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Case Reports

Radial artery perforation treated with balloon tracking and guide catheter tamponade – A case series☆

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ABSTRACT

A 78 year old woman was admitted with an acute coronary syndrome. She underwent coronary angiography via the left radial artery which was complicated by a guide catheter induced radial artery perforation confirmed by extravasation of contrast into the forearm. We used balloon assisted tracking and guide catheter tamponade to complete the angioplasty procedure via the radial artery and successfully seal the radial artery perforation. We describe a series of 7 cases where this technique was used to both treat radial artery perforation and to complete the angioplasty via the radial approach.

1. Introduction

The transradial access (TRA) site has been increasingly adopted as the preferred access site for percutaneous coronary intervention (PCI) across Europe and many North American Centers. Whilst transfemoral angiography and angioplasty has been the primary access site for many institutions, the number of procedures performed via the radial route has increased dramatically, particularly in Europe. One of the most important reasons for this is that TRA is associated with decreased mortality rates in high-risk patient groups, at least in part mediated through a reduction in major vascular access site related bleeding complications [1]. Although very rare, access site complications may also occur in the radial artery and spasm, dissection, haematoma, hemorrhage, pseudoaneurysm formation, arterio-venous fistula formation and perforations have been reported in the literature. Radial artery perforations are more likely to occur in small or tortuous vessels and can be caused by radial sheaths, guide wires, diagnostic catheters or guiding catheters and are described in less than 0.5% of cases [2]. In the presence of a radial perforation, successful completion of the procedure may necessitate switching to an alternative access site with its attendant risks. Furthermore, continuous hemorrhage and haematoma formation can occur as a result of radial perforation and can rarely lead to complications including compartment syndrome in the forearm requiring surgical intervention. We report a large series of cases in our high volume institution where radial artery perforations were managed using the technique of balloon assisted tracking (BAT) first described by Patel et al. [3] that allowed the procedure to continue via the affected artery and resulted in successful sealing of the perforation. This technique may reduce the impact of this rare but important complication of TRA PCI.

2. Case series

2.1. Patient A

A 78 year old woman was admitted with an acute coronary syndrome (ACS). The patient underwent urgent coronary angiography using a 6 French (Fr) radial sheath (Terumo Corporation) in the left radial artery. Diagnostic coronary angiography was performed using 6Fr Judkins Right (JR) 4.0 and Judkins Left (JL) 3.5 catheters. This showed a critical lesion in the right coronary artery (RCA). The diagnostic catheter was removed over a 0.035 in. guide wire and an attempt was made to exchange to a 6Fr JR 4.0 guide catheter. The patient complained of pain over the left forearm and there was resistance to the advancing catheter. Injection of diluted contrast via the radial sheath revealed a guide catheter induced radial artery perforation with active extravasation of contrast (Fig. 1a). A 5Fr JR diagnostic catheter was inserted and crossed the perforation in the radial artery without difficulty. This was placed in the aortic root and the 0.035 in. guide wire (120 cm) removed

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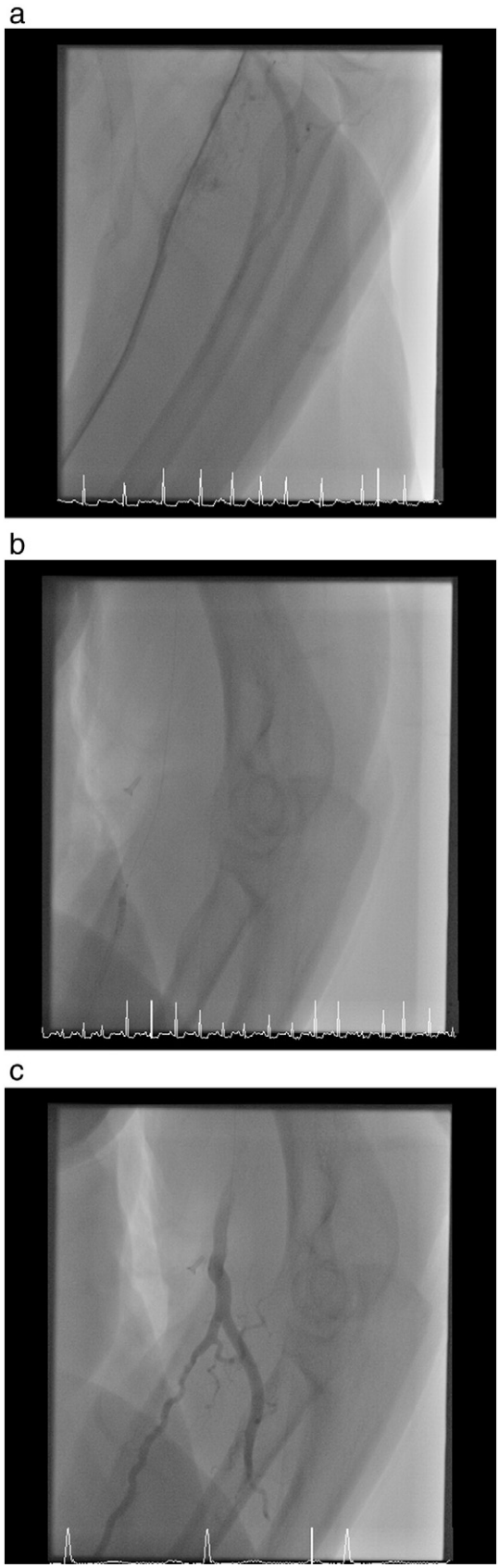

