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Case Report

Massive Coronary Air Embolism – Fatal but Preventable Complication

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Abstract

Coronary air embolism causes events ranging from trivial to fatal complications like arrhythmias, acute coronary syndrome and death. Most common cause of coronary air embolism is iatrogenic injection of air into coronary tree. It is preventable complication and its incidence depends on operator experience and awareness. Treatment includes immediate administration of 100% oxygen, aspiration of air, mechanical dispersion of air and cardiopulmonary resuscitation when needed. We present a case of 52 year male, who developed coronary air embolism due to inadvertently injecting air during contrast administration in percutaneous coronary intervention.

Keywords: *Coronary Air Embolism*

Introduction

Coronary air embolism is an uncommon complication encountered during cardiac catheterization. It results from the iatrogenic introduction of air into the coronary vasculature. It is potentially life threatening as the heart and brain are unable to stand even short periods of ischemia.

Case Report

We report a case of 50 year old male, presented to our department with typical resting chest pain of 6 hour duration. He was smoker and he had no previous history of diabetes, hypertension and coronary artery disease. His ECG revealed ST segment elevation in lead 1, lead avl and in lead V1 to V6. Vitals showed blood pressure of 102/70 mmHg, pulse rate 102/min and respiratory rate was 18/min. His JVP was not raised and chest was clear. He was given loading doses of aspirin and clopidogrel and shifted to cath lab for primary percutaneous intervention.

On coronary angiography through right femoral artery approach, there was double vessel disease. There was total cut-off of LAD just after origin and ramus showed 90% discrete concentric stenosis (Figure 1a). After crossing BMW wire in the LAD, TIMI 2 flow achieved. There was 95% discrete stenosis in proximal LAD, which was dilated with balloon (2 × 10 mm). Then everolimus drug eluting stent (3 × 16 mm) was deployed in LAD (Figure 1b). There was no residual stenosis and TIMI 2 flow was achieved.

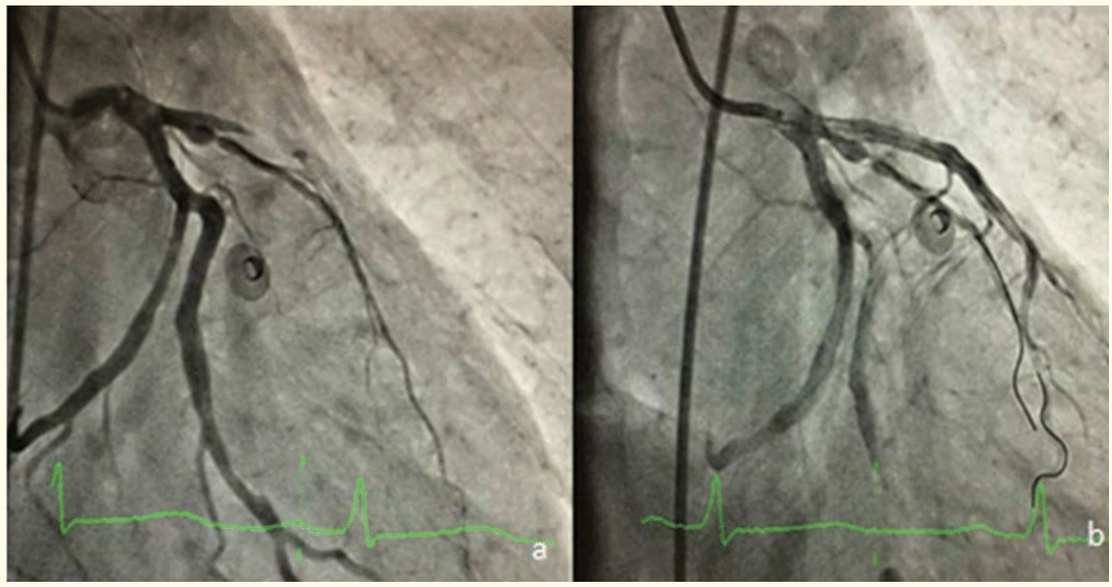

Figure 1: *(a) showing total cut of LAD just after origin and Ramus shows discrete concentric 90% stenosis in proximal part. (b) There was TIMI 2 flow in LAD with no residual stenosis.*

