Radiology Case Reports 21 (2026) 3471–3475

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Real-time IVUS-guided retrieval of a coronary retained guidewire fragment: A case report ☆

Augustin Tchassem Dimdie, MD[a,], Moncef Al Barajraji, MD[b], Georges H. Mairesse, MD[c], David Dechaux, MD[a], Pierre-Emmanuel Massart, MD[d], Laurent Jamart, MD[a,e]*

[a] *Department of Cardiology, Centre Hospitalier Régional Sambre et Meuse, Namur, Belgium*
[b] *Department of Surgery, Centre Hospitalier Universitaire Charleroi-Chimay, Charleroi, Belgium*
[c] *Department of Cardiology, Cliniques du Sud Luxembourg, Arlon, Belgium*
[d] *Department of Cardiology, CHU UCL Namur, Site Saint-Elisabeth, Namur, Belgium*
[e] *Department of Cardiology, Clinique Saint-Luc Bouge, Namur, Belgium*

ARTICLE INFO

Article history:
Received 27 September 2025
Revised 18 April 2026
Accepted 28 April 2026

Keywords:
Percutaneous coronary intervention
Guidewire fracture
Intravascular ultrasound
Snare retrieval
Coronary intervention
Foreign body

ABSTRACT

Percutaneous coronary intervention is generally safe, but rare complications such as guidewire fracture can occur and may lead to thrombosis, embolism, vessel injury, or myocardial ischemia. We report the case of a 58-year-old male patient with 2-vessel coronary artery disease who underwent coronary stenting of the left anterior descending and circumflex arteries in another institution. During the index procedure, the guidewire fractured at the bifurcation between the left anterior descending artery and the first diagonal branch. One week later, the patient presented at our institution with recurrent chest pain and a second procedure was performed to retrieve the retained fragment. Real-time intravascular ultrasound imaging was used to visualize the fragment and perform targeted retrieval using a gooseneck snare introduced into the vessel. The fragment was successfully removed without altering the stent position, with uneventful follow-up. This case highlights that real-time IVUS visualization can modify procedural strategy for such complication by improving localization of retained intravascular material and allow safer percutaneous retrieval compared with fluoroscopy alone, potentially reducing the need for surgical intervention.

Introduction

Percutaneous coronary intervention (PCI) is widely used to manage coronary artery disease. Despite its safety, complications during PCI are not uncommon. Among these, the fracture and retention of intravascular devices such as guidewires during PCI is a rare but serious complication, with an estimated incidence of 0.1%-0.8% [1]. Guidewire fractures typically occur in cases involving complex coronary anatomy, chronic total occlusions, or very calcified arteries [2–4]. A fracture may occur due to wire deformation by the vessel or the

☆ Competing Interests: The authors have declared that no competing interests exist.

* Corresponding author.
E-mail address: augustin.tchassem.dimdie@ulb.be (A. Tchassem Dimdie).

https://doi.org/10.1016/j.radcr.2026.04.082

catheter and/or structural failure. This fractured guidewire tip can migrate within the heart vasculature with risks of coronary thrombosis, embolism, or perforation and subsequent heart ischemia, prompting early retrieval whenever possible [1–4]. Nowadays, intravascular ultrasound (IVUS) is increasingly used not only for vessel assessment and stent optimization but also as a real-time procedural guidance improving intraluminal visualization of retained material [3,4]. With such complication, several retrieval techniques have been described in the literature (eg, snare devices, balloon-assisted trapping, multi-wire techniques) with variable success depending on the coronary vessel anatomy and fragment location [5]. In our case, the retained guidewire fragment was retrieved using an Amplatz Goose Neck snare under simultaneous real-time 3D guidance by IVUS. Similar ultrasound-guided intravascular retrieval approaches have been described in non-coronary settings, supporting the feasibility of this technique in PCI [6]. We searched the literature through PubMed/Medline and Cochrane databases between the first of October 2000 and first of January 2026 using the key terms "Coronary," "IVUS," "Ultrasound," "Retrieval," and "Goose Neck." After reviewing the literature, this case report represents to our knowledge one of the first reports of IVUS use for real-time guidance during percutaneous retrieval of a fractured guidewire tip within a coronary vessel.

