Intraoperative acute type A dissection caused by an intra-aortic filter (EMBOL-X®) in a patient undergoing mitral valve re-replacement for acute endocarditis

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Abstract

We report on the case of a 60-year-old male patient who underwent mitral valve re-replacement for acute mechanical valve endocarditis. When an intra-aortic filter (EMBOL-X Inc, Mountain View, CA) was inserted through the arterial cannula in order to prevent embolization from a floating thrombus attached to the mitral valve prosthesis, our patient developed acute type A aortic dissection. This, to our knowledge, is the first report on this kind of complication using intra-aortic filter systems. Here we discuss a potential mechanism that might have led to the event of acute type A dissection in our case. Furthermore we point out strategies that might help to prevent this life-threatening complication in the future. © 2002 Elsevier Science B.V. All rights reserved.

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1. Case presentation

A 60-year-old male patient was admitted to our hospital with the diagnosis of acute prosthetic mitral valve endocarditis caused by Enterococcus faecalis after mechanical mitral valve replacement in 1990 using a 29 mm SJM bileaflet prosthetic valve (St Jude Medical, Minneapolis, USA). Five days before admission, the patient developed neurological symptoms due to embolization from a floating thrombus attached to the mitral valve prosthesis. The patient underwent urgent operation after admission to our hospital. After median sternotomy, the ascending aorta was cannulated with a modified 24F arterial cannula (EMBOL-X Inc, Mountain View, CA) (Fig. 1) and the superior and inferior vena cava were cannulated separately with standard venous cannulas. The initiation of cardiopulmonary bypass was uneventful. Before manipulating the heart, an appropriately sized intra-aortic filter (EMBOL-X Inc, Mountain View, CA) was placed through a special side port of the arterial cannula. Instantly, a haematoma of the ascending aortic wall developed followed by malperfusion of the inominate artery and coronary arteries. The intra-aortic filter was immediately removed and the ascending aorta crossclamped.

After crossclamping, malperfusion of the inominate artery subsided. Aortotomy of the ascending aorta revealed typical signs of an acute type A dissection involving the entire aortic root. The entry was located at the arterial cannulation side where the intra-aortic filter was introduced. The intima at the opposite side of the ascending aorta was not affected by the intra-aortic filter. Selective antegrade blood cardioplegia was installed for myocardial protection. For mitral valve re-replacement, a standard transseptal approach was performed. The posterior annulus of the mitral valve was affected by the endocarditis of the prosthetic valve, which necessitated reconstruction of the annulus with autologous pericardium followed by mitral valve re-replacement with an ON-X mechanical bileaflet prosthesis (Comfort-X-Mitral 25/33, MCRI™, Texas, USA). After reconstruction of the aortic root, supraaortic branches and proximal descending aorta using a gelantine–resorcin–glutaraldehyde glue (Cardil, Saint Etienne, France), complete replacement of the ascending aorta and proximal aortic arch was performed using a 28 mm hemashield vascular prosthesis. For hemiarch replacement, moderate hypothermic circulatory arrest and selective hypothermic antegrade cerebral perfusion was used. The patient was weaned from cardiopulmonary bypass after 183 min (aortic cross clamping time: 130 min; circulatory arrest time: 17 min; selective antegrade cerebral perfusion time: 15 min). An abdominal and thoracic CT-scan was performed immediately after the operation to
rule out malperfusion. The postoperative course was uneventful and the patient was extubated at postoperative day 2. He was discharged from the intensive care unit on day 3 and further recovered uneventfully.

2. Comment

Particulate embolization from the ascending aorta occurs frequently during cardiac surgery as a consequence of vascular manipulation, which might impact on the postoperative outcome [1–4]. The use of an intra-aortic filter in order to capture particulate emboli in the ascending aorta during cardiac surgical operations have been previously described by Reichenspurner et al. and us [5,6].

Patients with floating thrombi located in the left heart or ascending are at increased risk for thromboembolic events during cardiac surgery. Precautions, such as minimal manipulation of the heart do not guarantee absolute prevention of dislodgement of floating thrombi. Therefore, an intra-aortic filter system for catching thromboembolic material may provide additional safety. In our patient, we decided to use an intra-aortic filter to prevent further endocarditis-related intraoperative thromboembolization. However, insertion of the filter device resulted in acute type A aortic dissection. After diagnosis and analysis of the pathomechanism, we were aware that the ascending aorta was covered by scar tissue from the previous operation with subsequent thickening of the aortic wall. The intra-aortic filter has to be inserted through a side port of the arterial cannula with the tip of the side port directing inside the aortic lumen. The length of the side port is approximately 5 mm (Fig. 2). In the presence of aortic wall thickening, it might be possible that the tip of the side port might not be long enough in order to be completely inserted into the aortic lumen. Therefore, it might be sticking in between the aortic wall layers. In this situation, inserting the intra-aortic filter may disrupt the integrity of the aortic wall with subsequent protrusion of the intima resulting in acute dissection. Having experienced this complication, we recommend epiaortic scanning to determine the thickness of the aortic wall for appropriate location of a spot of less than 4 mm for cannulation, or a separate introduction device for the filter, which should not be attached to the arterial cannula. So far, we have used the EMBOL-X intra-aortic filter system in more than 100 patients with no negative events. To our knowledge, this is the first report on this devastating complication using an intra-aortic filter system. We believe this case presentation will help to avoid filter-related complications in cardiac surgery in the future.

References