After that same wire was crossed in ramus, , after we had injected the contrast, the patient suddenly started complaining of chest pain and developed hypotension. In monitor there was ST segment elevation. We immediately recognized that the air was injected during contrast administration into left coronary artery (Figure 2a and 2b). Then immediately 100% oxygen was started and we asked the patient to do violent coughing. On giving injection to LAD, there was no flow in distal LAD (Figure 3a), our wire was still in LAD so we passed balloon (2 × 10 mm) into LAD and mechanical dissipation of air bubble was done with this balloon. After that good antegrade flow was achieved (Figure 3b), ST elevation settled and blood pressure came to 102/70 mmHg. The everolimus drug eluting stent (2.5 × 20 mm) was deployed in ramus.

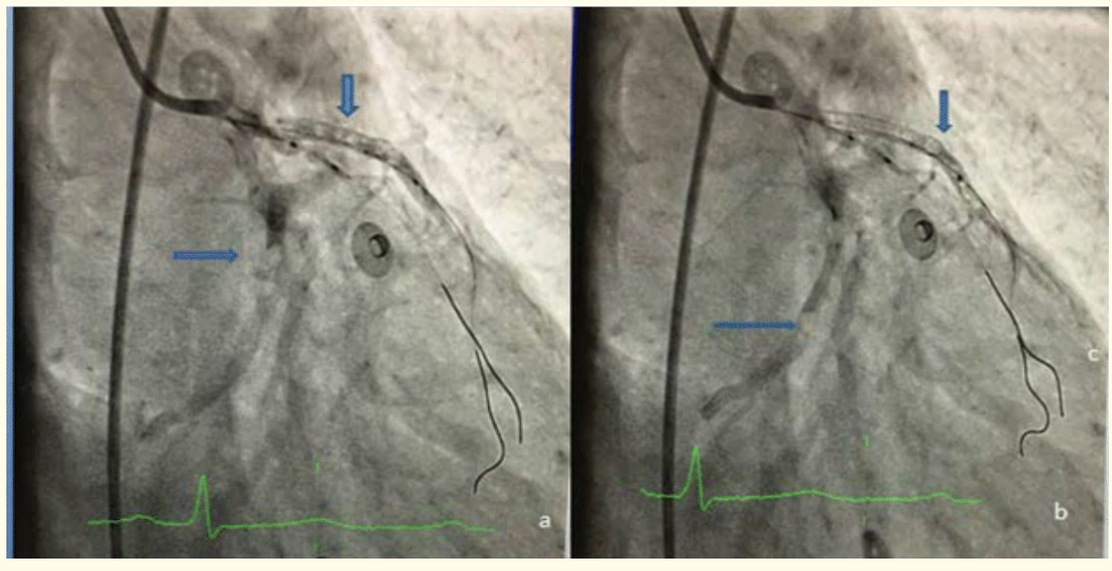

Figure 2: *(a) showing multiple air bubbles both in proximal LAD and in distal LCX (blue arrows) during contrast administration. (b) Showing air bubbles travelling into mid-distal LAD and distal LCX.*