Fig. 1. a – Perforation of the left radial artery with extravasation of contrast in patient A. b – Balloon assisted tracking (BAT) of the guiding catheter in patient A. c – Sealed perforation of the left radial artery with no evidence of contrast extravasation in patient A after BAT.

and replaced with a 0.014 in. Sion blue coronary wire (180 cm). The JR diagnostic was then removed whilst the Sion blue wire remained in the aortic root.

We then used the technique of balloon assisted tracking (BAT) to attempt to introduce the 6Fr guiding catheter into the aortic root. To perform balloon assisted tracking, a compliant 2.0 mm by 15 mm balloon was inserted into the guiding catheter and advanced until the distal two thirds of the balloon protruded outside the tip of the catheter. The balloon was then inflated to nominal pressure. The balloon and guiding catheter were then loaded onto the back of the Sion blue wire and advanced gently across the site of the perforation (Fig. 1b). This maneuver allowed the guiding catheter to safely bypass the site of perforation and be used to engage the RCA, with successful angioplasty performed with the insertion of a single drug eluting stent. After removal of the guiding catheter, a further angiogram of the left radial artery revealed that the perforation of the radial artery had successfully been sealed (Fig. 1c). The following day the patient was found to have minor bruising over the forearm but no haematoma and was discharged home.

2.2. Patient B

A 63 year old man with a history of hypertension was admitted with an ACS. Following diagnostic angiography showing RCA disease, a guiding catheter induced a right radial artery perforation (Fig. 2a). Exchange to a 180 cm 0.018 coronary guide wire and BAT allowed delivery of a 6Fr guiding catheter and successful PCI to the RCA. A radial angiogram at the end of the procedure showed that the radial artery perforation had been sealed (Fig. 2b).

2.3. Patient C

A 66 year old man was admitted with an ACS. Diagnostic angiography via the right radial artery showed severe disease of the distal left main stem (LMS). Upon switching to a larger guiding catheter, advancement of the 6F Extra Backup (EBU) guiding catheter was met with resistance and pain. Angiography via the radial sheath revealed a small caliber axillary radial artery with perforation in the forearm (Fig. 3a). A 0.014 in. coronary wire was advanced into the aortic root and BAT (Fig. 3b) allowed delivery of the EBU catheter and PCI to the LMS was performed without difficulty. A radial angiogram at the end of the case confirmed that the perforation had been sealed (Fig. 3c).

2.4. Patient D

A 51 year old man with a history of hypercholesterolaemia was admitted with an ACS. Angiography via the right radial artery showed severe disease in the RCA. A radial artery perforation was caused by a 6Fr JR 4.0 guiding catheter (Fig. 4a). Again, exchange to a coronary guide wire followed by the use of BAT (Fig. 4b) allowed deliver of the guiding catheter to the RCA and successful completion of the case. An angiogram confirmed that the radial artery was again patent (Fig. 4c).

2.5. Patient E

An 85 year old lady with a history of hypertension was admitted with an inferior ST elevation myocardial infarction (STEMI). Diagnostic angiography via the right radial artery confirmed an occluded RCA. Advance of a JR 4.0 guiding catheter caused radial artery perforation (Fig. 5a). BAT allowed delivery of the guiding catheter and the RCA was stented. A final angiogram via the radial sheath showed that although the radial artery was open, there was continued extravasation of contrast, confirming that the perforation was not fully sealed (Fig. 5b). External compression was applied after removal of the radial sheath and the patient was discharged home 3 days later without further complication.