woman with hypercholesterolemia and systemic hypertension underwent elective coronary angiography because

of effort angina. A severe lesion was revealed in the proximal RCA (Fig. 1) and, having administered heparin (10 000 IU i.v.), a coronary balloon angioplasty was attempted.

Using a 6F guiding catheter (Right Judkins 4, Cordis, Johnson & Johnson, Miami, FL, USA), the ostium of the RCA was easily cannulated. Before attempting to pass the wire, contrast medium was manually injected. This revealed a dissection of the proximal RCA and contrast staining into the aortic root with progression to the aortic wall on the right sinus of Valsalva. The patient experienced severe chest pain followed by ST-segment elevation in the infe-

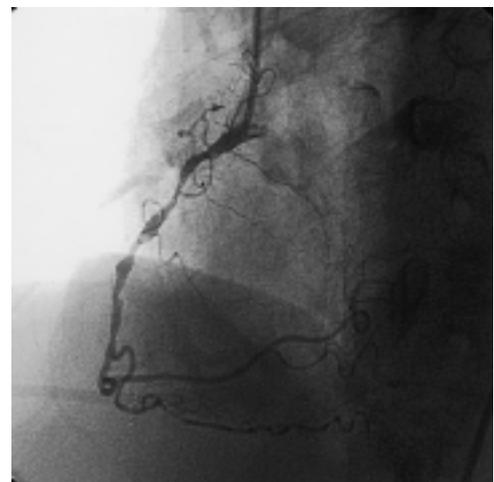


Figure 1. Left anterior oblique view showing severe disease of the right coronary artery in the proximal and mid segments.

rior leads. Hemodynamic conditions were stable. A soft-tip guidewire (ACS HI-Torque Floppy II 0.014", Guidant, Indianapolis, IN, USA) was advanced into the RCA and a 3.0 mm diameter, 28 mm long Cordis Bx Velocity stent was implanted without predilation, starting at the ostium. A second Cordis Bx Velocity stent (3.0 mm diameter, 13 mm long) was implanted in the mid segment of the RCA, distally to the first stent (Fig. 2).

After stenting, protamin, a heparin antagonist, was administered (50 mg i.v.).

Persisting the contrast medium staining of the aortic wall, an aortic root angiography was performed (Fig. 3). Because, after stent implantation, the patient became asymptomatic and since the iatrogenic aortic dissection was stable, apparently with no progression, conservative management was decided. Transesophageal echocardiography revealed an intimal flap extending from the ostium of the RCA to the anterior wall of the ascending aorta without involvement of the ostium of this vessel (Fig. 4). Twenty-four hours later, a second transesophageal echocardiography was performed. The

exam revealed the resolution of the dissection with localized thickening of the aortic wall (Fig. 5).

Serial blood sampling did not reveal any increase in the serum levels of creatine kinase (CK) and CK-MB.

The patient was discharged 3 days later, after a second control transesophageal echocardiogram that confirmed the resolution of the dissection. The antiplatelet therapy was never suspended and, at discharge, ticlopidine (250 mg bid) for 4 weeks and aspirin (325 mg daily) were prescribed.

At 6 months of follow-up, the patient was asymptomatic and a transesophageal echocardiography did not reveal evidence of aortic dissection.

Discussion

Acute catheter-induced aortic dissection during coronary angiography and percutaneous coronary intervention is a rare event. Among 21 000 coronary angioplasty procedures performed by five experienced in-

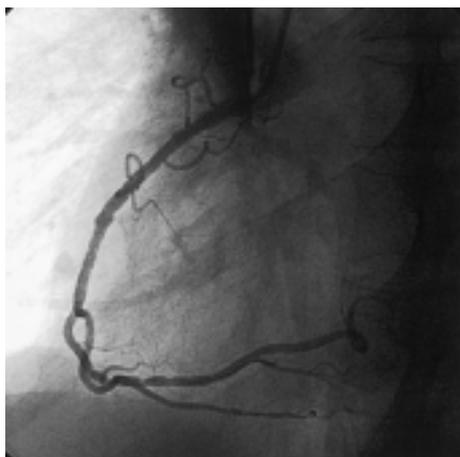


Figure 2. Final result of stenting of the right coronary artery. The stented segment extends from the ostium to the middle segment of the vessel.