Case description

A 58-year-old man with effort-induced oppressive chest pain for 1 month initially presented at a first center for diagnostic work-up. His medical history included arterial hypertension, dyslipidemia, obesity (body mass index of 30 kg/m^2), and active smoking. Transthoracic echocardiography showed normal left ventricle wall motion and ejection fraction. A stress-test induced an oppressive chest pain with a 2-mm ST segment depression in the anterolateral leads of the electrocardiogram (ECG). The coronary angiography revealed a left dominant circulation with a 2-vessel disease resulting from severe occlusion of the left anterior descending artery (LAD) and circumflex artery (Cx) respectively estimated at 90% and 80% of the lumen caliber (Fig. 1A). In addition, a 70% stenosis of the bifurcation between the LAD and its first diagonal branch (D1), also known in angiographic coronary anatomy as "carina," was observed. The stenosis of the LAD and Cx arteries were treated by direct implantation of a drug-eluting stent (DES). To stent D1 and treat the carina lesion, a final kissing balloon inflation (FKBI) stenting technique was used. When stenting a LAD artery lesion close to its bifurcation with D1 artery, the deployment of the stent classically induces a shift of the bifurcation towards D1 artery, occluding its ostium. To address this issue, the FKBI technique is one of the several techniques the operator can use. It consists of first deploying a stent in the LAD segment at the bifurcation with D1 artery, without fully applicating it against the LAD wall. The D1 artery lumen is then re-wired through the stent struts of the first stent to insert and deploy a stent within D1 artery. Finally, simultaneous deployment of 2 non-compliant balloons in both vessels allow optimal application of both stents against the vessel wall and correction of the LAD/D1 bifurcation shift to reopen the occluded D1 artery ostium. In this case, a stent was first deployed in the LAD lesion with satisfying angiographic result (Fig. 1B). The D1 artery lumen was then re-wired through the stent struts to deploy a stent within D1 artery lumen using the FKBI technique. Unfortunately, when withdrawing the guidewire from D1 lumen, the tip ruptured and remained trapped within the stent struts at the level of the LAD-D1 bifurcation (Fig. 1C). In this center, none of the interventional cardiologists had experience with percutaneous management of such complications. After multidisciplinary discussion involving the interventional cardiologists and cardiothoracic surgeons of this center, decision was taken to interrupt the procedure without conversion to surgery as the patient was clinically stable and the fragment small and thin. Post-dilatation of the stents was also not performed to prevent any vessel injury or migration of the fragment. The patient was sent home with dual antiplatelet therapy (aspirin and platelet inhibitor) and scheduled for close clinical follow-up and eventual reintervention in case of clinical deterioration. A week later, the patient presented at our center due to recurrence of an oppressive chest pain. Although no alterations were observed on ECG, we decided to perform percutaneous retrieval of this retained fragment using under fluoroscopic and IVUS guidance. The procedure occurred under dual-operator control and started with placement of a Launcher 7Fr EBU 3.5 guide catheter (Medtronic, USA) in the left main stem coronary artery to insert a 0.014″ Sion Blue guidewire (Asahi, Tokyo, Japan) up to the distal segment of the LAD. To allow a more precise 3D visual-guided extraction, an Eagle Eye Platinum IVUS probe (Philips Medical Systems, Nederland) was simultaneously used. Initially, the IVUS probe failed to cross the LAD-D1 bifurcation due to its size and absence of post-dilatation of the previously deployed stents. To solve this, we used again a kissing balloon technique to dilate this segment and the proximal portion of the LAD (Fig. 2A). The IVUS probe could then cross the obstacle and visualized a highly echogenic linear structure entrapped within the D1 stent struts and floating within D1 lumen, that corresponded to the retained guidewire fragment (Fig. 2B). A Balanced Middle Weight (BMW) guidewire was then used to introduce a coronary 2 mm loop ONE Snare System (Merit Medical Ireland, Galway, Ireland) up to D1 lumen. Simultaneous IVUS guidance allowed precise localization of the fragment relative to the stent architecture and optimal positioning of the snare around it. After few manipulations, the foreign body was successfully caught and extracted (Fig. 3). The stent initially placed in the LAD was post-dilated using a balloon catheter, which completed the procedure (Fig. 3). The patient was discharged the next day with double antiplatelet therapy (aspirin and platelet inhibitor) and scheduled for regular close clinical and echocardiographic follow-up in the first 3 months. After 3 months, no recurrence of chest pain was observed and cardiac ultrasound showed a normal stent architecture without any residual retained fragment (Fig. 4).

