Case report

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REVASCULARISATION STRATEGY IN THE CRITICAL LEFT MAIN CORONARY ARTERY DISEASE ASSOCIATED WITH ACUTE CORONARY SYNDROME AND CHRONIC TOTAL OCCLUSION OF RIGHT CORONARY ARTERY

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Critical left main stenosis combined with chronic total occlusion of the right coronary artery and cardiogenic shock in acute myocardial infarction has been the most challenging case for an interventional cardiologist. Emergency revascularization, CABG or PCI is mandatory. A 46-year-old man presented with non-ST-elevation myocardial infarction and cardiogenic shock. Coronary angiography revealed chronic total occlusion in the middle portion of RCA and severe bifurcation stenosis of the distal left main (LM). LM bifurcation stenosis includes stenosis of the distal LM 80%, ostial stenosis left anterior descending artery (LAD) 80%, ostial stenosis, left circumflex artery (LCX) 90%. A decision was made to perform a two-step procedure, the first one immediately to solve the lesion of the left main, and the PCI CTO RCA in another act. Considering coronary anatomy, we decided to do the "TAP" (T and protrusion) technique for LM. RCA recanalisation was performed six months later. *Acta Medica Medianae 2023;62(1):66-70.*

Key words: *left main coronary artery, acute coronary syndrome, surgery, percutaneous intervention, chronic total occlusion*

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Introduction

Critical left main coronary artery (LMCA) stenosis in an acute coronary (ACS) setting is associated with increased morbidity and mortality.

Critical left main (LM) stenosis combined with chronic total occlusion of the right coronary artery (RCA) and cardiogenic shock in acute myocardial infarction (AMI) has been the most challenging case for interventional cardiologists and heart team. There was no clear consensus on unprotected LMCA lesions associated with acute myocardial infarction with a culprit lesion of LMCA (1–4).

Case presentation

A 46-year-old man presented with non-ST-elevation myocardial infarction (NSTEMI) and cardiogenic shock. His systolic blood pressure was around 90 mmHg even though vasoactive agent use and his heart rate was around 100 to 110/min.

Electrocardiography showed diffuse ST-segment depression in precordial and standard leads and ST elevation in AVR lead. His coronary risk factors include hypertension, hyperlipidemia, and smoking.

Coronary angiography revealed chronic total occlusion in the middle portion of RCA and severe bifurcation stenosis of the distal left main (LM). LM bifurcation stenosis include stenosis of the distal LM 80%, ostial stenosis left anterior descending artery (LAD) 80%, ostial stenosis left circumflex artery (LCX) 90% (Figure 1).

His SYNTAX score (synergy between percutaneous coronary intervention with TAXUS and cardiac surgery) was 21.

The patient and his family refused emergency coronary artery bypass grafting (CABG). Based on this, a decision was made to make a two-step procedure, the first one immediately to solve the lesion of the left main, and the PCI CTO RCA in another act.

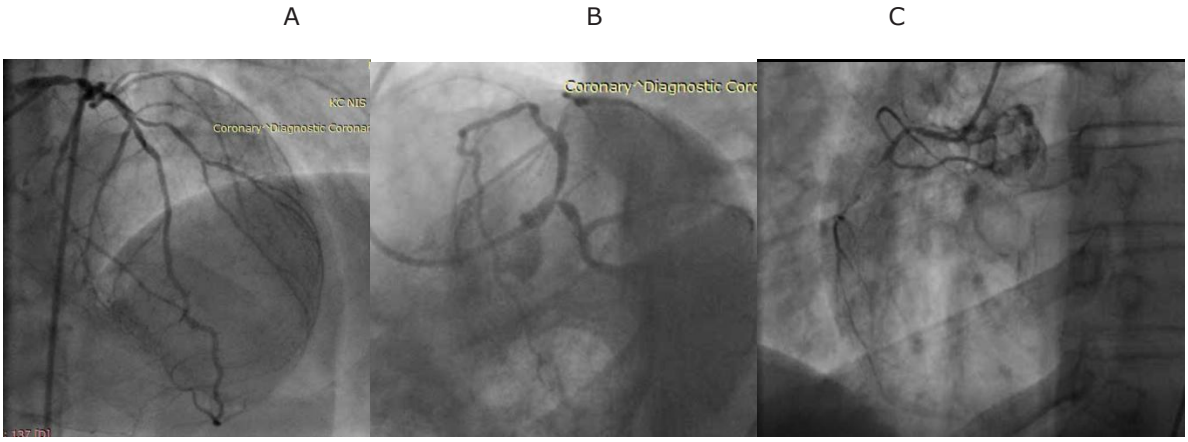


Figure 1. A (significant stenosis distal LM). B (distal LM bifurcation stenosis). C (chronic total occlusion RCA)

Due to the significant narrowing of the ostium LCx and its large caliber, it was decided to do a two-stent technique. Considering the favorable angle of separation, we decided to do the "TAP "(T and protrusion) technique.

Coronary intervention was performed via right transfemoral (TF) approach.

