Case Report

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Interventional Cardiology Journal
ISSN 2471-8157

2018
Vol.4 No.2:3

DOI: 10.21767/2471-8157.100073

Simultaneous Massive Coronary Air Embolism and Intraprocedural Stent Thrombosis

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Citation: Úcar EA, Vazquiánez MR, Saura FT, Villarreal DD (2018) Simultaneous Massive Coronary Air Embolism and Intraprocedural Stent Thrombosis. Interv Cardiol J. Vol.4 No.2:3

Abstract

Massive coronary air embolism and intraprocedural stent thrombosis are a very infrequent but live-threatening complications of coronary interventions. The simultaneous occurrence of both have never been published yet. In this case report, 50-years-old male, with prior history of dyslipidemia is presented. Coronary air embolism is a rare complication of cardiac catheterization with a known incidence of 0.1% to 0.3% of all the procedures. This case exemplifies that the strategy of using directly a guiding catheter previous the contralateral diagnostic angiography if the EKG changes are manifest, is valid.

Keywords: Coronary air embolism; Intraprocedural stent thrombosis; Primary PCI

Received: July 19, 2018; **Accepted:** August 29, 2018; **Published:** September 04, 2018

Introduction

Over the last decade, Primary percutaneous coronary intervention (PCI) has been established as the optimal treatment of ST elevation myocardial infarction [1]. Procedure related complications are rare, but relevant under this background. Significant coronary air embolism is an unusual complication of any catheterization, caused mainly by a loss of the integrity in the closed system that forms the patient's artery and the injector pump. Before beginning every single procedure, catheters, lines and connectors are methodically purged by the operators. Automated contrast injectors have incorporated sensors to aware the introduction of air bubbles in the system and block the shot under this circumstance. After any alarm of the pump, the system is completely purged and carefully reviewed once again, and injection cannot re-establish until it is resolved. However, and despite of it, non-adverted gas can still remain and produce embolization.

Stent Thrombosis (ST) is also a rare complication of PCI but associated with severe morbidity and mortality, especially in the setting of acute coronary syndrome. Academic Research Consortium established standardized definitions for definite, probable, and possible ST and the chronology of events as acute (0–24 hours), subacute (>24 h to 30 days), late (>30 days to 1 year), and very late (>1 year) [2].

Intravascular imaging has helped us to advance in the understanding of the mechanisms underlying stent thrombosis such as under expansion, malposition, uncovered struts, and neoatherosclerosis. Acute events are very frequently procedure related. We report this first clinical case of simultaneous massive coronary air embolism and stent thrombosis.

Case Report

A 50-years-old male, with prior history of dyslipidemia, is currently admitted due to inferior ST elevation myocardial infarction. Symptoms started two hours before first medical contact and electrocardiography showed ST elevation in inferior leads. Primary PCI was performed using radial approach and using automated contrast injector. The operator decided to begin the procedure with a 6F JR-4 guiding catheter, as suspected occlusion of right coronary artery. Patient was pre-treated with 180 mg of Ticagrelor and 300 mg of Acetyl salicylic acid and 100 U/kg of Sodic Heparin was administrated after the arterial puncture. The first shot confirms the thrombotic occlusion of the vessel in the mid portion. Once crossing a conventional 0,014" coronary

wire, and performing aspirative thrombectomy, artery flow was partially recovered (**Figure 1**). Finally, a 3.5 × 33 mm Everolimus drug eluting stent was implanted, with TIMI III flow and good final angiographic result (**Figure 2**). Immediately after, left coronary artery (LCA) was catheterized using a 5F JL-3.5, in order to identify any other severe obstructions. The automated contrast injector detected air in the pump, so the operator purged the complete system and inspected catheters, lines and connections. However, in the first shot, a massive air embolism occurred. LCA developed a severe no reflow phenomena and patient began with hemodynamic instability, chest pain and bradycardia. Initial medical treatment included intracoronary saline, oxygen, 100 mg of adenosine and 1 mg intravenous adrenaline. The patient recovers left coronary flow and improved hemodynamically. No other significant lesions were observed in the LCA (**Figure 3**). Although there were any clinical or electrocardiographic facts to support it, right coronary artery was catheterized once again due to the maintained hypotension episode. Angiography showed hyperacute stent thrombosis (ST), with new thrombus adhered and TIMI II flow. Aspirative thrombectomy and administration of Abciximab (intracoronary bolus and perfusion) was performed at first. Taking in consideration the important amount of remaining thrombus, the operator decided to implant a new Everolimus 3.5 × 33 mm stent. Post-dilatation was done with a 3.5 mm non-compliant balloon achieving TIMII III flow without significant remaining image of thrombus (**Figure 4**). Patient did not develop