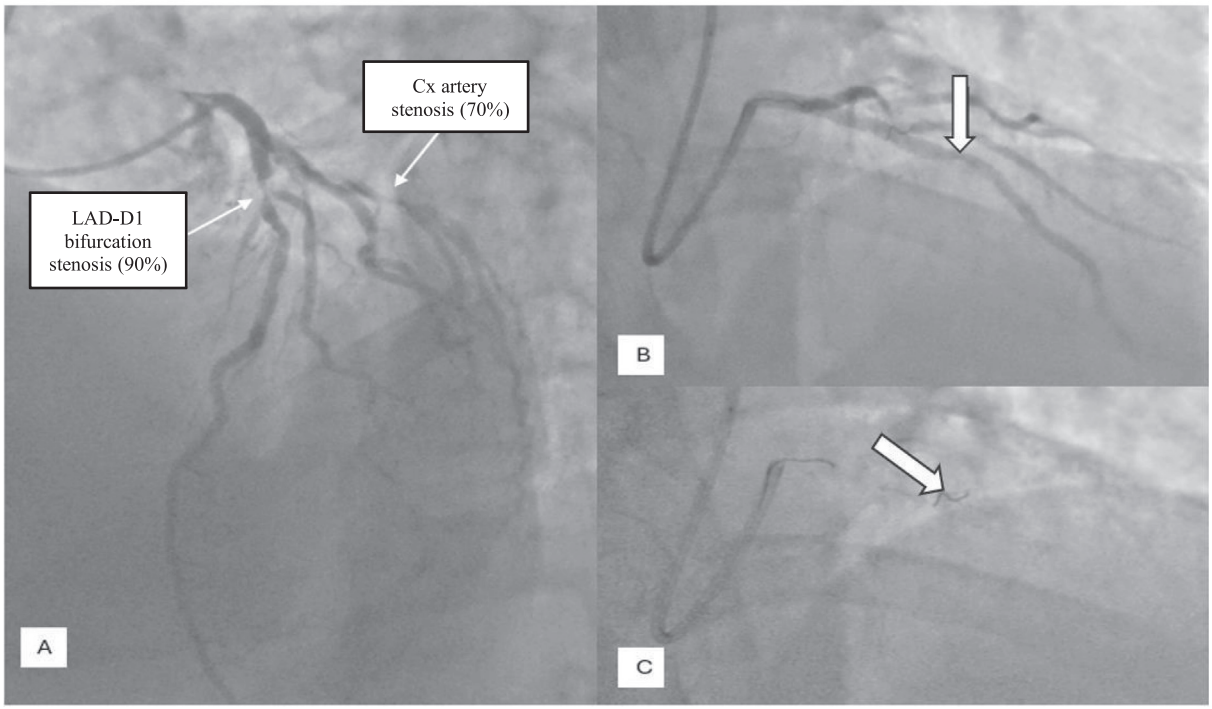

Fig. 1 – Angiography of the left coronary branches : the circumflex artery (Cx) was easily treated by direct stenting. The LAD-D1 bifurcation was first treated by direct stenting in the LAD, without any protection of D1. After many difficulties in recrossing the struts towards D1 with a Pilot 50 wire, a T-stenting of D1 was performed, followed by a kissing balloon and post dilatation (A). Note the persistence of a lesion at the level of the LAD stent and the broken wire tip (white arrow, B and C).

