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Negative results - Coronary

# Surgical removal of entrapped and broken percutaneous transluminal coronary angioplasty balloon catheter

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**Abstract**

**Objective:** The percutaneous coronary artery angioplasty is routinely being used worldwide for the management of short and discrete coronary artery stenosis. The purpose of this report is to address the potentially lethal complication among the variety of surgical problems in conjunction with this procedure. The case also illustrates the potential pitfalls in the management of CAD. **Methods:** A 60-year-old man had a broken and retained percutaneous transluminal coronary angioplasty (PTCA) balloon catheter entrapped in the left anterior descending artery and portion of it was lying in the ascending aorta. The patient underwent retrieval of this catheter through the standard coronary arteriotomy for coronary anastomosis without aortotomy on cardiopulmonary bypass. **Results:** It was found that the PTCA balloon catheter was entrapped in the entire LAD and portion of it was lying in the ascending aorta, which could be delivered through the standard coronary arteriotomy for coronary anastomosis, thus avoiding the aortotomy. **Conclusions:** PTCA balloon catheter entrapped in the entire LAD and portion of it lying in ascending aorta could be delivered through the standard coronary arteriotomy for coronary anastomosis, thus avoiding the aortotomy.


*Keywords:* Cardiac catheterization/Intervention; Emergency

## 1. Introduction

Broken and retained percutaneous transluminal coronary angioplasty (PTCA) balloon catheter is a rare but serious complication of intervention cardiology. The presence of a calcified, distal lesion is believed to prevent withdrawal of the broken catheter [1]. It requires retrieval and emergency coronary bypass grafting to prevent further complications [2–5].

## 2. Case report

A 60-year-old male, hypertensive for 10 years on angiotensin converting enzyme inhibitor and calcium channel blocker underwent renal Doppler for resistant hypertension, which revealed renal artery stenosis. Electrocardiogram showed T-wave inversion in lead III and evidence of left ventricular hypertrophy. Angiography reveled proximally occluded small non-dominant right coronary (RCA), proximal left anterior descending (LAD) 70% tubular stenosis, diagonal two had 70% distal stenosis and small obtuse marginal diffuse disease. Right renal artery showed 70% stenosis, which was stented with 7×12 mm Lewis, cordis stent. A 2.5×2 mm PTCA balloon catheter was passed to inflate the LAD lesion. The shaft broke down during withdrawal and the balloon remained inflated for around 4 min. The patient developed angina, bradycardia and hypotension. A temporary pacemaker was placed and dopamine was started. An attempt to snare the broken catheter for retrieval pushed the catheter further distally (Fig. 1). A portion of the catheter was in the ascending aorta and arch. The patient was taken up for emergency surgery as he was hemodynamically unstable. The patient was placed on cardiopulmonary bypass using standard technique. Retrograde and antegrade cold blood cardioplegia was given to arrest the heart. PTCA catheter could be felt in the lumen of the LAD. Arteriotomy was done beyond the tubular stenosis in the mid portion of the LAD. First the distal and then the proximal portion of the PTCA catheter could be retrieved from the lumen of the LAD through the arteriotomy site by gentle traction (Fig. 2). The patient underwent reversed sapheneous vein grafting to LAD and diagonal on cardiopulmonary bypass. The left internal mammary was not chosen as a conduit for LAD due to the emergency situation.

## 3. Discussion

If the fragment of angioplasty balloon or guidewire is dislodged in a proximal and patent coronary artery, the likelihood of acute embolization which could lead to an acute coronary thrombus and/or myocardial infarction

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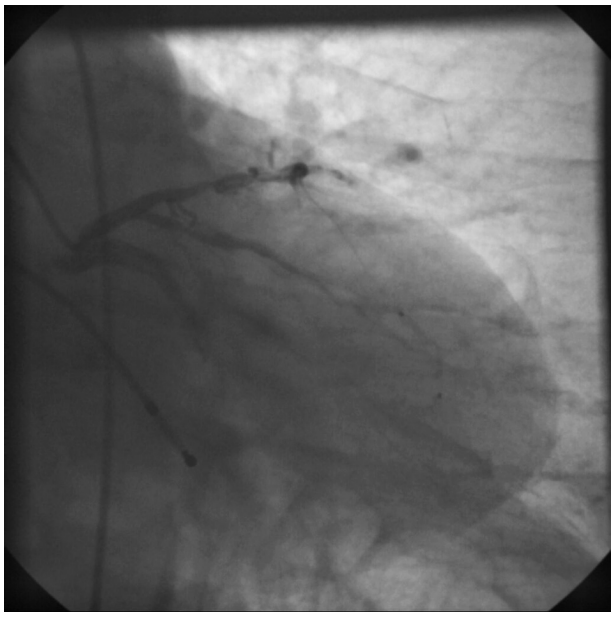

Fig. 1. PTCA catheter lying in the entire LAD.

exists. Management of these cases is dictated by the hemodynamics; therefore, the immediate removal of the broken piece of the angioplasty catheter is imperative when the patient becomes hemodynamically unstable or there is evidence of an acute coronary event. There are reports in which guidewires or components of PTCA lodged in coronary arteries have managed conservatively [6,7]. In a reported case the exchange guidewire snapped and the distal 20 cm of the wire caused immediate thrombotic occlusion of both the left anterior descending and circumflex arteries. The resulting complication was treated by emergency bypass surgery [2].

