



A percutaneous coronary intervention strategy for chronic total occlusion in a patient with severely impaired left ventricular systolic function. A wise move?

Przezskórna rewaskularyzacja wieńcowa przewlekle zamkniętej tętnicy wieńcowej u pacjenta z ciężką dysfunkcją skurczową lewej komory. Mądre posunięcie?

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Abstract

Percutaneous coronary intervention (PCI) for chronic total occlusion is a widely accepted revascularization procedure that accounts for around 10% of PCI procedures. Chronic totally occluded (CTO) coronary artery often is problematic, with most patients managed medically or referred for coronary artery bypass graft surgery due to the lack of standardized indication criteria. It has been shown that in patients with ischaemic heart failure left ventricular ejection fraction (LVEF) $\leq 35\%$, worse long-term outcome was related to the presence of CTO. However, it seems evident that improved survival and symptoms in patients with left ventricular dysfunction undergoing any myocardial revascularization is only achieved when viability is preserved. Here the authors present a case of CTO of the left anterior descending artery that was successfully treated with PCI resulting in subsequent left ventricular function improvement.

Key words: chronic total occlusion, CTO, coronary artery disease, percutaneous coronary intervention, complex PCI

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Introduction

The incidence of chronic total occlusion (CTO) in a Large French Registry (CARDIO-ARSIF) was 8.1% [1]. Undoubtedly, conscientious planning is crucial in CTO management, which includes treatment applicable to selected patients [2]. Percutaneous coronary intervention (PCI) for chronic total occlusion is a generally accepted revascularization procedure that accounts for around 10% of PCI procedures [3]. However, chronic totally occluded (CTO) coronary artery often is problematic, with the majority of patients managed medically or referred for coronary artery bypass graft surgery (CABG), due to the lack of standardized indication criteria., due to the lack of standardized indication criteria.

Moreover, recent comparative studies of CTO PCI versus conservative treatment have shown ambiguous benefits of revascularization concerning both clinical and quality of life measures [4].

It has been shown that in patients with ischaemic heart failure left ventricular ejection fraction (LVEF) $\leq 35\%$, worse long-term outcome was related to the presence of CTO [5]. Although PCI might remain the only alternative to manage patients with low LVEF, a limited body of literature is available covering studies on outcomes of percutaneous CTO recanalization regarding viable myocardium. Nonetheless, in a study by Galassi et al. [6], LVEF improved significantly six months after successful CTO PCI in patients with LVEF $\leq 35\%$. Similarly, in a cardiac magnetic resonance study,

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including 29 CTO patients with LVEF \leq 40%, Cardona et al. [7] showed that successful CTO PCI resulted in subsequent left ventricular function improvement. In the meta-analysis by Megaly et al. [8], which included studies using cardiac magnetic resonance (CMR) for quantification of volumes, demonstrated that successful CTO PCI was associated with a statistically significant increase in mean LVEF.

Even though regarding symptoms, patients with CTO particularly tend to adapt to their condition, they (not only those with low LVEF) frequently will experience dyspnoea more than from exertion angina. Galassi et al. [9] confirmed symptoms alleviation after CTO PCI: less dyspnoea in patients with low LVEF and less angina in those with preserved LVEF [6].

Nevertheless, here is presented a case of the CTO of the LAD that was successfully treated with PCI resulting in subsequent left ventricular function improvement.

Case report

In May 2019, a 52-year-old 20 pack-years smoker with no medical history presented for evaluation of chest pain radiating to the left upper extremity for about six months. Physical examination was grossly unremarkable. A surface electrocardiogram showed poor R-wave progression in V1–V3. Left ventricular function was severely diminished, with significant global wall motion abnormalities and a calculated ejection fraction of 27%.

He underwent coronary angiography due to the typical nature of his symptoms and high pre-test probability for coronary artery disease. Coronary angiogram revealed double-vessel coronary artery disease with a recanalized total occlusion of left anterior descending (LAD) and 80% occlusion of the proximal segment of the right coronary artery (RCA) (Figure 1). A drug-eluting stent (DES) was implanted in the RCA with adequate postprocedural TIMI (Thrombolysis In Myocardial Infarction) flow (Figure 2).

Subsequently, in June, the patient underwent CMR, which revealed viable myocardium in the LAD territory. European System for Cardiac Operative Risk Evaluation (EuroSCORE) II and J CTO score of 2.28% and 2 points, respectively. Therefore, it was decided that he would benefit after undergoing PCI for CTO of LAD. An antegrade wire escalating using Fielder FC wire with Finecross® microcatheter was attempted successfully. Predilatations with 1.5- \times 15-mm and 2.5- \times 20-mm balloons were performed. After an intracoronary injection of nitro-glycerine, two 3.0- \times 38-mm sirolimus-eluting coronary stents (CRE8 3.0 \times 31 mm; 3.0 \times 25 mm) were implanted at the lesion site in LAD resulting in TIMI III flow. During follow-up, the exercise capacity of the patient, as well as left ventricular function (40%), rapidly improved. Additionally, he was advised to quit smoking.

