Massive Air Embolism During MitraClip Insertion

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Abstract

This case describes massive air embolism occurring a MitraClip procedure. This most likely occurred when the guide catheter was against the left atrial wall, resulting in external air entrainment. There was air embolism to the right coronary artery causing acute myocardial ischemia and ventricular fibrillation. The patient was successfully rescued and recovered. She underwent a successful MitraClip procedure subsequently.

Keywords

Mitral regurgitation • MitraClip • Air embolism

Clinical History

A 75-year-old woman with myelodysplastic syndrome and chronic atrial fibrillation was referred for progressive dyspnea on exertion. She was NYHA III heart failure and could only walk slowly for 100 m before stopping. Echocardiography showed significant mitral regurgitation (MR) secondary to left ventricular dilatation and dysfunction, restricted posterior mitral leaflet (PML) motion, and a dilated mitral annulus with consequent leaflet malcoaptation. The surgeons felt she was a poor surgical candidate given her myelodysplasia, and she was referred for the MitraClip.

An uncomplicated septal puncture was performed with insertion of the steerable guide catheter (SGC) to the left atrium (LA). The dilator and extra stiff guidewire were extracted during continuous aspiration as usual. The clip system was introduced into the SGC to the tip of the SGC during continuous infusion of saline. At that time, air was seen in the ascending aorta (AA) on transesophageal echo (TEE), and air was sucked into the right coronary artery (RCA) (Video 40.1). ST elevation was seen on ECG, and the patient's systolic BP dropped to 50 mmHg. The right ventricle became

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dilated with marked reduced systolic function. A pigtail catheter was introduced through the left femoral artery to the AA, and through the pigtail catheter, large amount of air was aspirated from the AA. The pigtail catheter was switched to a right Judkins catheter, and contrast injection showed that RCA was filled with air (Fig. 40.1 and Video 40.2). Large quantities of air were then sucked out from RCA. Contrast injection now showed filling of RCA, but the patient went into ventricular fibrillation, and she needed defibrillation and external heart compressions. Left-sided coronary angiography showed no air embolism. Because of continuous low BP in spite of good blood flow in RCA, an intra-aortic balloon pump (IABP) was inserted. The procedure was discontinued, and the patient was taken to ICU.

In the following days, the patient initially had signs of multiorgan failure but then improved clinically as well as on echocardiography. The IABP was removed after 3 days, and she was extubated after 5 days. She had no signs of cerebral damage. After 2½ weeks in the hospital, she was discharged.

Six weeks later the patient came for an outpatient visit. She was feeling quite well although still in NYHA III. On echocardiography the RV had recovered. The patient was very persistent to give it another try with MitraClip, "It cannot happen twice," she said. Two months later, the patient underwent another MitraClip procedure without any complications, and at 6 weeks follow-up, she reported a significant physical improvement.

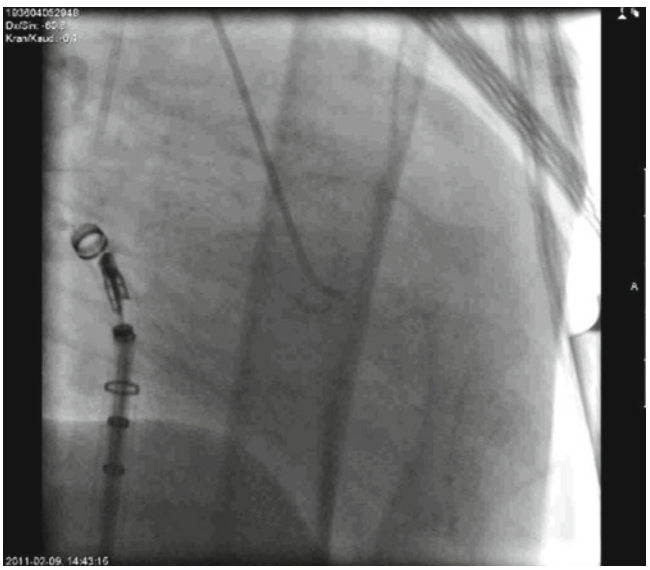

Fig. 40.1 RCA was filled with air

Discussion

After the procedure the entire MitraClip system was thoroughly investigated without any positive findings of leakage. However, when occluding the tip of the SGC and at the same time aspirating through the system, we were able to suck in air through the valve in the SGC. We think that the most probable cause of the air embolism was that the tip of the SGC was too far into the LA, and when we started to retract the guide dilator during aspiration, the tip of the SGC was sucked to the wall of the LA (Video 40.3). This created a negative pressure in the system. We were able to aspirate blood from the distal part of the system, but at the same time, air was sucked in through the valve. When we introduced the MitraClip, we pushed air in front of the MitraClip into the LA.

The MitraClip system is a large caliber, which infers a potential risk for air trapping in the system. The system has limited possibilities for simultaneous pressure recording from the LA, which would be very helpful for judging the effect of the treatment and for discovering if occlusion occurs somewhere in the system. This case highlights the fact that it is crucial throughout the entire procedure to have a very close overview of the system in the LA. It is very easy to "want to be secure" and advance the system too far into the LA, but at the cost of increased risk of serious complications, in this case, air embolism. Another risk may be perforation of the atrial wall.

Learning Points

- Air embolism is a potential serious complication.
- Air embolism can occur if the SGC is against the wall of the LA and air is entrained when blood is aspirated.
- The operator and echocardiologist must be watchful for the SGC being advanced too far into the LA and impinging against the LA wall.
- The echocardiologist has a very crucial role in observing for any unexpected anomalies occurring during the procedure (in this case, air in the ascending aorta).
- Immediate actions to aspirate air from the aorta and coronary arteries, and an intra-aortic balloon pump may be lifesaving.