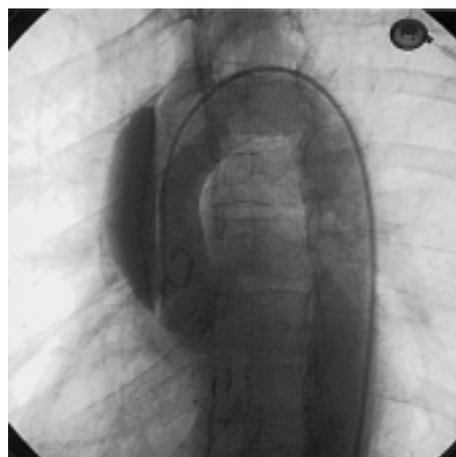


Figure 3. Angiogram of the ascending aorta in the left anterior oblique view following stent implantation of the right coronary artery.

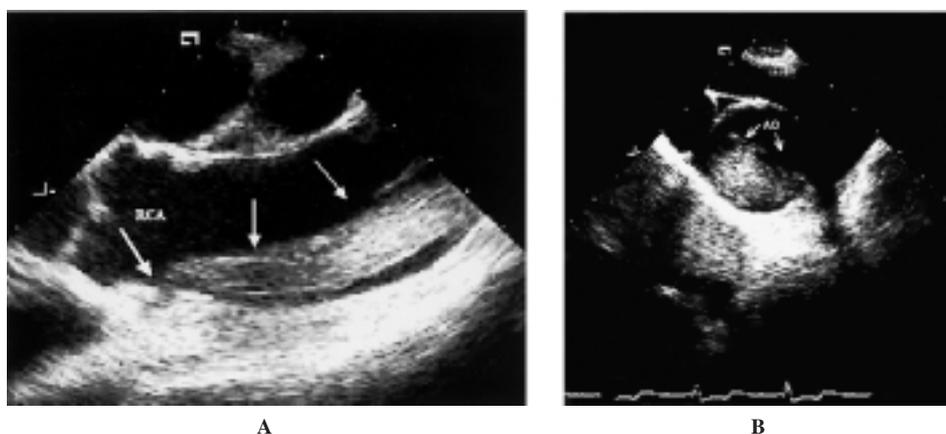


Figure 4. Transesophageal echocardiographic study following the coronary intervention procedure. A: long axis of the ascending aorta (AO); B: short axis of the ascending AO. An echogenic image on the anterior wall starting from the ostium of the right coronary artery (RCA) may be clearly seen.

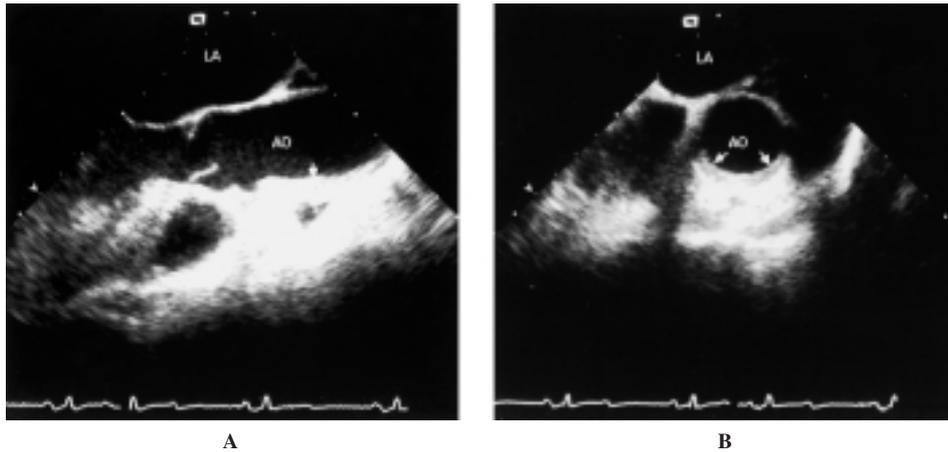


Figure 5. Transesophageal echocardiographic study 24 hours following the coronary intervention procedure. A: long axis of the ascending aorta (AO); B: short axis of the ascending AO. LA = left atrium.

terventional cardiologists, 4 cases of acute aortic dissections occurred giving an incidence of 0.02%². A similar incidence was reported in a study including 43 143 cardiac catheterizations and coronary interventions performed at a tertiary cardiac referral center¹.