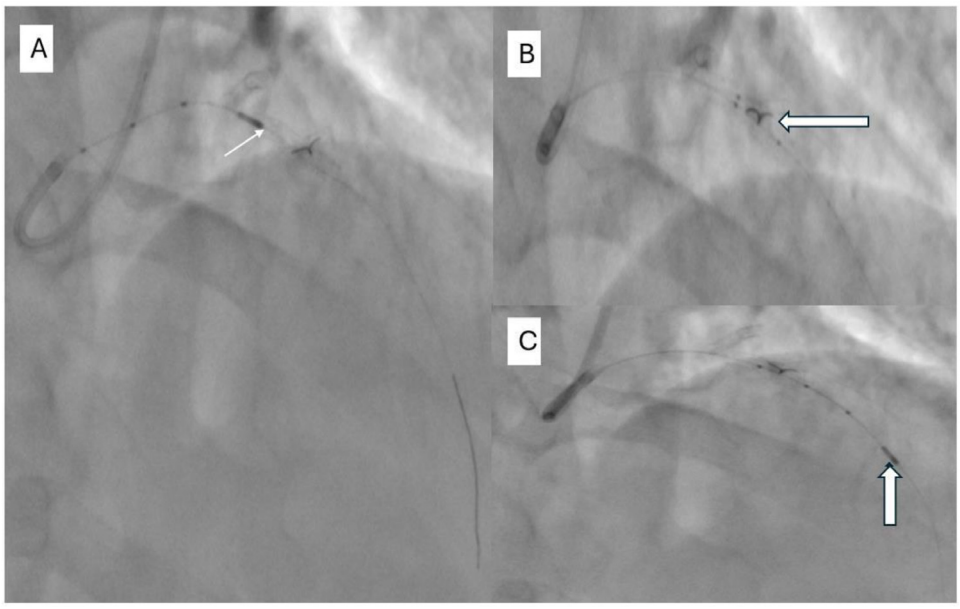

Fig. 2 – A Sion Blue wire was positioned in the distal part of LAD, but the IVUS Eagle Eye failed to cross the bifurcation (white arrow, A). Therefore, a second Sion Blue wire was placed in D1 (white arrow, B) to perform a new kissing balloon dilatation and post dilatation (POT) allowing the IVUS probe to easily cross the bifurcation (white arrow, C).

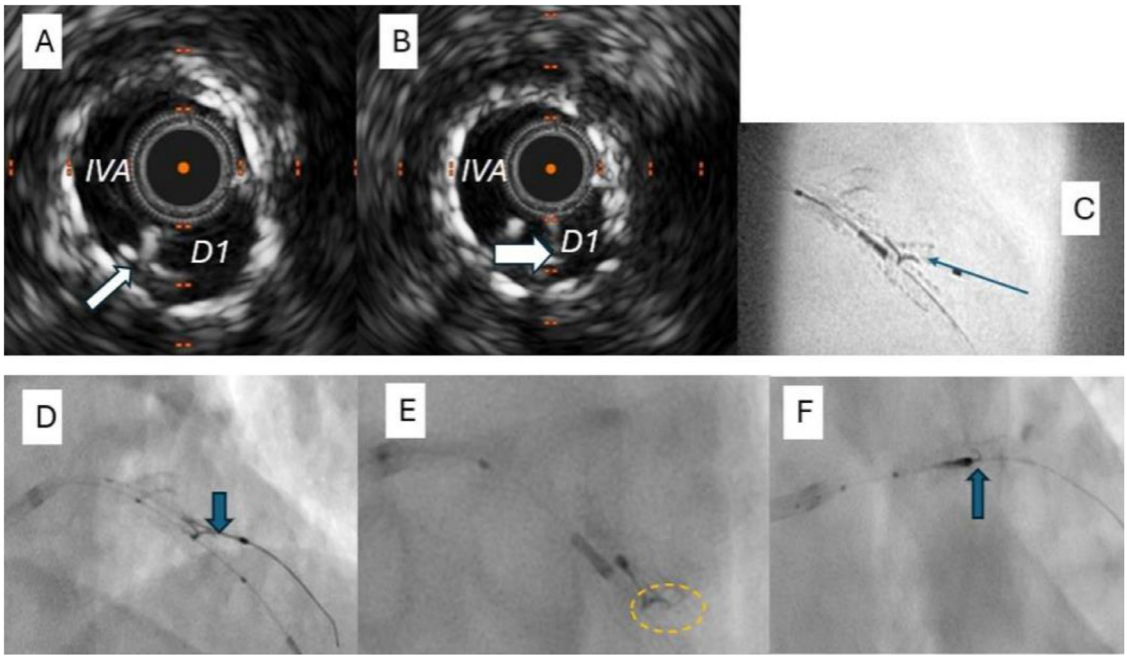

Fig. 3 – IVUS showing the distal part of the broken looping wire trapped in the D1 artery (white arrow, A) with a free and floating distal part in D1 (blue arrow, B), confirmed after an imagery reconstruction (blue arrow, C). After repositioning a guidewire in D1 artery, a snare device is advanced within D1 artery (D) to catch the distal part of the guidewire tip, under IVUS live visualization (dotted circle E), allowing the fragment extraction (blue arrow, F).

