

# Successful percutaneous coronary intervention on triple chronic total occlusion

## Skuteczne przezskórne udrożnienie przewlekłej niedrożności trzech tętnic wieńcowych

### ABSTRACT

Chronic total occlusions may be found in 20–30% of patients admitted to hospital and undergoing coronary catheterization. In last few years we observe a great progress in a field of those procedures and higher rate of successful interventions. In the current paper, case of successful percutaneous recanalization of triple chronic total occlusion was shown.

**Key words:** triple CTO, angioplasty

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### STRESZCZENIE

Przewlekłe okluzje naczyń wieńcowych mogą wystąpić u 20–30% pacjentów przyjmowanych do pracowni hemodynamiki, u których wykonuje się diagnostykę inwazyjną. W ciągu ostatnich kilku lat obserwujemy znaczny postęp na tym polu oraz większy odsetek skutecznych interwencji. W przedstawionej pracy opisano przypadek pacjenta poddanego skutecznej rekanalizacji trzech nasierdziowych tętnic wieńcowych

**Słowa kluczowe:** potrójne CTO, angioplastyka

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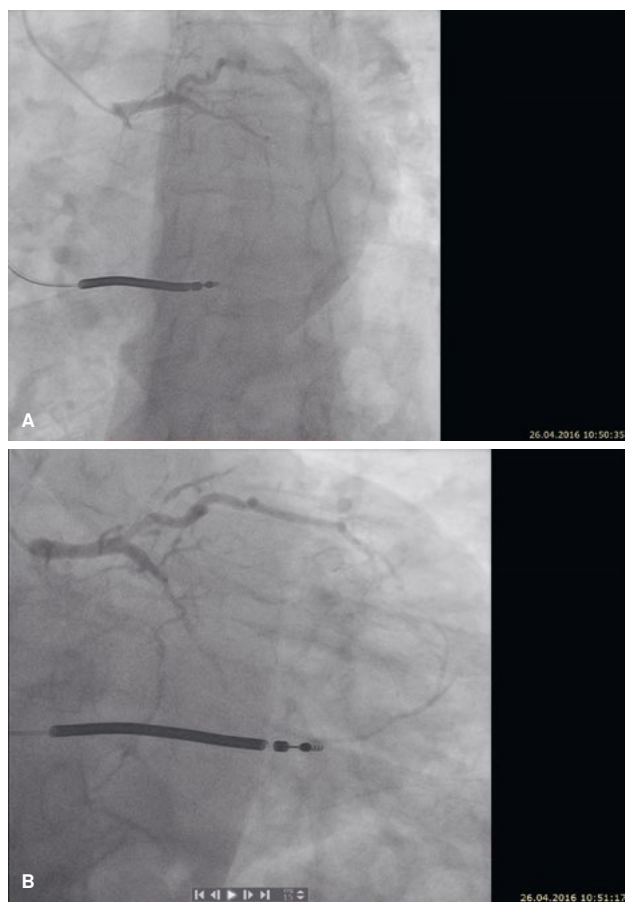
Chronic total occlusions (CTOs) may be found in 20–30% of patients admitted to hospital and undergoing coronary catheterization [1]. In last few years we have observed a great progress in the field of these procedures and an increase in the rate of successful interventions [2].

The success rate may be assessed by using the scoring systems (e.g. J-CTO predicting score). In our Cathlab it oscillates between 80–85% and is similar to success rates reported by many experienced centres. Such an improvement would not be possible without development of huge variety of technologies and devices such as dedicated guidewires, microcatheters, balloons, over-the-wire (OTW) balloons, mother and child technique (Terumo, ASAHI Intecc) in conjunction with utilizing both antegrade and retrograde technique [2]. We are still looking forward to novel devices, such as plasma wire, which may be available in not so distant future.

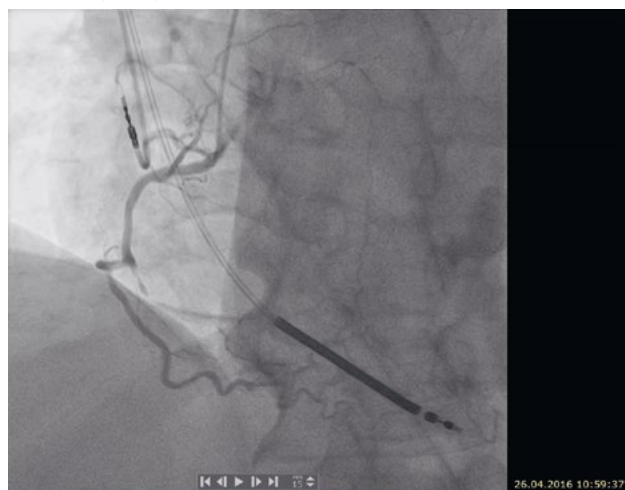
We present a challenging case of a patient with triple CTO.

A 64-year-old patient with hypertension, diabetes, heart failure with reduced ejection fraction (HFrEF), with a history of multivessel disease (MVD) (in 2007 patient did not consent to coronary artery bypass surgery CABG), myocardial infarction (2013), previous percutaneous coronary intervention (PCI) of the right coronary artery (RCA) in 2013 with implantation of three bare metal stents (BMS) and after implantation of implantable cardioverter-defibrillator (ICD-DDD) in (2016) was admitted to our department with exertional angina class III according to the Canadian

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**Figure 1.** Chronic total occlusion of LAD and Cx — spider view (above), AP cranial (below)



**Figure 2.** Chronic total occlusion of RCA — LAO cranial view



**Figure 3.** Final result after triple PCI — left coronary artery RAO caudal view (left), right coronary artery RAO view (right)

Cardiovascular Society. Patient underwent coronary angiography which revealed ostial occlusion of left anterior descending artery (LAD), proximal occlusion of circumflex coronary artery (Cx) (Fig. 1A, B) and medial in-stent occlusion of the right coronary artery (Fig. 2). The patient still did not consent to CABG so our decision, after confirming myocardial viability by echocardiography, was to perform staged PCI.

