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Large-bore SOFIA catheter for bailout thrombus aspiration in STEMI

Jacek Klaudel[1], Wojciech Trenkner[1], Krzysztof Pawłowski[1, 2], Piotr Radowski[1], Dariusz Surman[1], Bartłomiej Ziniewicz[1], Michał Smolarczyk[1], Urszula Kossakowska-Jemioło[1], Włodzimierz Krasowski[1]

[1]Department of Cardiology, St. Adalbert's Hospital in Gdansk, Copernicus PL, Gdansk, Poland
[2]Department of Cardiology and Interventional Angiology, Kashubian Center for Heart and Vascular Diseases in Wejherowo, Poland

Routine thrombus aspiration in primary percutaneous coronary intervention is not recommended in the current European and American guidelines [1, 2]. The Japanese Cardiological Society recommendations state that selective or bailout manual aspiration thrombectomy may be considered in patients with ST-segment elevation myocardial infarction (STEMI) [3]. Despite downgrading in the guidelines, thrombus aspiration still has a role in STEMI interventions, albeit limited to heavy thrombus burden, unsuccessful reperfusion or distal embolization [4–6]. However, the task of large clot extraction usually calls for a large-bore catheter [7–9]. The lumen of 6 F (French) coronary aspiration devices, limited by the extra channel for rapid exchange wire, is often too small to evacuate large thrombus. Seven and eight F aspiration catheters are available, although they are less likely to be used with radial access, while femoral crossover will certainly prolong the door-to-balloon time and bring about higher risk of access site complications, particularly in patients typically receiving GP IIB/IIIA inhibitors due to the high thrombus burden. Therefore, guiding catheters that were traditionally used for extraction of proximally lodging clots are sometimes still utilised, while guide extension catheters have been employed to reach thrombus in medial and distal segments. After using a so called intermediate or distal access catheter Sofia (Microvention, Terumo) for thrombectomy in stroke interventions, being satisfied with its performance, we decided to resort to it in bailout situations in STEMI patients.

An 81-year-old male patient with a history of arterial hypertension, diabetes mellitus type 2, and chronic renal insufficiency was admitted due to the inferior wall STEMI. In angiography, the right coronary artery (RCA) occlusion was found (Fig. 1A). Six F 4.0 Judkins Right guide (Launcher by Medtronic) was used for intervention. After balloon inflation, partial recanalization revealed massive thrombus in the middle to distal RCA (Fig. 1B). Due to the clot size, based on our previous experience, a 5 F 125cm long neurointerventional catheter Sofia was used. Its excellent trackability allowed us to smoothly deliver it wirelessly even without an extra backup guiding catheter (Suppl. Video 1). Two passes were needed to completely evacuate the thrombus, with contact aspiration first performed in the middle and subsequently in the distal segment of the RCA (Fig. 1C). To maintain constant negative pressure, two 50 ml vacuum locking syringes were attached through a three-way stopcock. After the thrombectomy, TIMI 3 flow was achieved with a residual 50% stenosis (Fig. 1D). Two days later, deferred drug-eluting stent implantation was performed to avoid the no-reflow phenomenon.

Sofia is available as a 115 or a 125 centimetre long catheters with a straight tip, compatible with

Address for correspondence: Jacek Klaudel, Aleja Jana Pawła II 50, 80–462 Gdansk, Poland; tel.: +48 768 44 34; e-mail: jklaudel@copernicus.gda.pl

