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Case report

Balloon Disruption during Below the Knee Angioplasty, A Serious Uncommon Complication

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Background: Peripheral arterial disease is a prevalent vascular condition that frequently necessitates endovascular interventions, such as balloon angioplasty, for revascularisation

Materials and Methods: This case report describes the management of a 65-year-old male patient with critical limb ischaemia and a chronic total occlusion of the anterior tibial artery.

Results: The procedure encountered a challenging complication when a monorail balloon used for crossing the lesion in the anterior tibial artery disrupted from mid-shaft, leaving a long segment inside the vessel. However, this complication was effectively resolved using an endovascular approach.

Conclusion The clinical implication of this case highlights the importance of adaptability and skill in managing unexpected complications during endovascular procedures. Proper guidewire management and careful balloon handling are essential in preventing additional damage to the vessel and achieving a successful outcome.

Keywords: Balloon Angioplasty, Endovascular Techniques, Complicity

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Introduction

Peripheral arterial disease (PAD) is a common vascular disorder characterized by the narrowing or blockage of arteries supplying blood to the extremities, primarily the lower limbs.(1) Revascularization procedures, such as balloon angioplasty, are frequently employed to alleviate symptoms and improve blood flow in affected individuals. (2) Herein, we present a case of a 67-year-old male patient diagnosed with critical limb ischemia and a chronic total occlusion (CTO) in the anterior tibial artery, who encountered a unique complication during below the knee balloon angioplasty.

Case Presentation

A 65-year-old male patient with a medical history significant for PAD presented with critical limb ischemia. Diagnostic imaging revealed a CTO in the anterior tibial artery (**Figure 1**), necessitating revascularization. The decision was made to perform a below the knee balloon angioplasty to restore blood. flow to the affected limb