In a rare situation a retained ruptured balloon, with broken catheter caught in an incompletely opened stent during PTCA stenting procedure, was removed with a short, warm heart bypass and single cross-clamping coronary artery bypass grafting procedure was performed [3]. Whereas in another case, because of the stable condition of the patient, elective aorto-coronary bypass surgery was performed successfully two weeks after this event. However, the broken end of the guidewire was not found in the opened RCA lumen. Eighteen months postoperatively, the patient was doing well while the guidewire remained in the same position [8].

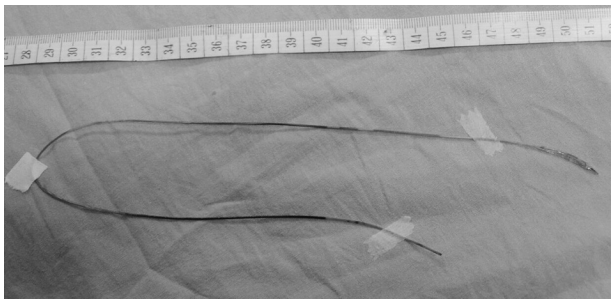

Fig. 2. Removed PTCA catheter.

Removal of fractured guidewire is not always straightforward as it may uncoil and transform into razor-sharp wire. Passing a Teflon catheter over the wire to protect the coronary artery to free the entrapped distal end of the guidewire at operation has been suggested [4].

Coronary artery perforation is a rare but potentially lethal complication during PTCA. To avoid pericardial tamponade, it has been suggested that perforating wires or balloons should not be withdrawn and that the patient should be transferred immediately to surgery.

Angioplasty guidewires and catheter are extremely reliable, device failure can occur, when any device is subject to extreme operating stress such as when a guidewire is rotated repeatedly in a single direction while the tip is held fixed in a total occlusion, or when a balloon catheter is inflated past its operating pressure range in an attempt to dilate a resistant stenosis [1]. In our case snapping of the balloon catheter occurred at the time of withdrawal, possibly from the traction force resulting from pull of the catheter while the catheter is impacted in the incompletely dilated lesion, because of calcification or incompletely deflated balloon. A similar mechanism has been reported when the balloon got stuck in the incompletely open stent [3].

Non-surgical successful snaring and retrieval has been reported [1,9,10]. Fracture and dislodgement of an angioplasty device within the coronary arteries and retrieval of the broken piece has been described [9]. A non-surgical retrieval technique, using a second dilation system, to free the entrapped catheter during percutaneous transluminal coronary angioplasty has been described. The presence of a calcified, distal lesion is believed to prevent withdrawal of the broken catheter [1]. Watson [10] described two cases of percutaneous removal of trapped, broken steerable PTCA guidewires.

In our case an attempt to snare resulted in further migration and dislodgement of the catheter in the entire LAD and the patient developed angina, bradycardia and hemodynamic instability, and ischemic changes in ECG. At operation the catheter was palpable in the entire LAD; distal as well as proximal portions were delivered through a standard coronary arteriotomy for coronary anastomosis distal to the lesion. The optimal method to remove the retained long guidewire/balloon catheter with proximal end in the ascending or arch is not known. It may be possible to retrieve the entire length through the standard coronary arteriotomy distal to the offending lesion; otherwise the guidewire or balloon catheter may have to be divided distal to the lesion and deliver the distal end through coronary arteriotomy and the proximal portion through a small aortotomy. Any failed device should be sealed and returned to the manufacturer for structural analysis that may disclose the root cause of a manufacturing defect.

In the stent era detachment of a part of wire or dilatation catheter; dislodgement of a bare, mounted stent from its delivery balloon or failure of a stent delivery balloon to inflate or deflate properly are going to increase. As a result, intervention cardiologists and cardiac surgeons around the world are going to encounter more of these complications. The angioplasty operator and cardiac surgeon should be familiar with various techniques of basket,

bioptomes, intertwined guidewires for catheter removal and optimal surgical management in cases of unsuccessful non-surgical retrieval.

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