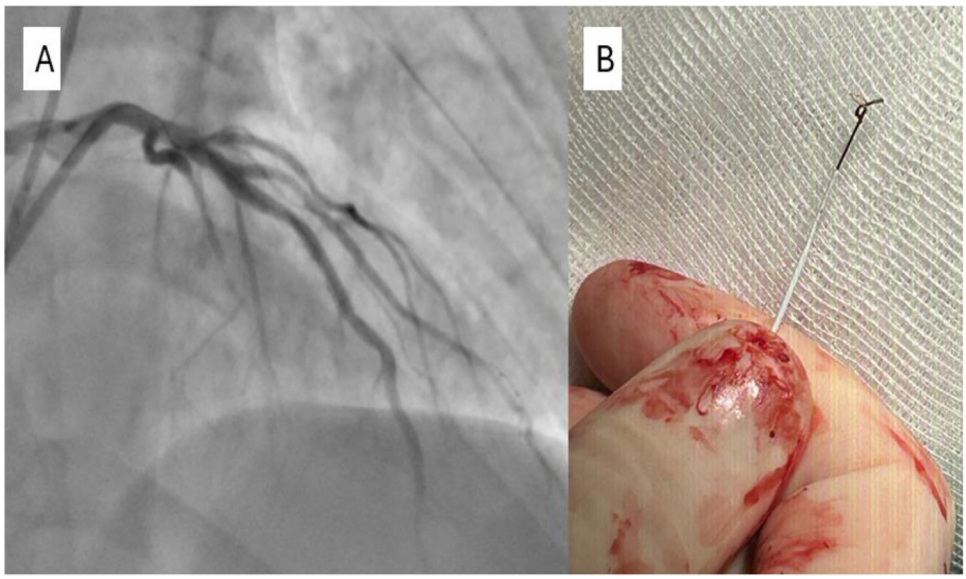

Fig. 4 – Final result after stenting the mid LAD (Pannel A) and the broken tip wire in the 2 mm loop of the ONE Snare (Pannel B).

Discussion

Nowadays, PCI with coronary artery stenting is a common procedure for CAD treatment. Material fracture during the procedure is a rare but harmful event, potentially life-threatening [1,2]. Currently, there is no consensus regarding the optimal management of this complication. Various approaches have been described in the literature, including percutaneous intervention, cardiac surgery, or sometimes conservative follow-up with watchful waiting [1–5]. In this case, conservative management was considered after the index procedure due to lack of experience in managing such complication and the morbidity associated to a surgical retrieval, in a clinically sta-

ble patient. However, watchful waiting has only been proposed in the literature for small fragments retained in distal vessels, with however risks of thrombosis and embolization [2,5]. For more proximal fragments, several percutaneous retrieval techniques have been described, such as balloon-assisted techniques, multiple guidewire approach, or snare catheter retrieval [2–10]. The balloon-assisted techniques use a guidewire passed through, alongside, or distal to the retained material to advance a small balloon inflated to trap the retained material between the balloon and a catheter, the vessel wall, or a sheath. The bundle is then pulled back as a unit to extract the foreign body. This technique is particularly indicated when the fragment cannot be easily snared due to lack of accessible free end, or to place the object in a more favorable position for subsequent snaring [5]. The multiple guidewire technique uses 2 or more guidewires advanced next to the retained object and rotated together to wrap around the fragment, before pulling it back. In coronary settings, this procedure is commonly called the “twisting wire” or “triple-wire” technique and is mainly used for fractured or entrapped guidewire fragments, especially in small or medium vessels where a snare is impossible to place [5,10]. Lastly, the snare catheter retrieval, is the most used technique in the literature due to its versatility [5,11]. A loop snare is advanced over a guiding catheter or sheath and opened distally or laterally to the foreign body to capture its free end. Once secured, the fragment is withdrawn into a sheath, when possible, reducing manipulations and vessel trauma during extraction. Despite several advantages (familiar equipment, good control, broad applicability), the technique is limited by the repeated manipulations needed with risk of embolization, vessel injury, or nearby stent distortion [11]. Compared with fluoroscopy alone, IVUS provides superior visualization of the relationship between the foreign body, vessel wall, and stent struts, allowing to lower these manipulations and reduce potential complications such as vessel injury, stent deformation, or fragment embolisation [3,4]. Optical coherence tomography (OCT), a high-resolution intracoronary imaging modality, could represent an alternative to IVUS although its use may be limited by requiring contrast injection and a lower penetration depth than IVUS [12]. The particularity of our case is the use of IVUS probe for precise localization in real-time of the broken guidewire fragment to retrieve using a Goose Neck snare. IVUS provided us a 3D continuous vision that directly influenced the retrieval strategy by enabling accurate snare alignment with minimal manipulations within the vessel. This prevented any vessel trauma or stent alteration. To note, this technique is not indicated for fragments localized within small distal vessels due to the IVUS probe size or when the object is embedded in the artery wall, plaque, or stent struts without a free end to catch.