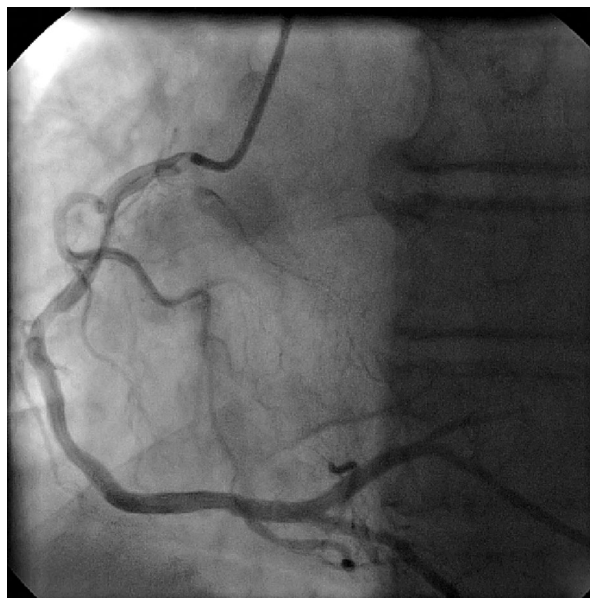


Figure 1. Left anterior oblique (LAO) caudal view showing right coronary artery 80% proximal occlusion

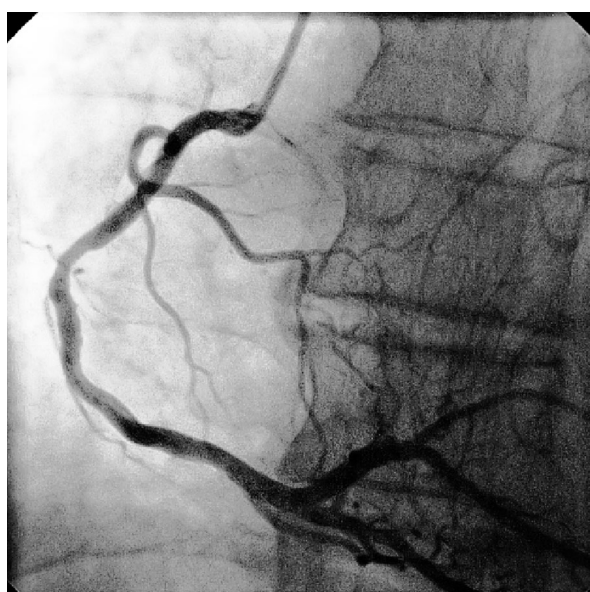


Figure 2. Left anterior oblique (LAO) caudal view showing post stenting of a proximal right coronary artery

Discussion and conclusion

Our findings are consistent with the generally accepted difference of at least 5% in LVEF as clinically significant left ventricular (LV) function improvement. Undeniably, according to the literature, percutaneous revascularization of CTOs in the setting of systolic dysfunction indeed

leads to improved LVEF and reduced adverse, resulting in positive clinical consequences. Accordingly, several observational studies showed that successful CTO revascularization is associated with improved quality of life [1]. However, it seems evident that the improvement of survival and symptoms in patients with left ventricular dysfunction undergoing any myocardial revascularization is only achieved when viability is preserved. This case study showed that despite significant radiation exposure and contrast dose, in high-risk patients, the advantages of CTO percutaneous procedure outweigh the disadvantages, primarily when performed by experienced PCI operators.

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Conflict of interest

The authors declare that there is no conflict of interest.

Streszczenie

Przełskórna angioplastyka (PCI) przewlekle zamkniętej tętnicy wieńcowej (CTO) jest powszechnie akceptowaną procedurą stanowiącą 10% zabiegów PCI. Przewlekle okluzję tętnicy wieńcowej w większości przypadków, ze względu na brak jasnych wytycznych postępowania, lecz się zachowawczo lub kardiochirurgicznie poprzez operacyjne wszczepienie pomostów naczyniowych. Wykazano, że u pacjentów z kardiomiopatią niedokrwienną i frakcją wyrzutową lewej komory niższą lub równą 35% obecność CTO tętnicy wieńcowej wiąże się z gorszym rokowaniem. Oczywistym jest jednak, że korzyści w odniesieniu do przeżywalności i poprawy jakości życia u pacjentów z dysfunkcją skurczową lewej komory po rewaskularyzacji są osiągalne tylko wtedy, gdy zachowana jest żywotność mięśnia sercowego. Przytoczono przypadek kliniczny pacjenta po skutecznej PCI przewlekle zamkniętej gałęzi przedniej zstępującej lewej tętnicy wieńcowej z następującą poprawą funkcji skurczowej lewej komory.

Słowa kluczowe: przewlekle zamknięta tętnica wieńcowa, choroba wieńcowa, przełskórna rewaskularyzacja wieńcowa, złożona przełskórna rewaskularyzacja wieńcowa

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