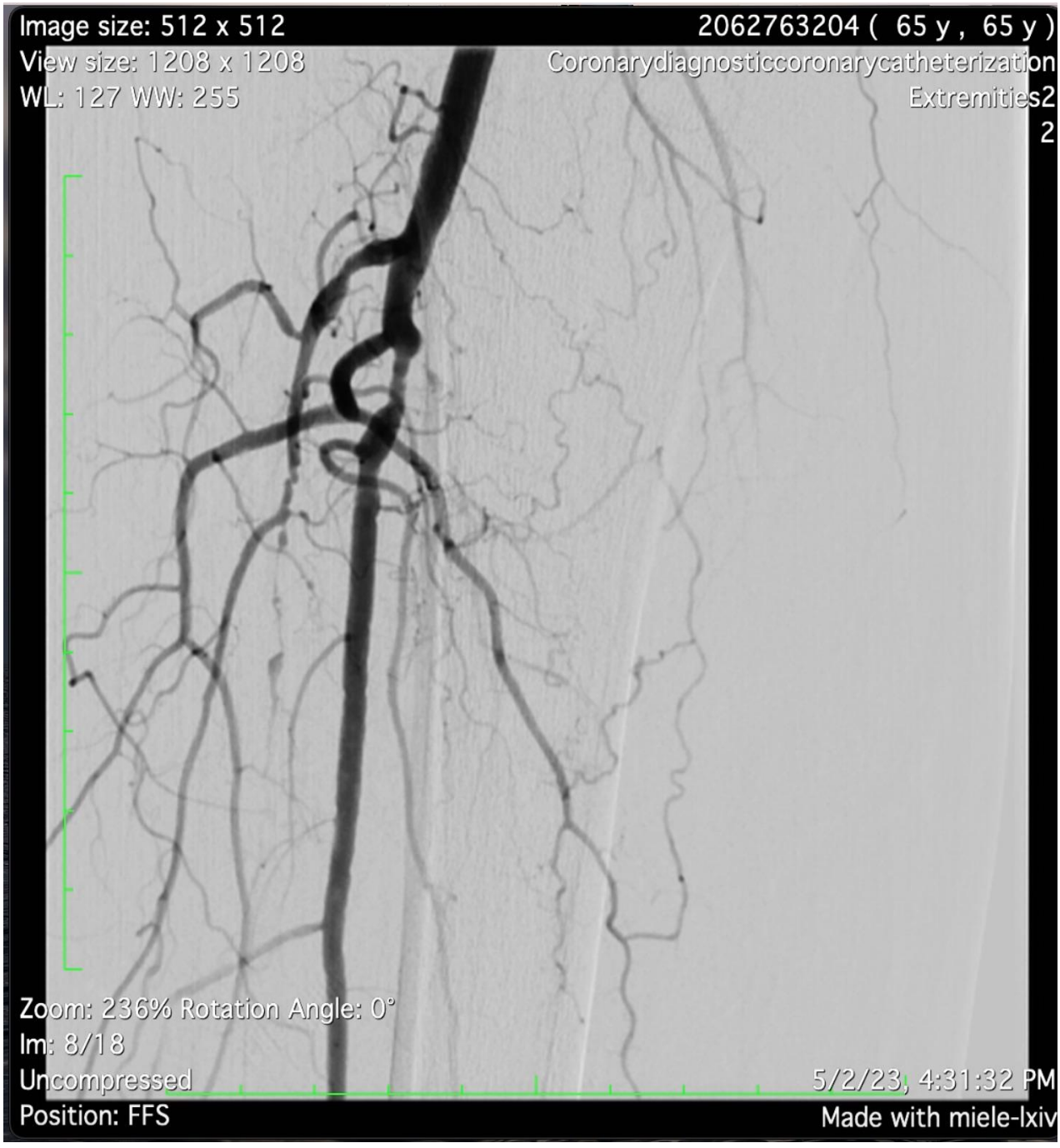

Fig 1. Below the knee digital sub traction angiography revealed anterior tibial artery occlusion.

A 6F antegrade sheath was inserted into the right femoral artery, after passing the 6F Guiding catheter and a Hi-Torque Command ES Guide Wire - 0.014 * 190cm (Abbott) was advanced across the CTO lesion in anterior tibial artery. A 2 mm* 10 mm, 0.014, monorail percutaneous transluminal coronary angioplasty (PTCA) balloon catheter was selected to dilate the occluded segment and re-establish blood flow (**Figure 2**).