Conclusion

Guidewire fracture during PCI is a rare but potentially life-threatening complication. Several percutaneous retrieval techniques with variable success rates have been described to avoid surgical intervention. Our case illustrates the benefit of IVUS use to perform a minimally invasive atraumatic percutaneous extraction of the retained fragment. To our knowledge, this appears to be one of the first reported cases of IVUS-guided retrieval in this specific situation.

Patient consent

Written informed consent was obtained from the patient for anonymous publication of this case report and accompanying images. Approval for publication was granted from our institution.

REFERENCES

[1] Balbi M, Bezante GP, Brunelli C, Rollando D. Guide wire fracture during percutaneous transluminal coronary angioplasty: possible causes and management. Interact Cardiovasc Thorac Surg 2010;10(6):992–4.

[2] Damjanović M, Šalinger Martinović S, Djordjević Radojković D, Koraćević G, Miloradović V. A successful retrieval of stripped outer coating of J tip diagnostic guidewire from the left popliteal artery during elective coronary angiography. Vojnosanit Pregl 2014;71(10):969–71.

[3] Li X, Wang H, Qiu H, et al. Surgical retrieval of protective guidewire that spontaneously fractured in the RCA and penetrated the vessel. J Am Coll Cardiol Case Rep 2025;30(37). doi:10.1016/j.jaccas.2025.105740.

[4] Tian W, Cui L, Nicholson CJ, Malhotra R. Successful retrieval of an entrapped and uncoiled guide wire using a wire-cutting technique. Cardiovasc J Afr 2022;33(3):162–4. doi:10.5830/CVJA-2021-056.

[5] Al-Moghairi AM, Al-Amri HS. Management of retained intervention guide-wire: a literature review. Curr Cardiol Rev 2013;9(3):260–6. doi:10.2174/1573403x11309030010.

[6] Corvino F, Giurazza F, Cavaglià E, Corvino A, Niola R. Aortic retrieval of an atrial occluder device. J Vasc Interv Radiol 2022;33(1):90. doi:10.1016/j.jvir.2021.09.002.

[7] Miyashita Y, Saigusa T, Ikeda U. Novel microsnare successfully used to remove small debris from the right coronary artery. J Invasive Cardiol 2011;23(7):E161–3.

[8] Damara S, Barik R, Prasad A. Coronary balloon assisted retrieval of a broken coronary guidewire. Niger J Cardiol 2017;14(1):47–50.

[9] Hashimoto S, Takahashi A, Yamada T, et al. Usefulness of the twin guidewire method during retrieval of the broken tip of a microcatheter entrapped in a heavily calcified coronary artery. Cardiovasc Revasc Med 2018;19(8S):28–30.

[10] Collins N, Horlick E, Džavík V. Triple wire technique for removal of fractured angioplasty guidewire. J Invasive Cardiol 2007;19(8):E230–4.

[11] Karabulut A, Daglar E, Cakmak M. Entrapment of hydrophilic coated coronary guidewire tips: which form of management is best? Cardiol J. 2010;17:104–108.

[12] Gupta A, Shrivastava A, Vijayvergiya R, Chhikara S, Datta R, Aziz A, et al. Optical coherence tomography: an eye into the coronary artery. Front Cardiovasc Med 2022;9:854554. doi:10.3389/fcvm.2022.854554.