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Removal of Partially Inflated Broken Balloon from Left Main Coronary Artery: a case from a tertiary care cardiac center of a developing country

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Abstract ***:We report a technique for retrieval of a balloon along with a portion of its shaft from the coronary system using a simple technique that does not involve the use of snare or any other retrieval tool. An additional angioplasty wire and a balloon catheter were used to remove the balloon from the coronary system.***

Key words*: Detached balloon, coronary angioplasty, retrieval*

Introduction

With the rapid expansion of coronary interventions, the incidence of breakage of any of the angioplasty hardware such as guide wire, guiding catheter, angioplasty balloon catheter and stent also increases. Retrieval of broken fragments of from intravascular compartment is a growing problem in hemodynamic laboratories. In some situations the clinical significance may be subtle; for example, broken percutaneous transluminal coronary angioplasty (PTCA) wire embolizing into the lower limb. But in other situations, the consequences may be grave; for example, an intracoronary balloon catheter after breaking from its shaft remaining inside the coronary tree. Retrieval of such broken fragments from the descending thoracic aorta and lower down artery can be accomplished using some of the retrieval equipment (snare, retrieval forceps, retrieval basket, etc.) with reasonable success and safety. However, attempts at retrieval of such broken fragments from the coronary tree with any of the retrieval equipment are both unpredictable and potentially dangerous. Hence, such an event in the catheterization laboratory, when it does occur, often culminates in panic. Here we report a case in which a coronary balloon catheter broken from its shaft and remaining inside the left main coronary artery (LM) was retrieved by a simple technique, which avoided emergency cardiac surgery.

Case

A 48 years old male patient, who was a known case of hypertension, dyslipidemia, and had

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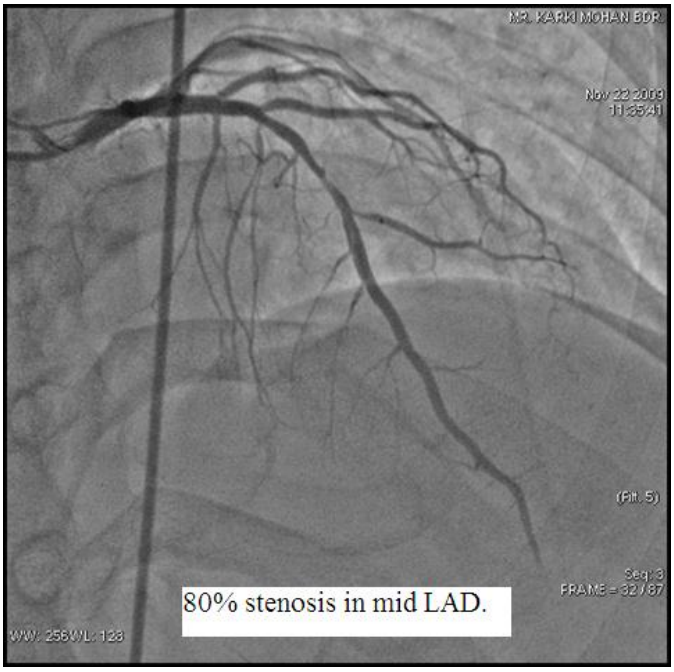
recently suffered from Anterior Wall Myocardial Infarction, thrombolyzed with streptokinase, with a left ventricular echocardiographic ejection fraction of 35-40 % was referred to Norvic International Hospital for further evaluation and management on 12-11-2009. His coronary angiogram done on the same day revealed 80% stenosis in mid left anterior descending (LAD) artery. He was planned percutaneous transluminal coronary angioplasty (PTCA) to the 80 % mid-LAD lesion (Figure 1), using GE Medical System Innova 2000.

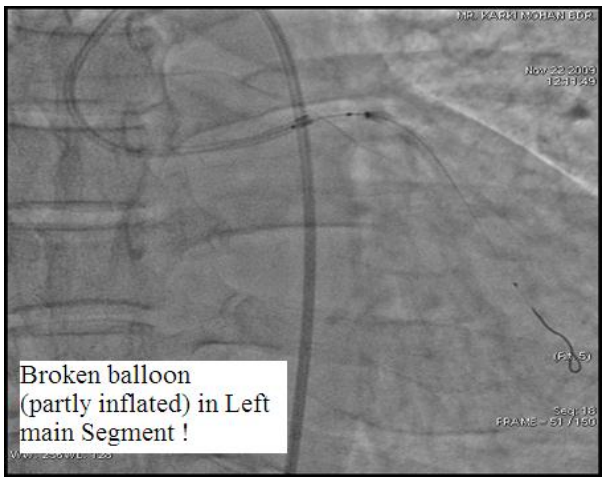
Figure 1. Coronary Angiogram showing 80 % mid-LAD lesion