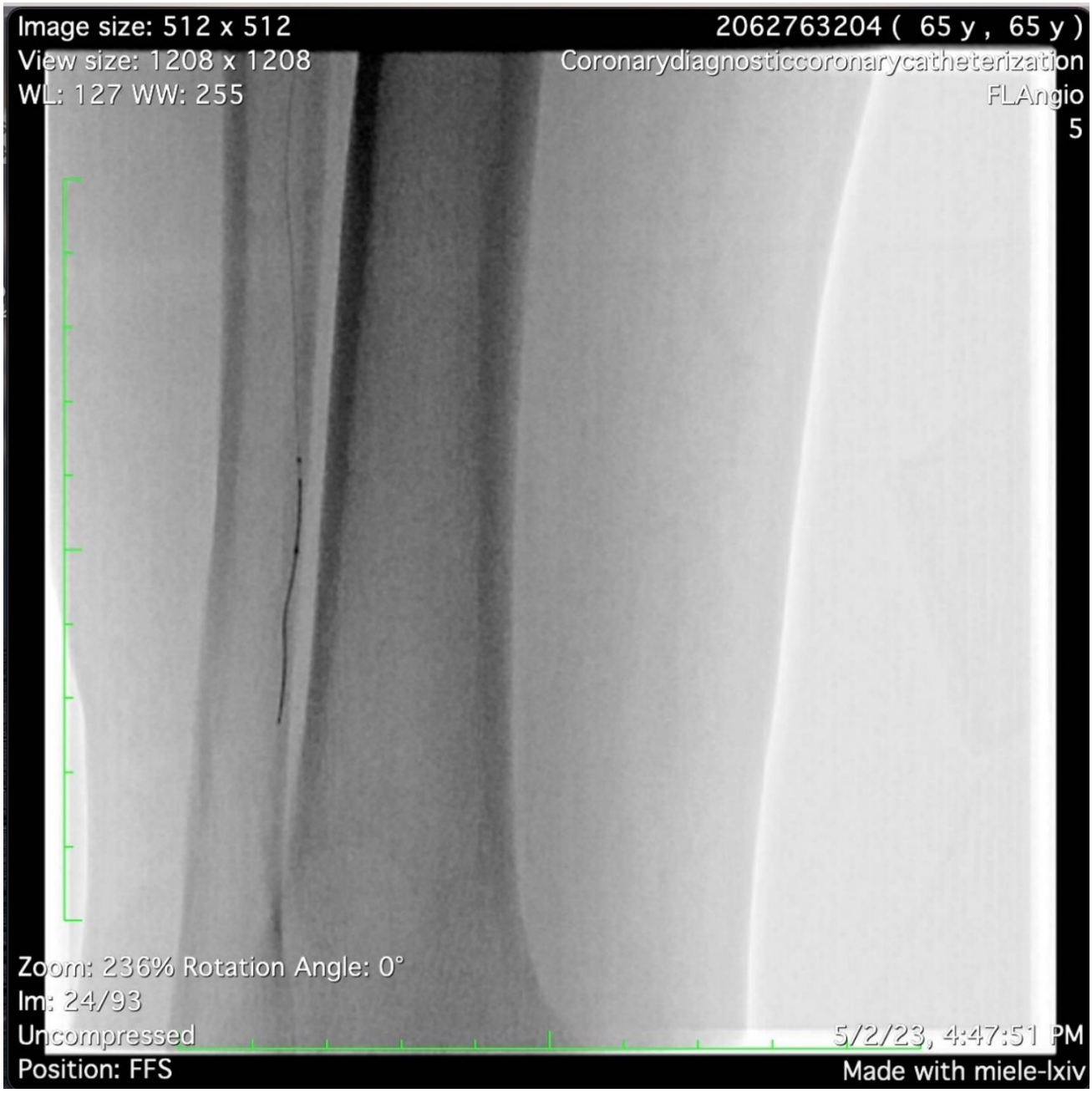

Fig 2. Crossing the anterior tibial artery lesion by Firefighter™ PTCA balloon but it disrupted suddenly.

During the balloon inflation, the PTCA balloon catheter suddenly disrupted from mid-shaft, resulting in a significant portion of the balloon becoming lodged from the middle anterior tibial artery to distal of femoral artery. This unforeseen complication posed a challenge to the ongoing procedure

To address the complication of the disrupted balloon, an endovascular approach was employed. Under fluoroscopic guidance, the Command ES guide wire was removed and then again carefully advanced through the guiding catheter and passed beyond the disrupted segment of the balloon (**Figure 3**).

Fig 3. Successfully passing the second balloon beyond the disrupted balloon.

Subsequently, a second 2 mm 10 mm, 0.014 PTCA balloon catheter was passed over the guidewire with meticulous movement and navigated to the distal site of the disrupted balloon (**Figure 4**), where it was inflated. The inflated balloon was then pushed back using gentle traction, moved into the guiding catheter **(Figure 5**).

Fig 4. Pulling back the disrupted balloon by the second inflated balloon.

The guiding catheter and the inflated balloon in its tip were then pulled back together and out of the femoral sheath. Following the successful extraction (**Figure 6**) (Video 1), a new 2.5*80 mm Armada balloon was selected, and the angioplasty procedure was resumed. Post-procedure angiography demonstrated significant improvement in blood flow through the revascularized anterior tibial artery. The CTO was successfully treated, and the affected vessel showed improved distal flow with visible runoff to the foot. The patient's clinical course was uneventful, with resolution of rest pain, improved wound healing, and restoration of pedal pulses.

