

## Surgical removal of a guidewire entrapped during recanalization of chronic total occlusion of the right coronary artery

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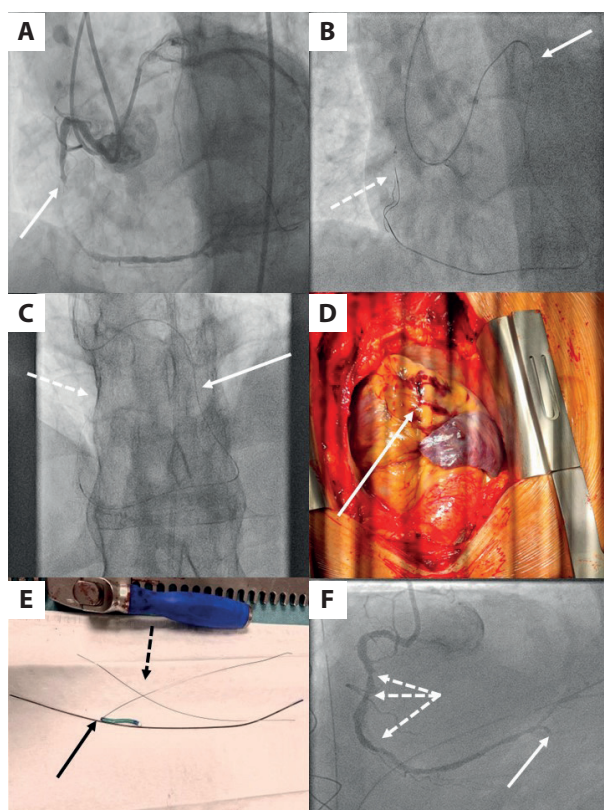
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Numerous studies indicate that successful chronic total occlusion (CTO) recanalization is beneficial when the occluded vessel supplies a significant area of the viable myocardium, leading to severe ischemia in this area [1, 2]. We present the case of a 70-year-old man with typical Canadian Cardiovascular Society (CCS) class III angina, non-sustained ventricular tachycardia, and preserved left ventricular systolic function based on echocardiography. The patient had undergone two unsuccessful attempts of antegrade recanalization of his chronically occluded and severely calcified right coronary artery (RCA). He was admitted to the Department of Cardiac Surgery after the entrapment of an externalized angioplasty guidewire during a successful retrograde attempt using the reverse-controlled antegrade-retrograde-subintimal tracking method (reverse controlled antegrade and retrograde tracking [rCART]) [3].

In the index procedure, his right coronary artery was intubated with an AL 1.0 7 F guiding catheter introduced through his right femoral artery and the left coronary artery, with 3.5 6 F-EBU introduced through his left radial artery. Following an unsuccessful antegrade attempt, which required several different micro-catheters and dedicated recanalization guidewires, retrograde recanalization with rCART was performed. Ultimately, externalization of the RG3 300 cm guidewire (Asahi Intecc, Irvine, CA, US) was achieved. Following predilatation with 3.0 mm non-compliant (NC) balloon catheters, 3 Promus Premier

drug-eluting stents (DES) were implanted: 3.0/16 mm, 3.0/16 mm, and 3.5/16 mm, with a 3.5 mm NC postdilatation catheter under intravascular ultrasound (IVUS) control. At the end of the procedure, very strong resistance was encountered when attempting to remove the externalized guidewire. To release the guidewire with the antegrade method, inflation with a new 3.0 mm NC balloon catheter and a semi-compliant 2.0/15 mm balloon catheter, as well as a FineCross microcatheter was used; all the tools stopped on the proximal stent. The Caravel-microcatheter, which remained in septal collaterals at that time, was retrogradely guided to the distal stent implantation site and stopped there as well. Further removal attempts were discontinued because of the risk of coronary perforation and the patient's poor tolerance (chest pain, hypotonia), leaving the RG3 guidewire with micro-catheters in both the right and left coronary arteries (Figure 1B). The procedure lasted 235 minutes, with 128 minutes of fluoroscopy time; the radiation dose was 6081 miligrays, and 250 milliliters of contrast media was used.

The patient in stable condition was transferred to the Department of Cardiac Surgery. His blood pressure was 121/78 mm Hg; heart rate, 84/min; and oxygen-saturation-level, 94%. In the hybrid room, median sternotomy was performed with extracorporeal circulation. An epicardial hematoma was found alongside the right coronary artery (Figure 1D). The aorta was opened transversely and the guidewire protruding from



**Figure 1.** **A.** Angiography showing mid-segment chronic occlusion of the right coronary artery (RCA). The arrow indicates the site of closure. **B.** Reverse controlled antegrade retrograde subintimal tracking. The dashed arrow indicates the antegrade Guideliner 6 F and the 2.5 mm balloon catheter. The solid arrow indicates the retrograde guidewire Gladius. **C.** Angiography preceding cardiac surgery. The dashed arrow indicates an entrapped RG3 300 cm guidewire. The solid arrow indicates a 150 cm Caravel micro-catheter wedged in the distal stent. **D.** The arrow indicates an epicardial hematoma in the course of the right coronary artery during cardiac surgery. **E.** The solid arrow indicates the guidewire fragments, and the dashed arrow indicates the guidewire fragments that were removed from the coronary arteries during cardiac surgery. **F.** Post-procedure angiography with successfully opened mid-segment RCA (TIMI3). The solid arrow indicates the closure of the posterior descending artery (PDA). The dashed arrow indicates right coronary artery wall irregularities as a result of the presence of mural thrombi which were the consequence of platelet transfusion for reversal of dual antiplatelet therapy and additional heparin reversal during surgery

the orifices of both coronary arteries was cut off, leaving three-centimeter segments. Attempts to remove the guidewire from either side were unsuccessful. Therefore, the posterior descending aorta (PDA) was opened, the guidewire was cut, and both its segment were removed from the right and left coronary arteries without resistance (Figure 1E). The surgery lasted 115 minutes, with 40 minutes of extracorporeal circulation, and 30 minutes

of aortic cross-clamping. The final angiographic result (Thrombolysis in Myocardial Infarction [TIMI], flow grade 3) after surgery showed undamaged coronary vessels but acute closure of the PDA (Figure 1F). Despite the good angiographic effect visualized immediately after CTO recanalization, on the coronary angiography performed after cardiac surgery, RCA wall irregularities were observed, which were related to the presence of mural thrombi which were the consequence of platelet transfusion for reversal of dual antiplatelet therapy and additional heparin reversal during surgery. The patient was discharged from the hospital 22 days after surgery.

Entrapment of the externalized guidewire during retrograde recanalization of coronary arteries is a unique and surprising complication [4]. Massive calcifications within the proximal and middle segments of the right coronary artery were likely the cause of wedging between them and the implanted stents of the externalized guidewire RG3. Surgical cutting of the guidewire in its middle segment is rarely used as therapy and, as a final solution, it probably altered the traction forces allowing its removal.

### Article information

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