In the first stage, we started with PCI of RCA with JR 6Fr guiding catheter through, right radial access. The occlusion was crossed with antegrade approach with Sion Blue, Fielder XT-R and. Finally, Gaia Second guidewires and finally, Gaia Second guidewires and Finecross microcatheter. After predilatation with 1.5 x 15 mm, 2.5 x 15 mm balloons we implanted two drug-eluting stents (DESs), 2.5 x 33 mm and 3.5 x 28 mm, with postdilatation with non-compliant balloon 4.0 x 12 mm. In the final injection, TIMI 3 flow was restored. Total dose of radiation received by patient was 1729 mGy. We excluded acute kidney injury (AKI) in postprocedural period.

On the second admission, we performed PCI of the LCx with EBU 6 Fr guiding catheter and right femoral access. The occlusion was crossed with antegrade approach with Fielder XT-A guidewire. After predilatation with 1.0 x 15 mm, 2.5 x 20 mm balloons we implanted 3.0 x 28 mm DES with good angiographic effect. In this case, in order to reduce total radiation exposure, we decided to use collimation, 7.5 frames per second (FPS) fluoroscopy and low dose projections achieving 385mGy total dose of radiation received by patient.

The last PCI of LAD was the most challenging. Very difficult (J-CTO score = 3 pts.) blunt, ostial, two-level occlusion was crossed with antegrade approach (EBU 7 Fr guiding catheter, right femoral access) with BMW UII, Fielder XT-R, Fielder XT-A and Gaia Second guidewires and Finecross microcatheter. Highly calcified lesion was predilatated with 1.5 x 20 mm, 2.0 x 30 mm balloons. We finally implanted

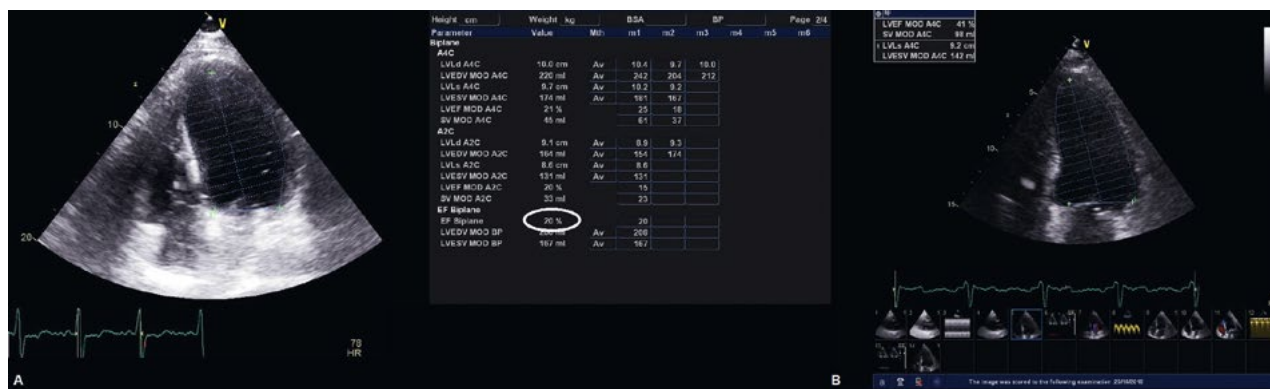


Figure 4. LVEF before PCI (left) and after PCI of triple CTO (right)

two DESs, 2.5 x 40 mm and 3.0 x 26 mm, with final high pressure postdilatation with a non-compliant balloon 3.0 x 20 mm. The apposition of the stent and the final result was assessed in IVUS. The collimation, 7.5 FPS fluoroscopy and low dose projections let us achieve total radiation dose of 1142 mGy in this stage.

After six months we confirmed a very good long term angiographic result by coronary angiography (Fig. 3). The patient is now asymptomatic, and his LV ejection fraction increased from 20% to 41% (Fig. 4A, B) due to successful recanalization of three CTOs.

CTO is still a very challenging problem of percutaneous treatment of coronary artery disease. Success rate may be assessed by using the scoring systems like J-score, huge variety of technologies and devices dedicated to CTO lesions and finally experience of operators [3]. One- or two-vessel CTO PCI are quite common in opposite to coronary artery disease with three-vessel CTO. In such cases surgical revascularization is the first option when the anatomy and technical possibilities are suitable for CABG [4]. Often indication for PCI in CTO is refusal of CABG treatment. In such cases, successful percutaneous treatment could be the only chance for ejection fraction improvement. In our patient three-stage procedure was done with revascularization of three CTO vessels. The most challenging stage was to open ostial CTO of LAD. Although retrograde access was expected we managed to cross the lesion with antegrade approach. In none stage, AKI criteria were met. The use of collimation, 7.5 FPS fluoroscopy and

low dose projections let us achieve acceptable dose of radiation. Because of high risk of restenosis of CTO lesions it is obligatory in our department to perform the control angiography. Also in this case a very good 6-month result was confirmed in angiography. In echocardiography significant increase in ejection fraction to 40% due to successful recanalization of three CTOs was also recorded. The patient remains asymptomatic in ambulatory follow-up.

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