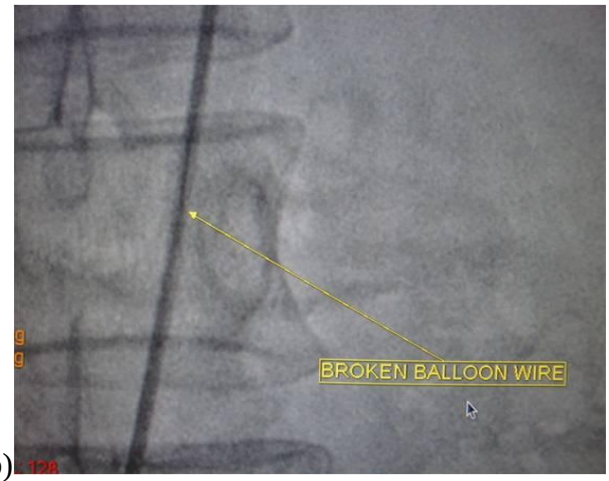
During the procedure, his left coronary artery (LCA) was hooked with a 6 F JL 3.5 guiding catheter. Lesion was crossed with All Star (Cordis) guide wire. Pre-dilatation was done with 2.5x15 mm balloon at 10 atmospheric pressures. Lesion was stented with 3.0 x 20 mm Presillion (Cordis) stent at 16 atmospheric pressures. The problem started while post-dilating when a lot of air was seen inside the balloon. An attempt was made to withdraw the balloon. However, the shaft broke and the balloon got stuck in left main segment (Figure 2). Partially inflated broken balloon was seen in left main segment. The patient started having chest pain with ST elevation in electrocardiogram and was bradycardiac as well.

Figure 2. Coronary Angiogram showing the broken balloon (a) and broken wire (b)

(a)



(b)



Rescue began with securing of a femoral venous access. The broken balloon was pushed down the distal LAD artery to decrease the risk of acute ischemia by LM occlusion (Figure 3).

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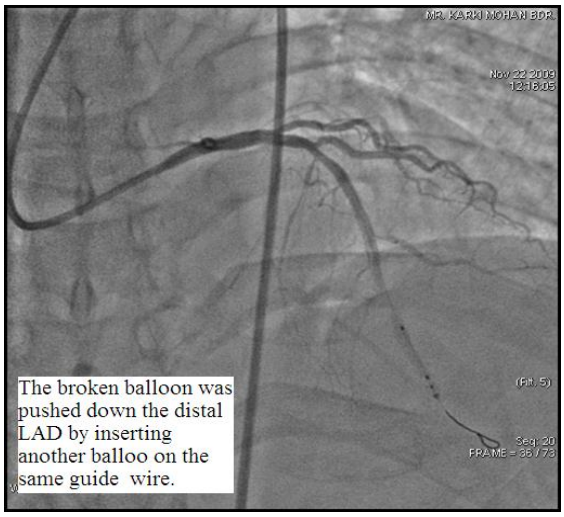
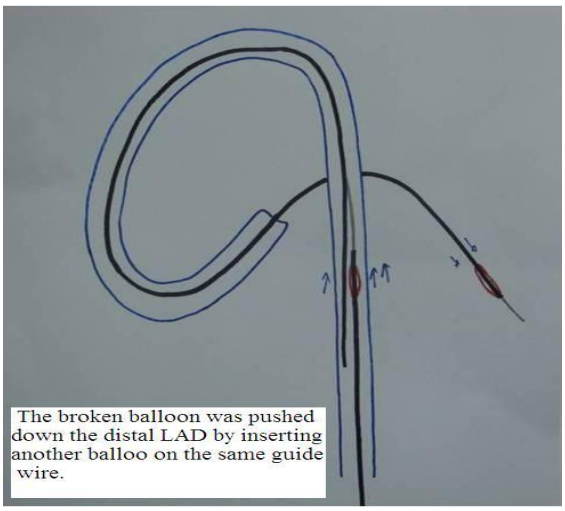
Figure 3. Coronary Angiogram (a) and (b) schematic diagram showing the broken balloon was pushed down the distal LAD artery



(a)



(b)

Another balloon (the same stent balloon, 3.0 mm) was inserted on the same guide wire and pushed up to the point where the guide wire came out from the broken balloon shaft (Figure 4). Patient became stable. The second balloon was inflated in the guide to entrap the broken shaft of the first balloon. The entrapment was confirmed by a little pull of the second balloon against the guide. The whole assembly (the guide, the two balloons and the guide wire) was taken out together. Shots taken after this showed normal distal filling of the artery (Figure 5).