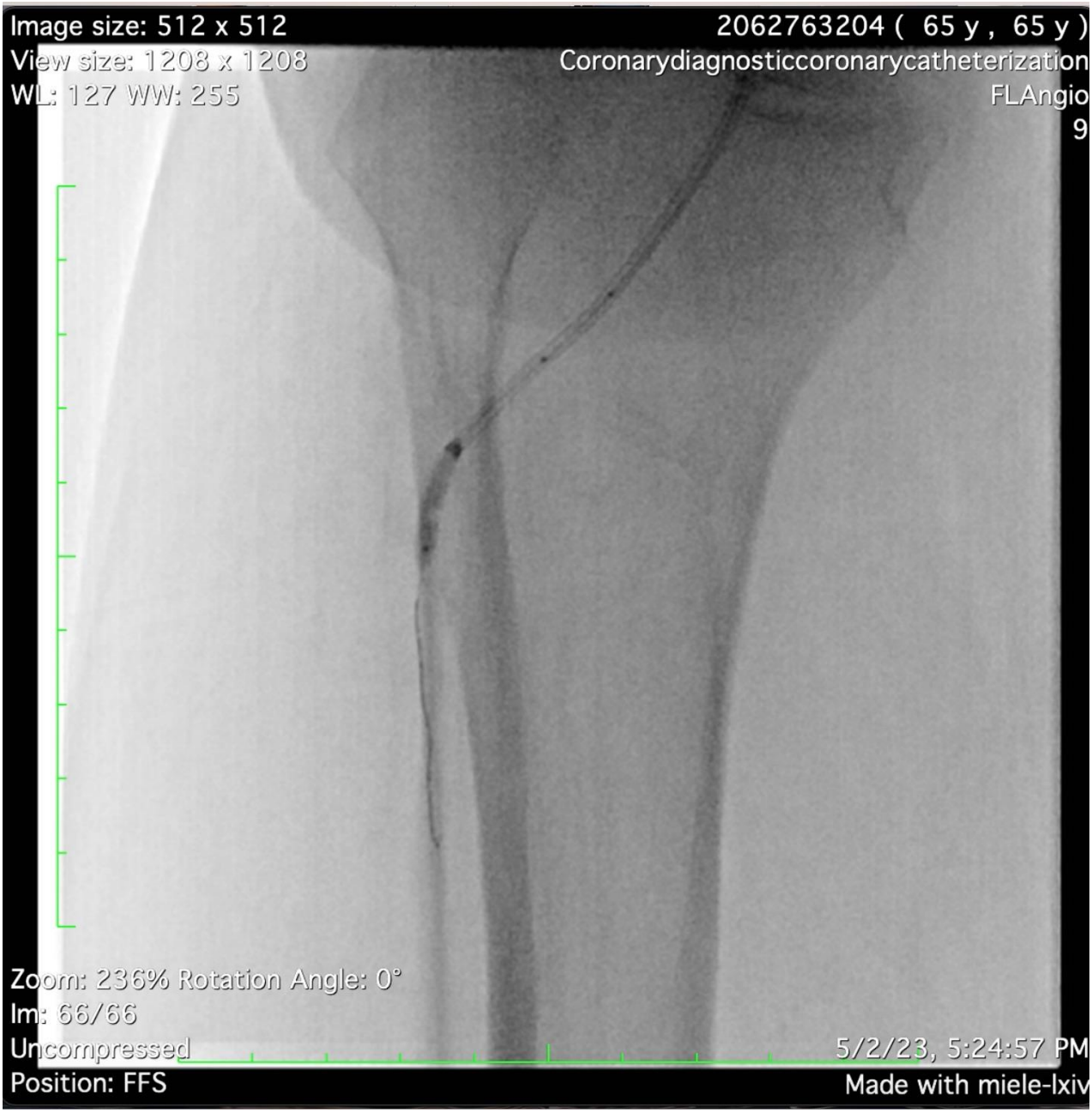

Fig 5. Entering the disrupted balloon into the guiding catheter.

Fig 6. Complete removal of the disrupted balloon.

Discussion

Balloon disruption during below the knee angioplasty is a serious complication that requires careful consideration and management. Several factors may contribute to this occurrence, including balloon manufacturing defects, excessive inflation pressure, vessel calcification, or anatomical variations. (3, 4) It is

crucial for healthcare providers to be aware of these potential factors and to take appropriate precautions to minimize the risk of such complications. When balloon disruption happens, it poses immediate challenges for the interventional team. The primary concern is the potential embolization of balloon fragments, which can lead to distal vessel occlusion or even ischemia in the affected limb. (3) Additionally, the disrupted balloon can impede further attempts at angioplasty, necessitating alternative treatment strategies such as stent placement or surgical intervention.

The management of balloon disruption requires a multidisciplinary approach. Prompt retrieval of the fragmented balloon components using specialized retrieval devices is crucial to prevent embolization and minimize the risk of complications. Due to the narrow diameter of the arteries below the knee, the use of a retrieval device such as snare was not feasible. This is because the snare ring does not open in arteries with a diameter of just a few millimeters. Faced with this disappointing situation, an alternative solution was proposed in our patient: pulling back the disrupted balloon into the guiding catheter using another balloon. This approach effectively resolved the problem at hand. It appears that the decision to remove the command guidewire in our patient was not an appropriate course of action. Ideally, the second guidewire should have been passed alongside the detached balloon while ensuring its stability. This is because having a guidewire within the lumen of the disrupted balloon facilitates its movement towards the guiding catheter, allowing for effortless entry into the catheter itself. However, there was a concern about potential damage to the arterial endothelium during balloon inflation. (5) This concern was successfully mitigated by carefully managing the balloon pressure during its passage. The endovascular method, utilizing a guide wire and recovery balloon, proves to be effective in addressing the challenging complication of balloon disruption. The successful outcome of below the knee balloon angioplasty underscores the significance of adaptability and skill in managing unexpected complications during endovascular procedures. (6)

In conclusion, this case underscores the importance of adaptability and skill in managing unexpected complications during endovascular procedures. Effective guidewire management and careful handling of the balloon are crucial to prevent further vessel damage and ensure a successful outcome. By employing these techniques, complications such as balloon disruption can be resolved, emphasizing the need for precision in endovascular treatments to achieve optimal results.

Declaration

Ethical Approval:

This study approved by the Ethics Committee of Babol University of Medical Sciences. (IR. MUBABOL. REC.1402.068)

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Conflict of Interest Statement

There was no conflict of interest.

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