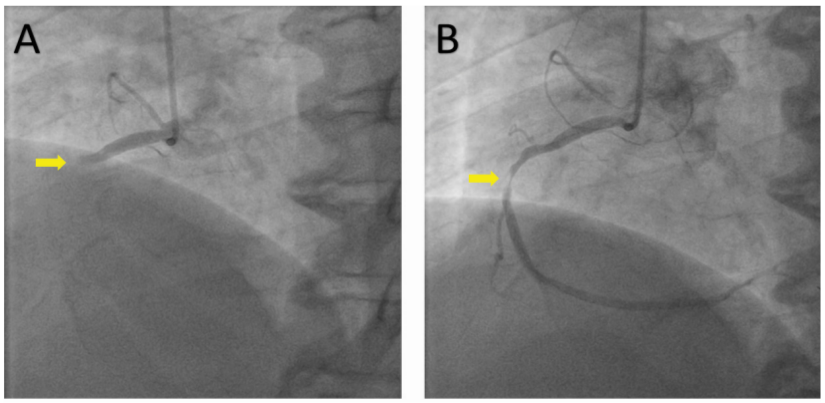

Figure 1 Panel A-Thrombotic occlusion of the mid coronary artery. Panel B-Flow recover after aspirative thrombectomy and severe lesion in the mid right coronary artery.

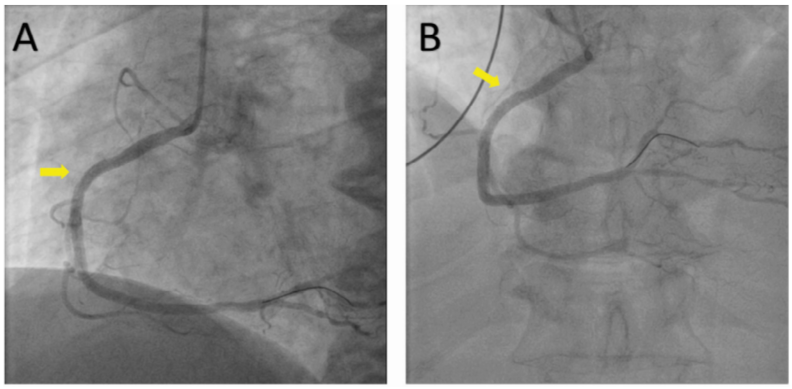

Figure 2 Panel A/B-Final result after stent implantation.

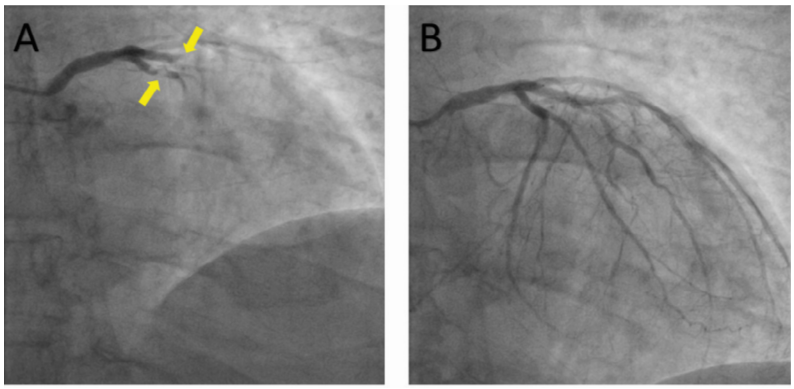

Figure 3 Panel A-Massive air embolization with sever no reflow phenomena. Air bubbles can be identified in the proximal portion of left anterior descending and circumflex artery. Panel B-Flow recover of left coronary artery after medical treatment.

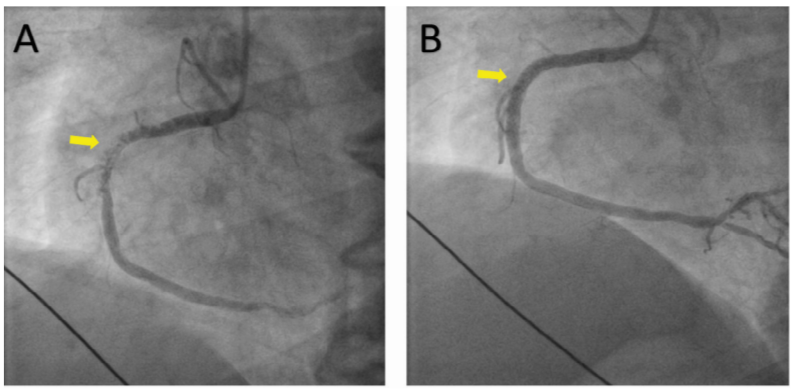

Figure 4 Panel A-Intra procedural stent thrombosis of the mid right coronary artery. Panel B-Final angiographic result after aspirative thrombectomy, Abciximab, new stent implantation and post-dilatation.

any in-hospital complications and could be discharged with normal ejection fraction and mild inferior hypokinesia.