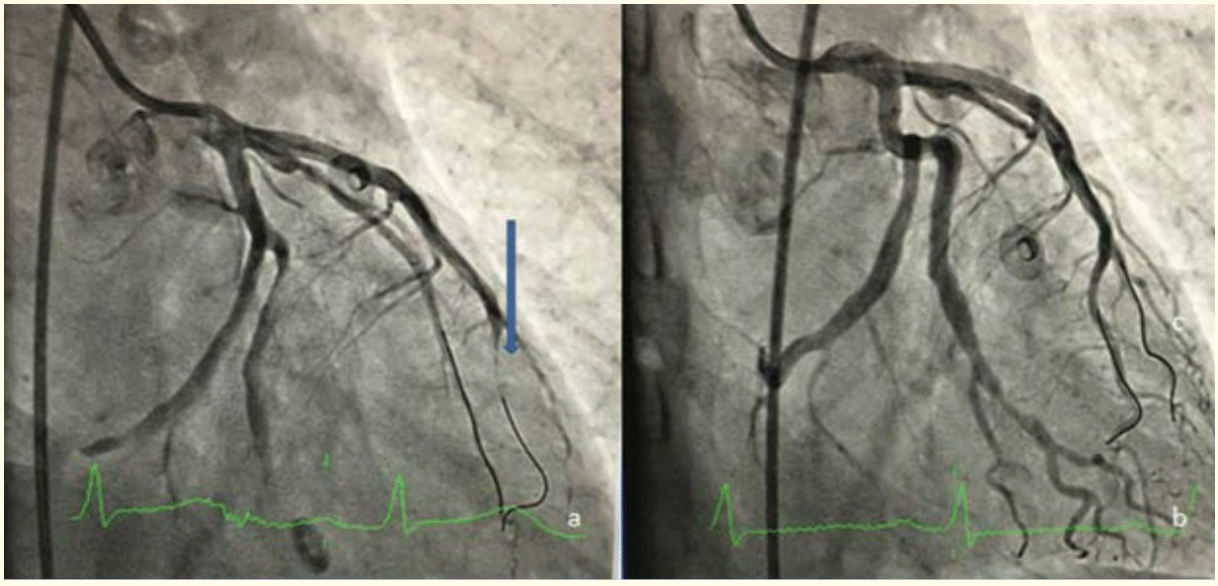

Figure 3: *(a) showing flow in distal LAD was stopped after air embolism. (b) Final result showing TIMI 3 flow after stent deployment in ramus.*

Analysis of the case – Air embolism in our case was occurred during contrast administration. We immediately recognize this complication and managed it according to standard protocol. To prevent this fatal complication, operator should ensure that before contrast administration all the guiding catheters, Y connector and luer lock should be air free.

Discussion

The incidence of coronary air embolism depends on operator experience and awareness and it occurs in 0.1-0.3% cases during coronary angiography or angioplasty [1,2]. The factors [3] associated with development of air embolism during coronary interventions include;

1. Inadequate flushing of catheters.
2. Not removing air from luer lock while giving contrast.
3. Rupture of balloon during balloon inflation, if inflating pressure exceeds RBP.
4. Loose connections and defective manifold system

Clinical manifestations depend on amount of air injected during procedure. A study on dogs showed that intracoronary injection of 0.02 mL/kg of air caused death in 28% of the animals [4]. It causes abrupt occlusion of vessel and manifests as chest pain, hypotension, transient ST segment elevation in ECG, heart block, ventricular tachycardia and ventricular fibrillations [5]. The diagnosis is made angiographically, on carefully looking for air bubbles in coronary tree.

Coronary air embolism requires early recognition and prompt treatment. Immediately give 100% oxygen as it reduces bubble size by diffusion of nitrogen from air bubble into tissue [3]. Definitive treatment requires air aspiration by guiding catheters or mechanical dissipation of air bubble by coronary guide wire and balloon catheter [6,7]. Forceful saline or contrast injection also helps in dissipation

of air bubble into smaller fragments, which results in clearance of epicardial coronaries. Air bubble dissipation results in microvascular dysfunction resulting in slow or no reflow [8]. The treatment of no reflow requires standard vasodilator adenosine and verapamil [8].

Conclusion

Coronary air embolism is preventable complication. We should keep the following pointes in mind before every procedure to prevent this fatal complication:

1. There should be frequent flushing of catheters with normal saline. Before giving contrast, wait until blood comes out from the hub of catheter.
2. Before giving contrast makes sure that your syringe or luer lock should be free from air.
3. Always keep syringe in upright position before giving contrast, so that air in syringe comes in contact with plunger away from catheter.
4. Secondary operator should always keep eye on Y connector and luer lock, they should be air free and connections should be tight. He should inform primary operator if he noticed any air in the manifold system.
5. Avoid overinflating the balloon especially in calcified lesions to prevent rupture of balloon.

So systematic planning, early recognition and prompt treatment offers best chances of survival in coronary air embolism.

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