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Percutaneous Management of a Retained Coronary Snare Fragment: Retrieval-Related Side-Branch Perforation and Migration to the External Iliac Artery: A Case Report

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Case Report

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Abstract

Background

Retained or fractured intracoronary devices are uncommon but potentially serious complications of complex percutaneous coronary intervention. Retrieval may itself cause vascular injury or systemic embolization and can require several bailout techniques.

Case presentation:

A 50-year-old man was referred after a chronic total occlusion intervention at another institution had been complicated by guidewire fracture and subsequent fracture of the snare used for retrieval. The retained snare fragment extended from the right coronary artery toward the aorta. Repeat snaring and a three-wire knot technique were unsuccessful. Balloon-assisted retrieval mobilized the fragment but caused disengagement of the system; the fragment escaped into the systemic circulation and was localized to the right external iliac artery. Control coronary angiography demonstrated perforation of the side branch used for balloon anchoring. Extravasation persisted despite prolonged balloon inflation, and microcatheter delivery for coil embolization was unsuccessful. The perforated branch was therefore occluded with a cut balloon. After angiographic hemostasis, the embolized snare fragment was captured with a peripheral snare and removed through the sheath. The patient remained hemodynamically stable, developed no tamponade, and had no procedure-related complication at 3 months.

Conclusion

This case illustrates a stepwise percutaneous strategy for a cascade of device-related complications. Maintaining control of the foreign body, rapidly reassessing the coronary circulation after device migration, prioritizing active coronary perforation, and retaining alternative embolization options when microcatheter delivery fails were central to successful management.

Background

Entrapment or fracture of coronary equipment is an uncommon complication of percutaneous coronary intervention (PCI), with guidewire entrapment and fracture historically reported in approximately 0.1%-0.2% of procedures (1). Retained intravascular material can promote thrombosis, vessel injury, ischemia, or systemic embolization. Management must therefore be individualized according to the patient's clinical status, the location and length of the retained component, and the procedural risk of further retrieval attempts (1).

Percutaneous retrieval options include loop snares, entanglement with two or more guidewires, balloon trapping, and microcatheter-assisted techniques. These maneuvers may avoid surgery but can cause

dissection, perforation, or loss of the device into the systemic circulation. We report the complete percutaneous management of a retained coronary snare fragment in a patient referred from another institution. Balloon-assisted retrieval was complicated by side branch perforation and systemic embolization of the fragment; both complications were managed without emergency surgery.

Case presentation

A 50-year-old man was referred to our center for percutaneous removal of a retained snare fragment from the right coronary artery (RCA). According to the referral information, a previous attempt to recanalize a proximal RCA chronic total occlusion at another institution had been complicated by fracture of a polymer-jacketed coronary guidewire during withdrawal. A tapered, higher tip-load non-polymer-jacketed wire subsequently crossed the occlusion, but the microcatheter could not be advanced. An attempted retrieval of the fractured guidewire with a snare resulted in fracture of the snare, leaving its distal portion within the RCA. A second snare attempt was unsuccessful. The patient declined surgical removal and was referred to our center. Details regarding the mechanism of the initial guidewire and snare fractures were not available to the treating team at our institution.

At our center, a guiding catheter was advanced to the RCA, and the retained snare fragment was visualized with its proximal portion protruding toward the aorta (Video 1). An additional snare failed to capture the fragment. Three floppy guidewires were then advanced through the retained snare and their distal portions were intertwined in an attempt to entangle the foreign body; this maneuver was also unsuccessful.

A balloon-assisted retrieval strategy was therefore undertaken. A guidewire was passed through the retained snare, but a balloon could not initially be advanced distal to the fragment. To increase guide-catheter support, a small RCA side branch was engaged for balloon anchoring. Two guidewires were subsequently passed through the retained snare, and two balloons were positioned distally, inflated simultaneously, and withdrawn together. The fragment was mobilized; however, the guiding system disengaged from the RCA ostium during withdrawal. While an attempt was made to draw the fragment into the guiding catheter in the ascending aorta, the fragment caught at the catheter tip, escaped from the retrieval system, and embolized into the systemic circulation.

The RCA was immediately re-engaged. Control angiography demonstrated perforation of the side branch that had been used for balloon anchoring, with active contrast extravasation. The branch was rewired and a balloon was inflated at its ostium. Because extravasation ceased during inflation and the patient remained hemodynamically stable, a fluoroscopic survey was performed to locate the embolized fragment. The fragment was identified in the right external iliac artery (Video 1).

After localization of the foreign body, attention was redirected to the more time-sensitive coronary complication. Extravasation recurred after balloon deflation and persisted despite prolonged balloon inflation. Coil embolization of the side branch was planned. The RCA was engaged using a ping-pong double-guide technique, and the branch was wired with a second guidewire. Despite anchoring, a

microcatheter could not be advanced into the branch through either guiding catheter. Because conventional coil delivery was not feasible, a cut balloon was advanced over the coronary guidewire into the injured branch and deployed as an embolic material. Final angiography confirmed cessation of extravasation (Video 1).

Once coronary hemostasis had been secured, the fragment in the right external iliac artery was captured with a peripheral vascular snare, withdrawn into the sheath, and removed together with the system (Fig. 1 and Video 1). The patient remained hemodynamically stable throughout the procedure. No cardiac tamponade occurred. He was monitored for 1 day in the intensive care unit and for a further 2 days on the cardiology ward before discharge. At 3-month follow-up, no procedure-related complication was identified.