Discussion

Coronary air embolism is a rare complication of cardiac catheterization with a known incidence of 0.1% to 0.3% of all the procedures [3]. Its clinical relevance depends on the amount and location of the embolization and range from a clinical irrelevant event to an acute coronary syndrome and/or death. Treatment includes administration of oxygen, adenosine and in some reported the use of mechanical aspiration devices [4]. Automated contrast injectors were incorporated into catheterization laboratories as have been proven to reduce time of the procedure and contrast volume administered to the patients [5]. They also incorporate an air detection sensor that helps to detect the presence of air columns in the injection line. However, it is not designed to replace the care and control of the operator, inspecting visually the presence of bubbles and purging them. There are any published studies that demonstrate the superiority of the automated contrast injectors compared to the manual injection for preventing the coronary air embolism.

ST is a rare but serious complication that has concerned interventional cardiologists over the last decades. The risk associated with this complication has been classically grouped in patient-related, lesion-related, procedure-related and stent-related, and pharmacotherapy-related factors [6]. Intra procedural stent thrombosis (IPST) is the development of occlusive or non-occlusive new thrombus in or adjacent to a recently implanted stent before the PCI procedure is completed, as defined in previous studies [7]. Despite its high mortality and morbility, the Academic Research Consortium has not included IPST in the definition of ST.

To our best known, this is the first reported case of simultaneous air embolism and IPST of non-culprit vessel. The underlying mechanism could be multiple: maintained hypotension, possible air embolization (across the aorta or contralateral coronary artery, as reported in previous clinical cases) [8] or non-adverted local complications derivate to stent implantation (embolization or persistence of thrombus, dissection, malposition, under expansion or fracture). Although intracoronary image techniques were no performed due to the clinical status of the patient, the optimal angiographic result prior to air embolization makes this hypothesis more unlikely.

Moreover, being the first reported case, its significance lies, under our opinion, on a couple of underlying ideas. Primary PCI is considered now-a-days the treatment for ST elevation myocardial infarction and it is a routinely procedure in most of the catheterizations laboratories. Although it is an exciting scenario based on the severity of the clinical setting and possible complications, it is not considered -most of the times- as challenging for an expert operator. It is fundamental to keep maintaining motivation and awareness until the end of every procedure, considering the frequency and hour band of the on-call activations.

Otherwise, and it is important to remark, that despite there were any facts to suspect stent thrombosis, the operator decided to review the result of the previous implantation. We consider this mandatory, as there are many factors that can contribute to it, and specially maintained hypotension.

Conclusion

Finally, and even if the possible complications of a diagnostic coronary study are remote, embolization or dissection of the non-culprit vessel prior treatment of the target lesion are-for sure-life threatening. This case exemplifies that the strategy of using directly a guiding catheter previous the contralateral diagnostic angiography if the EKG changes are manifest, is valid. If the embolization had happened with a closed right coronary artery, it would have been probably deleterious.

Conflicts of Interest

The authors have no conflicts of interest to declare.

References

1 Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, et al. (2018) 2017 ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The task force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J 39: 119-177.

2 Cutlip DE, Windecker S, Mehran R, Boam A, Cohen DJ, et al. (2007) Clinical end points in coronary stent trials: A case for standardized definitions. Circulation 115: 2344-2351.

3 Khan M, Schmidt DH, Bajwa T, Shalev Y (1995) Coronary air embolism: Incidence, severity, and suggested approaches to treatment. Cathet Cardiovasc Diagn 36: 313-318.

4 Patterson MS, Kiemeneij F (2005) Coronary air embolism treated with aspiration catheter. Heart 91: e36.

5 Anne G, Gruberg L, Huber A, Nikolsky E, Grenadier E, et al. (2004) Traditional versus automated injection contrast system in diagnostic and percutaneous coronary interventional procedures: Comparison of the contrast volume delivered. J Invasive Cardiol 16: 360-362.

6 Ong DS, Jang IK (2015) Causes, assessment, and treatment of stent thrombosis: Intravascular imaging insights. Nat Rev Cardiol 12: 325-336.

7 Brener SJ, Cristea E, Kirtane AJ, Mc Entegart MB, Xu K, et al. (2013) Intra-procedural stent thrombosis: A new risk factor for adverse outcomes in patients undergoing percutaneous coronary intervention for acute coronary syndromes. JACC Cardiovasc Interv 6: 36-43.

8 Sinha SK, Madaan A, Thakur R, Pandey U, Bhagat K, et al. (2015) Massive coronary air embolism treated successfully by simple aspiration by guiding catheter. Cardiol Res 6: 236-238.