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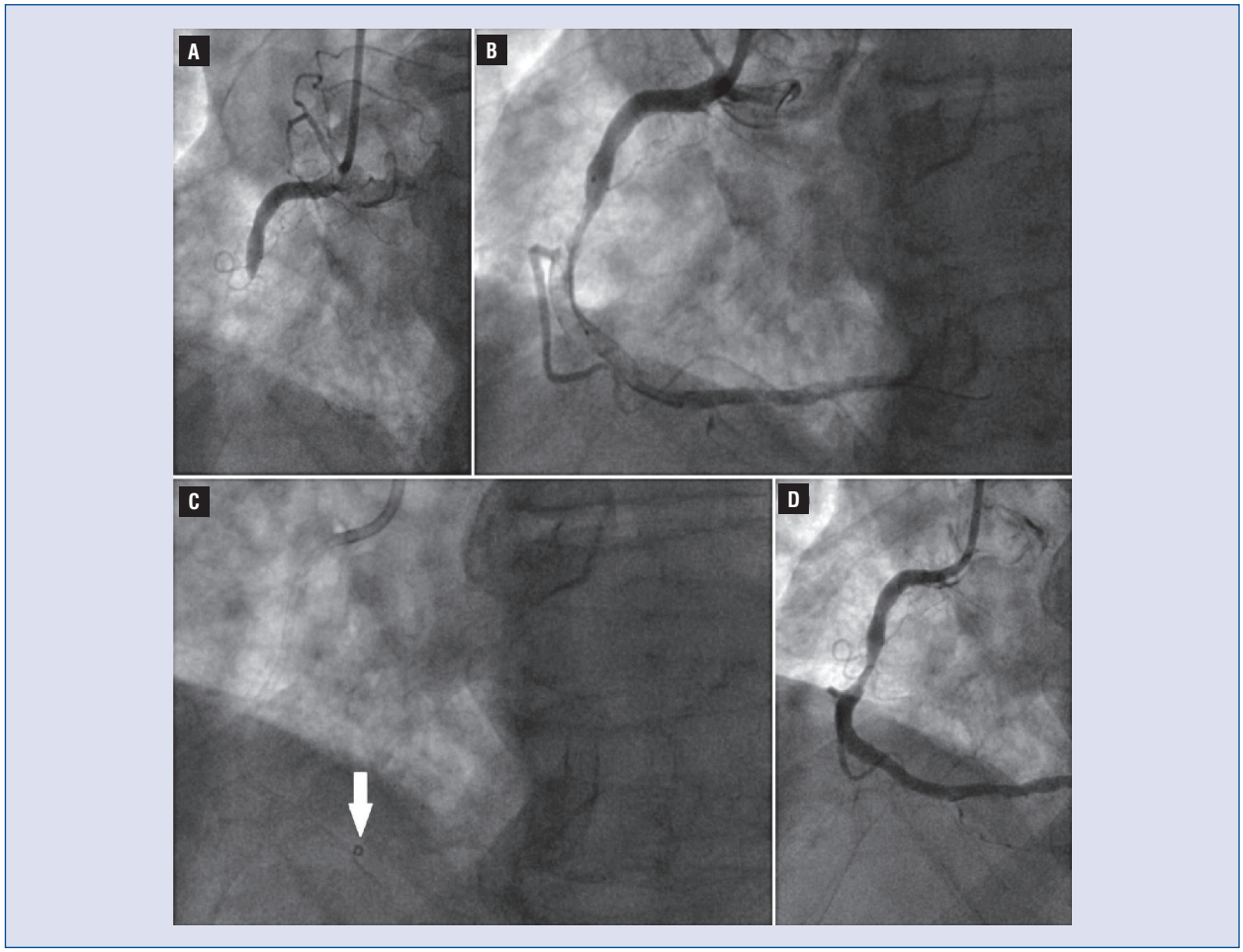

Figure 1. Aspiration thrombectomy performed with 5 F Sofia. Acute occlusion of mid-RCA (**A**). Large thrombus revealed after balloon inflation (**B**). Distal aspiration with Sofia (*arrow*) (**C**). Culprit lesion revealed after thrombus extraction (**D**).

6 F guides with an inner diameter of at least 0.070" (Figure 2 — Sofia setup). Sofia's distal 17 cm are very soft (even flaccid), flexible and hydrophilic, yet with a good kink resistance and pushability due to hybrid braid and coil reinforcement. The aspiration technique is intuitive, the same as with conventional aspiration catheters; however, a few caveats should be taken into account. Sofia is not a monorail catheter. It can be advanced and removed wirelessly (our preferred technique, offering larger aspiration lumen), but when vessel wiring is to be maintained upon withdrawal, a 300cm long guidewire is needed. For very distal aspiration, Sofia's working length can be increased by 9 cm by direct insertion of the catheter into the guide without a Y connector.

