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Robotic-assisted coronary excimer laser atherectomy: The first case of joined facilities

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Robotic percutaneous coronary intervention (R-PCI) is a novel approach to PCI that is thought to provide more precise manipulation tools while decreasing radiation dose and contrast usage [1]. In several studies, R-PCI proved to have a comparable success rate and procedure time with manual percutaneous coronary intervention. So far, it has been tested only for regular coronary balloons and coronary stents handled by a robotic arm. No data was available for special catheters, including coronary excimer laser atherectomy catheters (ELCA) [2].

A 63-year-old female with a history of arterial hypertension and gastroesophageal reflux disease was administered to our Cardiology Department, presenting Canadian Cardiovascular Society II angina symptoms. Previously, she underwent several percutaneous coronary interventions (PCI), including coronary stenting in the left anterior descending artery and in a circumflex artery (Cc). Because of the development of in-stent restenosis in 2017 and 2022, performing re-PCI in Cx with drug-eluting balloons was necessary.

An initial angiogram revealed a tight restenotic lesion (Figure 1A) of the Cx artery. Due to another episode of in-stent restenosis, excimer laser coronary atherectomy (ELCA) was used, mainly based on the morphology of the lesion showed by intravascular ultrasound (IVUS) (Figure 1C). R-One+™ device (Robocath Co) has been used to perform all the intravascular manipulations (IVUS, ELCA). After IVUS, the operator decided to advance the ELCA catheter

(0.9 mm X-80 catheter, Philips Co) and delivered energy equal to 70 mJ/mm^2 with a rate of 55 Hz. Following ELCA, we performed inflations with a semi-compliant 3.0 × 20 mm balloon at 12 atm, followed by a 3.5 × 25 mm cutting balloon at 12 atm, and finally with 3.5 × 25 mm sirolimus-eluting balloons at 10 atm with good angiographic result (Figure 1B). An intravascular ultrasound was performed to confirm a good result of the procedure (Figure 1D).

To our knowledge, this was the first R-PCI performed featuring ELCA. Our case indicates that an ELCA catheter is feasible for R-PCI and designates the future of complex PCI; however, further research in this field is necessary. What is very important is controlled, slow ELCA catheter advancement by the robotic arm is desirable for laser efficiency in many indications [3] and additionally addresses some limitations of manual ELCA interventions, such as more prolonged radiation exposure during slow advancement in contrary to other coronary devices and tools [4] used for in-stent restenosis treatment.

Article information

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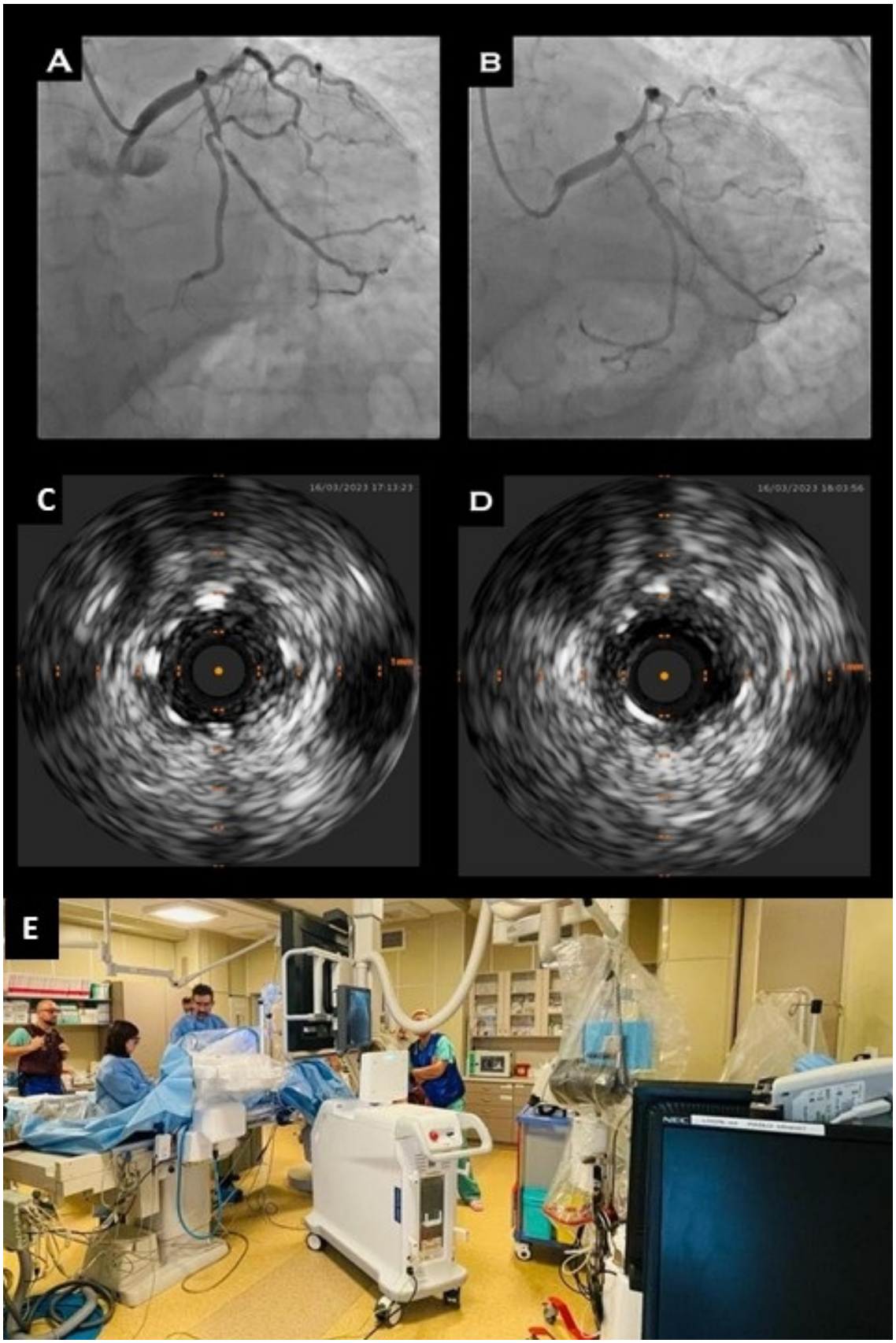

Figure 1. Case example of robotic-assisted coronary laser atherectomy. **A.** The initial angiogram. **B.** The final angiogram and intravascular ultrasound images (pre and post, respectively **C–D**). **E.** The cath lab setup for the procedure