In many cases, the origin of the dissection of the ascending aorta is localized at the ostium or in the proximal segment of the coronary artery where a dissection occurs following a trauma caused by the tip of the guiding catheter or because of balloon dilation. A vigorous manual injection of contrast material can play a role in extending the dissection to the aortic root.

Predisposing conditions to aortic dissection include hypertension, older age, diabetes and a history of atherosclerosis or previous coronary bypass surgery^{1,3}.

The role of medial cystic necrosis is controversial. Pande et al.⁷ reported a case of iatrogenic aortic dissection during coronary angioplasty in a patient with cystic medial necrosis. However, in other cases there are non-specific degrees of degeneration that do not justify any particular weakness of the media.

Many of the cases described in the literature involve the RCA, but reports of cases with involvement of the left main coronary artery are increasing. In recent years, several reports showed that an iatrogenic aortic dissection complicating coronary procedures does not always require surgery. To close the entry of an iatrogenic aortic dissection, frequently represented by a coronary dissection, coronary stent implantation can be a valid therapeutic option^{4,6}. The evolution of the iatrogenic aortic dissection can be monitored by means of transesophageal echocardiography. The role of transesophageal echocardiography in the diagnosis and evolution of an aortic trauma is well known⁸.

In many cases, this conservative management, defined as the “watchful waiting” strategy, showed a favorable evolution and constituted the definitive therapy. Alternatively, the progression of the aortic dissection will require aortic surgery.

In association with sealing the entrance by means of coronary stenting, an aggressive medical treatment is necessary to avoid the progression of the aortic dissection and to increase the probability of success of the conservative strategy. The two goals of medical therapy (i.e. the reduction in systolic blood pressure and in the force of the left ventricular ejection) have been well established. An additional problem in this iatrogenic complication is the management of the anticoagulant and antiplatelet therapy.

The early administration of heparin antagonists to restore a normal blood coagulation contributes to avoid the additional complications of aortic dissection and to facilitate the aortic repair. Regardless of the evolution of the aortic dissection during the early hours of post-procedural monitoring, the antiplatelet therapy should not be suspended, owing to the risk of thrombotic closure of the coronary stent.

To identify the subsets of patients with various degrees of severity and to guide the choice for the best therapeutic strategy, a classification of iatrogenic dissection of the ascending aorta was proposed. This classification is based on the extent of dissection to the aortic root¹.

A focal dissection limited to the coronary cup (class 1) and a dissection extending to the ascending aorta but < 40 mm in length (class 2) may be successfully repaired by means of stenting of the coronary dissection and these two classes have a good prognosis.

The treatment of an iatrogenic dissection of the ascending aorta > 40 mm in length (class 3) is still controversial. According to the International Registry of Aortic Dissection³, a type A iatrogenic dissection has a high mortality (32%) that is similar to that of spontaneous aortic dissection (35%). However, in the analyzed population only 27% of type A iatrogenic dissection occurred during coronary angiography or intervention. Previous reports suggested surgical intervention for the treatment of an iatrogenic dissection extending to the ascending aorta. In Dunning’s report¹, the 2 pa-

tients with a class 3 dissection who were submitted to surgery died before discharge. Both of these patients underwent coronary angiography because of acute myocardial infarction.

Ochi et al.⁹ described a case of an iatrogenic dissection extending to the entire ascending aorta. The patient underwent surgery to reconstruct the ascending aorta with a 30 mm Dacron prosthetic graft. Surgery did not reveal an intimal tear in the lumen of the ascending aorta or around the ostium of the left coronary artery.

In our case, an extensive iatrogenic dissection, > 40 mm in length but limited to the ascending aorta, has been efficaciously treated by means of coronary stent implantation. Stenting of the ostium of the RCA sealed the entrance of the dissection, preventing its further progression.

Serial transesophageal echocardiography provided adequate information during the postoperative surveillance of this complication.

This case report suggests that a waiting strategy can be reasonable even in case of an extensive dissection of the ascending aorta, reserving surgery for cases with documented progression of the dissection.

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