Clinical timeline

At the referring institution: RCA CTO intervention complicated by guidewire and snare fractures; unsuccessful retrieval and referral after the patient declined surgery. At our center: unsuccessful repeat snaring and three-wire entanglement; balloon-assisted mobilization complicated by fragment migration and side-branch perforation; coronary bleeding controlled with a cut-balloon fragment after failed prolonged balloon inflation and attempted coil delivery; subsequent iliac retrieval with a peripheral snare. After the procedure: 1 day in intensive care and 2 days on the cardiology ward; no procedure-related complication identified at 3 months.

Discussion

This case demonstrates the management of a procedural cascade rather than an isolated retained-device event. The clinically relevant contribution of this report is the stepwise rescue strategy used after referral: escalation through several percutaneous retrieval methods, recognition of two secondary complications, prioritization of active coronary bleeding, and definitive retrieval of the embolized fragment from the iliac circulation.

Retained coronary equipment is highly thrombogenic and may cause acute vessel occlusion, distal embolization, or vascular trauma. Nevertheless, aggressive retrieval is not uniformly appropriate. Small fragments trapped within chronically occluded distal vessels may occasionally be left in situ, whereas mobile or proximally extending material generally warrants removal because of the risk of embolization and ongoing mechanical injury (1). In the present patient, the retained snare extended toward the aorta and had already resisted prior retrieval, favoring a further percutaneous attempt after the patient declined surgery.

A systematic escalation strategy is important when conventional snaring fails. Multiwire entanglement can capture irregular foreign bodies without requiring passage of a dedicated retrieval catheter beyond the fragment. Balloon-assisted trapping can provide greater purchase by placing and inflating a balloon distal to or within the retained loop. However, these techniques transmit traction to the coronary artery

and guiding system. In this case, the need for side branch anchoring illustrates the limited guide support, while subsequent system disengagement illustrates the risk of losing control of a mobilized foreign body. When feasible, the retrieval plan should anticipate the point at which the fragment will enter the guide, maintain coaxial alignment, and minimize the interval during which the fragment is mobile but not secured.

The immediate re-engagement of the RCA after fragment loss was critical. Coronary perforation is uncommon but potentially life-threatening; consequences depend on vessel size, perforation site, ongoing anticoagulation, and the development of pericardial effusion or tamponade (2–4). Prolonged balloon inflation is an appropriate first-line measure for many wire-related distal or side branch perforations. Persistent distal bleeding may require embolization with coils, autologous fat or clot, thrombin, or other materials, whereas large-vessel perforation is more commonly treated with a covered stent (3, 4).

In the present case, coil embolization was selected after prolonged balloon inflation failed, but the microcatheter could not be delivered despite a double-guide strategy and balloon anchoring. Embolization with a cut balloon provided a readily available alternative. The technique has been described for distal coronary perforation and involves advancing a balloon fragment over a coronary wire into the target branch, usually with another balloon used as a pusher (5–7). In a multicenter series of 26 perforations, angiographic sealing was achieved using this approach, although pericardiocentesis remained necessary in a subset of patients (5). The method should therefore be regarded as a bailout technique that requires careful selection, secure distal placement, and confirmation of hemostasis rather than as a substitute for standard perforation management.

The sequence of priorities also deserves emphasis. After the migrated fragment was localized to the external iliac artery, the stable location of the foreign body allowed treatment to be deferred temporarily while active coronary extravasation was addressed. Only after angiographic hemostasis was obtained was the iliac fragment retrieved. This approach reduced the risk of delaying treatment of a potentially life-threatening coronary complication while preserving a fully percutaneous strategy.

The main limitation of this report is the absence of complete procedural documentation from the referring institution; consequently, the mechanisms of the original guidewire and snare fractures and the exact devices used during the first procedure cannot be established. In addition, this is a single case and cannot define the comparative safety of the retrieval or embolization techniques. Its value is educational: it shows how repeated reassessment and staged prioritization can permit percutaneous resolution of a complex chain of complications.

Conclusion

A retained coronary snare fragment can be managed percutaneously, but retrieval may generate further vascular complications. In this case, balloon-assisted mobilization was followed by side branch perforation and systemic embolization of the fragment. The perforation was sealed with a cut balloon

after coil delivery failed, and the fragment was subsequently removed from the right external iliac artery using a peripheral snare. Careful prioritization, rapid reassessment after device migration, and familiarity with alternative retrieval and embolization techniques enabled a complete percutaneous rescue.

Abbreviations

PCI: percutaneous coronary intervention

RCA: right coronary artery

Declarations

Consent for publication: Written informed consent was obtained from the patient for publication of the clinical details and accompanying images and video included in this case report.

Conflict of interest: The authors declare no conflicts of interest.

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Data availability: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions: Both authors contributed equally and actively to all stages of the study and read and approved the final version of the manuscript.

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Ethics approval and consent to participate: Not applicable to this single-patient case report; written consent for publication is stated above.

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Figures



Figure 1

Retrieved snare fragment after removal from the right external iliac artery.

Supplementary Files

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- VIDEO1.mp4