Figure 4. Another balloon inserted on the same guide wire and pushed up

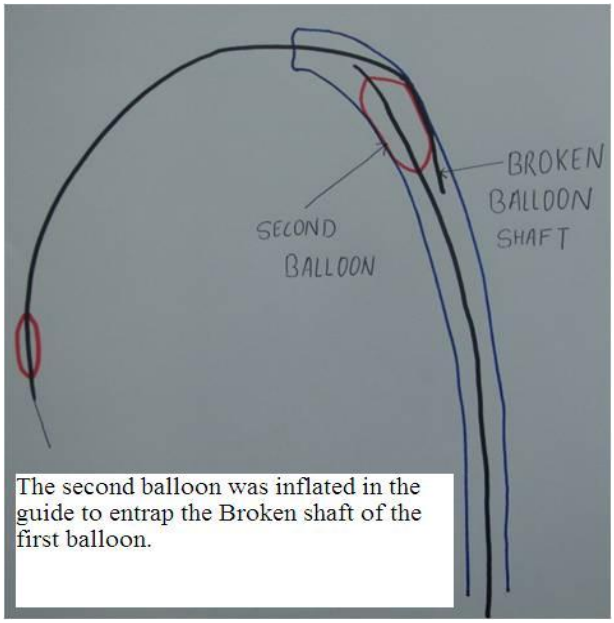
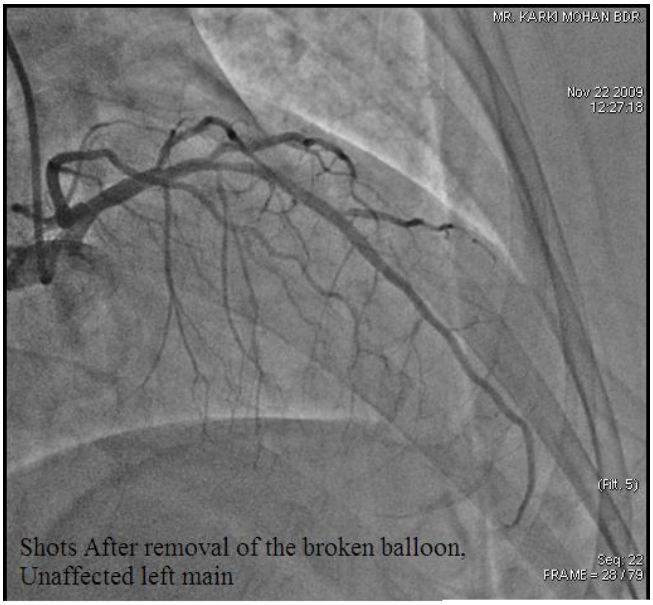


Figure 5. Coronary Angiogram showing normal distal filling of the artery



Patient was shifted out to CCU after one and half-hour in a stable condition; his stay in CCU was uneventful and was discharged from hospital after two days in a comfortable state.

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Discussion

There are anecdotal reports of the use of different retrieval equipment such as gooseneck snare, retrieval forceps, and the two-wire technique for retrieval of guidewire fragments, unexpanded and expanded stents from the intracoronary tree [1-4]. To the best of our knowledge, there is only one case report of retrieval of a detached and ruptured coronary angioplasty balloon after coronary stenting from the RCA successfully with a gooseneck snare [5].

Our technique was much safer than passing a snare, as the detached balloon was removed without any manipulation inside the coronary lumen, avoiding the risk of dissection and thrombosis. In our case, the possible mechanism of entrapment of the balloon within the stent was as follows. The balloon, which was not properly prepared by negative suction, got inflated with air and hence was not visible fluoroscopically. However, applying negative suction could not deflate it. This was most probably caused by a kink in the balloon catheter being induced by the noncoaxial guiding catheter. The kink produced a one-way valve mechanism, whereby positive pressure exerted by the inflator caused air to go into the balloon lumen, while negative suction applied manually on the inflator was not strong enough to overcome the resistance of the kink. So when a second balloon was inflated and high positive pressure was applied externally on the inflated balloon, it resulted in deflation of the balloon. Thus, the inflated balloon entrapped within the stent became free. An attempt to withdraw the broken balloon by passing the second balloon distally and inflating it resulted in further migration of the detected balloon into the distal RCA. As the balloon was only radiopaque and it was realized that an appreciable portion of the shaft had been retained and may be extending proximally into the aorta (within the guiding catheter), so instead of trying to snare it out, we applied the trick of inflating a second balloon within the guiding catheter, hoping that the shaft if extending within the guiding catheter might get entrapped between the outer wall of the inflated balloon and the inner wall of the guiding catheter. So, in a situation where a balloon along with a portion of its shaft gets detached, instead of trying to snare it out, we suggest that the guiding catheter should be intubated as deeply as possible into the coronary artery and similar steps applied.

This simple, effective technique can be added to the established techniques for retrieval of broken angioplasty balloons from the coronary tree safely.

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