With the outer diameter roughly the same as that of the 6 F coronary aspiration devices (1.70 mm Sofia vs. 1.72 mm Hunter by IHT Dynamics), Sofia offers a 60% larger extraction lumen than the latter (1.52 mm^2 Sofia vs. 0.95 mm^2 Hunter). To provide a similar extraction area, one would have to use 7 or even 8 F coronary devices (7F Pronto V4 by Teleflex: 1.45 mm^2, 8 F Eliminate by Terumo: 1.58 mm^2). Sofia's aspiration area is comparable to 6 F guide extension catheters (1.52 mm^2 Sofia vs. 1.58 mm^2 Telescope by Medtronic), with better trackability and continuous suction lumen [10]. Sofia is also much more flexible and hydrophilic than guide extension catheters, and understandably so, as the latter have been designed for providing additional support to guiding catheters. In fact, Sofia is so extremely trackable that it can and often is advanced wirelessly in stroke interventions. Originally a neurointerventional catheter, Sofia has an atraumatic tip and flexibility necessary to navigate tortuous intracranial arteries.

We believe that the use of such large-bore aspiration catheters with greater aspiration capacity may be a game changer in the coronary

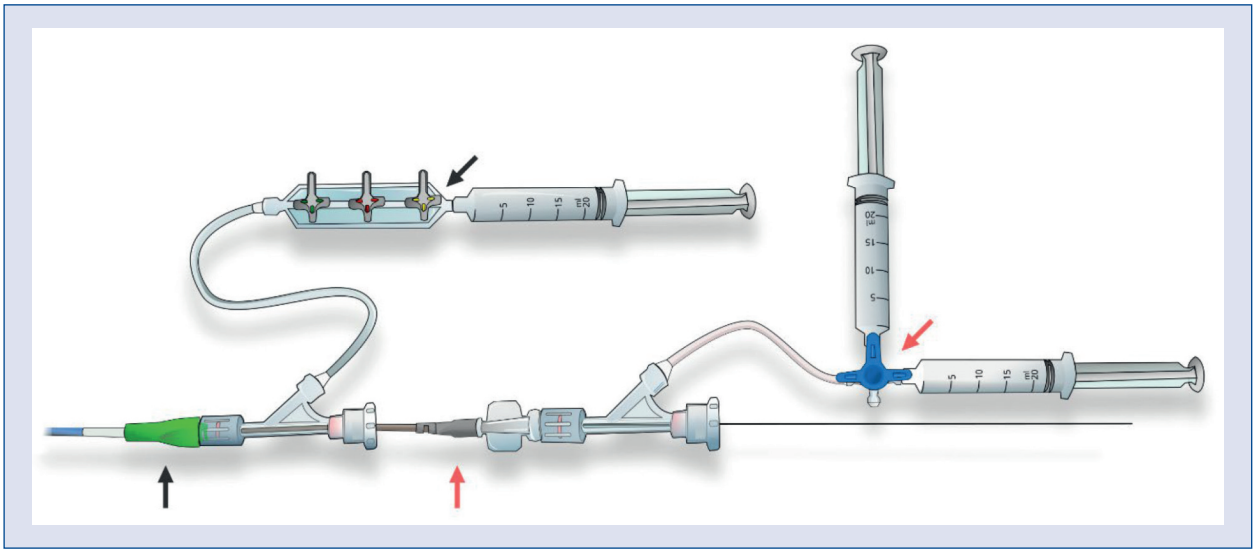

Figure 2. Author's typical setup for coronary thrombus aspiration with Sofia. Black vertical arrow — guide catheter; red vertical arrow — Sofia; black diagonal arrow — aspiration through the guide; red diagonal arrow — two vacuum locking syringes for aspiration through Sofia.

thrombectomy, significantly improving its efficacy, with the potential to reduce cerebral and coronary embolic complications due to the catheter's ability to generate greater suction force and accommodate entire chunks of clot without their fragmentation [9–12]. Our preliminary experience of massive thrombus aspiration with Sofia as a rescue or last resort technique are promising, with complete or near-complete clot clearance in all cases, and no coronary dissection or clot loss observed thus far.

Conflict of interest: None declared.

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