Iatrogenic aortic haematoma during primary PTCA: Diagnostic value of transesophageal echocardiography in cath lab

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Abstract
A 60-year-old woman with severe chest pain and ECG diagnostic for acute transmural ischemia was transferred to cath lab for primary PTCA. After procedure, transesophageal echocardiography (TEE) views revealed an intramural haematoma extending from the ostium of the RCA throughout the sino-tubular junction. These findings and the stable clinical conditions of patient guided us to a conservative therapeutic approach. A TEE study, performed 5 days after admission, showed a complete resolution of intramural haematoma. A waiting strategy can be a valid therapeutic option in selected patients with iatrogenic haematoma and TEE is a useful diagnostic tool for clinical decision making.

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Introduction
Acute aortic dissection (AD) is an uncommon but potentially catastrophic disease with a mortality of 1% per hour if untreated.1 AD is defined as iatrogenic when it occurs as a consequence of cardiac catheterization, coronary artery by-pass graft, or other invasive vascular procedures. Although relatively rare, iatrogenic AD is a major complication of diagnostic and therapeutic vascular procedures and may be life threatening.2 The increasing number of invasive procedures together with the evidence that intramural haematoma and aortic ulcers may be signs of evolving dissections have led to a new classification of AD by the European Society of Cardiology: classical aortic dissection (Class 1); intramural haematoma/haemorrhage (Class 2); subtle/discrete aortic dissection (Class 3); plaque rupture/ulceration (Class 4); iatrogenic/traumatic aortic dissection (Class 5).3

Frequently, iatrogenic aortic dissection is a retrograde extension of the coronary dissection and it

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presents as intramural haematoma in 10–30% of all cases. Although current literature relating to this complication suggests that surgical management may be indicated, a conservative approach has been adopted in several cases with excellent long-term results.

We report a case of iatrogenic haematoma during transluminal coronary angioplasty (PTCA), in a patient with acute myocardial infarction.

Case report

A 60-year-old woman with systemic hypertension and hypercholesterolemia was admitted to emergency room for severe chest pain started about 1 h before. ECG was diagnostic for acute transmural ischemia with ST-segment elevation in the inferior leads; for these reasons the patient was promptly transferred to cath lab for primary PTCA.

Coronary angiography revealed an occluded proximal right coronary artery (RCA) (Fig. 1A). The ostium of the RCA was cannulated with a 6-F guiding catheter and the guidewire was easily passed. A balloon of 3 × 12 mm was positioned at the level of the stenosis and inflated up to a pressure of 14 atmosphere for 30 s, after angiographic control of its positioning. A retrograde dissection from the proximal edge of the balloon to the origin of RCA was revealed at the angiographic control after the dilatation; furthermore, contrast staining was present into the aortic root extending to the aortic wall on the right sinus of Valsalva (Fig. 1B). A stent 3 mm diameter and 28 mm long was promptly implanted at the ostium.

After procedure, a transesophageal study was performed in order to better assess this lesion. Longitudinal and horizontal midesophageal views revealed an intramural haematoma of 2.5 cm extending from the ostium of the RCA throughout the sino-tubular junction (Figs. 2A, 3A).

These findings and the stable clinical conditions of patient guided us to a conservative therapeutic approach.

The patient was discharged 5 days later, after a second TEE study showing a complete resolution of intramural haematoma (Figs. 2B, 3B). The antiplatelet therapy, consisting in clopidogrel (75 mg/die) and ASA (165 mg/die), was never suspended and prescribed for a 6-month period. After 1 month the patient was asymptomatic, and a further TEE did not show any evidence of intramural haematoma.

Discussion

Acute catheter-induced aortic dissection during coronary angiography and percutaneous coronary intervention is a rare event, reported with an incidence of 0.02%. The iatrogenic AD may be more common than previously recognized and it may be highly lethal. In the international registry of acute aortic dissection, the patients with a Stanford type A iatrogenic dissection were older and showed an higher incidence of risk factors for cardiovascular disease than those with spontaneous dissection, despite a similar mortality rate between the two groups (32% vs 35%).

Figure 1 (A) Occlusion of proximal right coronary artery (RCA). (B) A dissection of proximal right coronary artery with contrast staining into the aortic root.
The origin of the most dissections of the ascending aorta is localized at the ostium or in the proximal segment of the coronary artery. This complication occurs following a trauma caused by the tip of guiding catheter or the balloon dilation; furthermore, a vigorous manual injection of contrast material may play a role in extending the dissection to the aortic root. The exact mechanism for the propagation of dissection and the occurrence of aortic dissection is not clearly understood; it has been suggested that several pathophysiologic variables should be considered as potential risk factors of this complication. First, calcification of aortic root, reducing elastic properties of the vessel, could play a role in the development of aortic dissection; second, the aging process and hypertension may accelerate medial cystic degeneration of the coronary sinus of Valsalva and media of the aorta; third, inflammatory process following acute myocardial infarction could weaken the vessel wall with a tendency to dissection during balloon inflation.

Review of literature revealed that retrograde dissection to the left coronary sinus of Valsalva during PTCA rarely occurs while a lot of cases described in the literature involve the right coronary artery suggesting that the inherent properties of this vessel may predispose the patient to aortocoronary dissection. The tunica media of left coronary artery have more spiral smooth muscle cells which are arranged in concentric layers with abundant elastic fibers making this vessel more resistant to retrograde dissection.

Recently, it has been proposed a classification of iatrogenic dissection in order to improve its management; however, the treatment of this pathology is still controversial. This classification, based on the extent of dissection, identifies three classes: (1) focal dissection limited to the coronary cup; (2) dissection extending to the ascending aorta but \( <40 \) mm in length; and (3) dissection of ascending aorta \( \geq 40 \) mm in length.
According to these indications we considered our patient in Class 2 and, also in view of her clinical conditions, we chose a "watchful waiting" strategy in which TEE played a major role; in fact we followed the evolution of this lesion with serial TEE that showed a complete resolution of the dissection at discharge and follow-up.

TEE offers considerable advantages in the diagnosis and follow-up of acute aortic syndrome. The European Cooperative Study group showed that positive predictive accuracy and negative predictive accuracy of single plane, occasionally biplane, but not multiplane were 89% and 99%, respectively. Furthermore, in selecting which imaging modality to perform one must consider the accuracy as well as the safety and the availability. Since iatrogenic AD usually occurs in cath lab, a technique, readily available, safe, and quickly performed as TEE is the procedure of choice to evaluate patient at bedside.

Coronary stent implantation can be a right therapeutic option since it seals the entry site of the dissection that originates from the coronary ostium, on the other hand, one of the objectives of definitive surgical therapy is the obliteration of entry into the false lumen to prevent even minimal progression which might lead to further complications as vascular compromise or aortic rupture.

Finally, although antiplatelet therapy was never suspended in our patient, in order to avoid stent thrombosis, we observed a complete resolution of the intramural haematoma in 5 days. In conclusion, our case suggests that a waiting strategy can be a valid therapeutic option in selected patients with iatrogenic haematoma and that TEE is the most useful diagnostic tool for the clinical decision making.

References