A 7-French (Fr.) Extra back-up (EBU) 3.75 guiding catheter (Terumo, Tokyo, Japan) was used for engaging the left main ostium. After advancing a 0.014 Sion blue wire (Asahi, Tokyo, Japan) to the distal LAD and another Sion blue wire to the distal LCx, predilatation was performed using NC Sprinter 2.5x15 mm (Medtronic, Minneapolis, MN) up to 16 atm for ostial LCx and NC Sprinter 2.75x15 mm up to 16 atm for ostial LAD. Drug-eluting stents (DES) (Promus Premier 3.5x16 mm) were deployed from the ostial LM to the proximal LAD (Figure 2 A). Due to occlusive dissection of the LAD on distal stent insertion, another stent (Promus Premier 3.0x16 mm) was implanted with adequate overlapping. Satisfactory result was obtained without residual narrowing and dissection of LM and LAD. Re-wiring was performed and strut opening with a small balloon Sapphire 1.5x10 mm up to 16 atm. Drug-eluting stent Promus Premier 3.0x18 mm was deployed in the LCx with minimal protrusion in the LM (Figure 2 B). "Kissing balloon" was performed with two NC Sprinter Legend 3.0x15 mm balloons (Figure 2 C), and finally POT (proximal optimisation) with NC Sprinter Legend 4.0x12 mm up to 20 atm.

Satisfactory result was obtained without residual narrowing and dissection (Figure 2).

Next intervention was performed six months later via bifemoral (TF) approach for recanalisation CTO RCA. A 7-French Extra back-up (EBU) 3.75 guiding catheter (Terumo, Tokyo, Japan) was used for engaging the left main ostium, and Judkins right (JR) guiding catheter for right coronary artery.

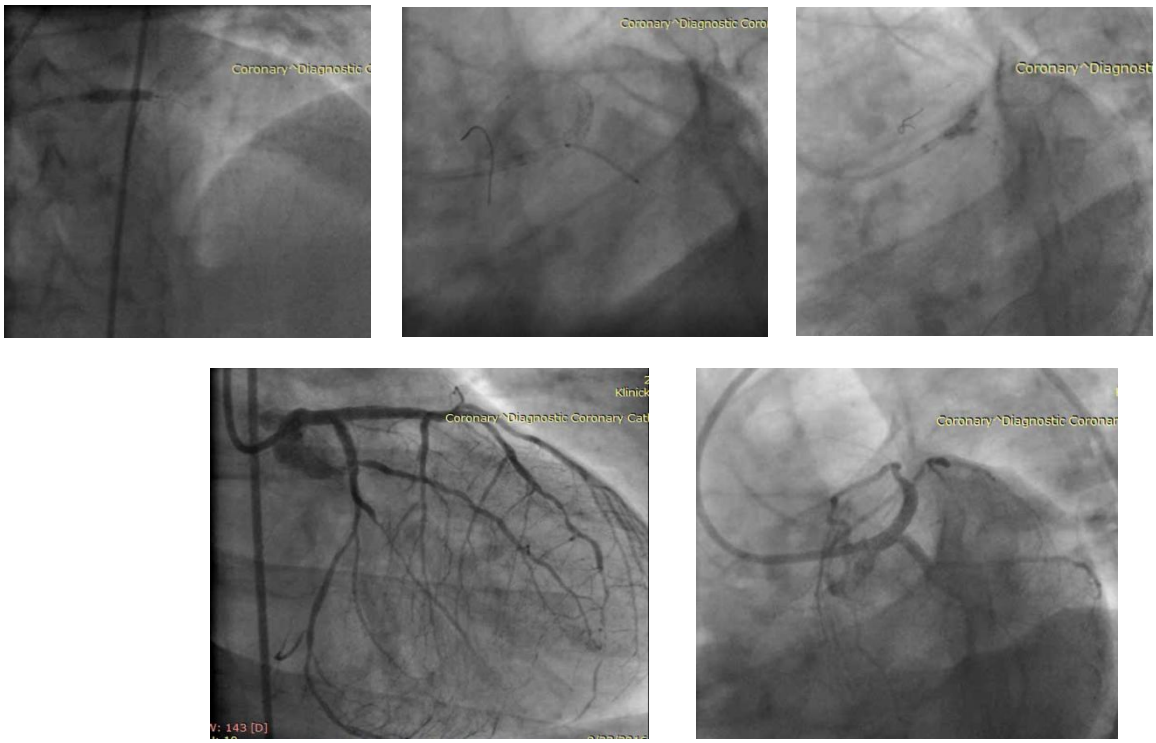
First, an antegrade approach was tried. The wires used were Fielder XT-a (Asahi, Japan), Progress 140 (Abbott Vascular) and Gaia second (Asahi, Japan), but it was unsuccessful. All of these wires went subintimally and it was impossible to make re-entry into the lumen (Figure 3 A). After that, it was decided to try retrograde approach. For passing through the septal collaterals, Sion black wire (Asahi, Japan) supported with Finecross microcatheter (Terumo, Japan) was used. The wire and microcatheter easily passed through the septal channels and entered into the right coronary artery (Figure 3 B).

After that, Sion black wire was exchanged for stiffer wires, Pilot 200 (Abbott Vascular) and Gaia second (Asahi, Japan). It was attempted to cross "lumen-to-lumen" but it was unsuccessful, wires went subintimally. At the occlusion site, the "R-CART" (reverse controlled antegrade and retrograde subintimal tracking) technique was performed. And finally, the retrograde wire Pilot 200 (Abbott Vascular) entered into the lumen and antegrade guiding catheter (Figure 3 C). The procedure was converted to an antegrade procedure using the "Rendezvous" technique with two microcatheters (antegrade and retrograde) (Figure 3 D). Predilatation was performed using balloons Sapphire 1.5x10 mm and Sprinter Legend 2.0x15 mm.

Four drug-eluting stents (DES) were deployed from the proximal to the distal segment right coronary artery with adequate overlapping.

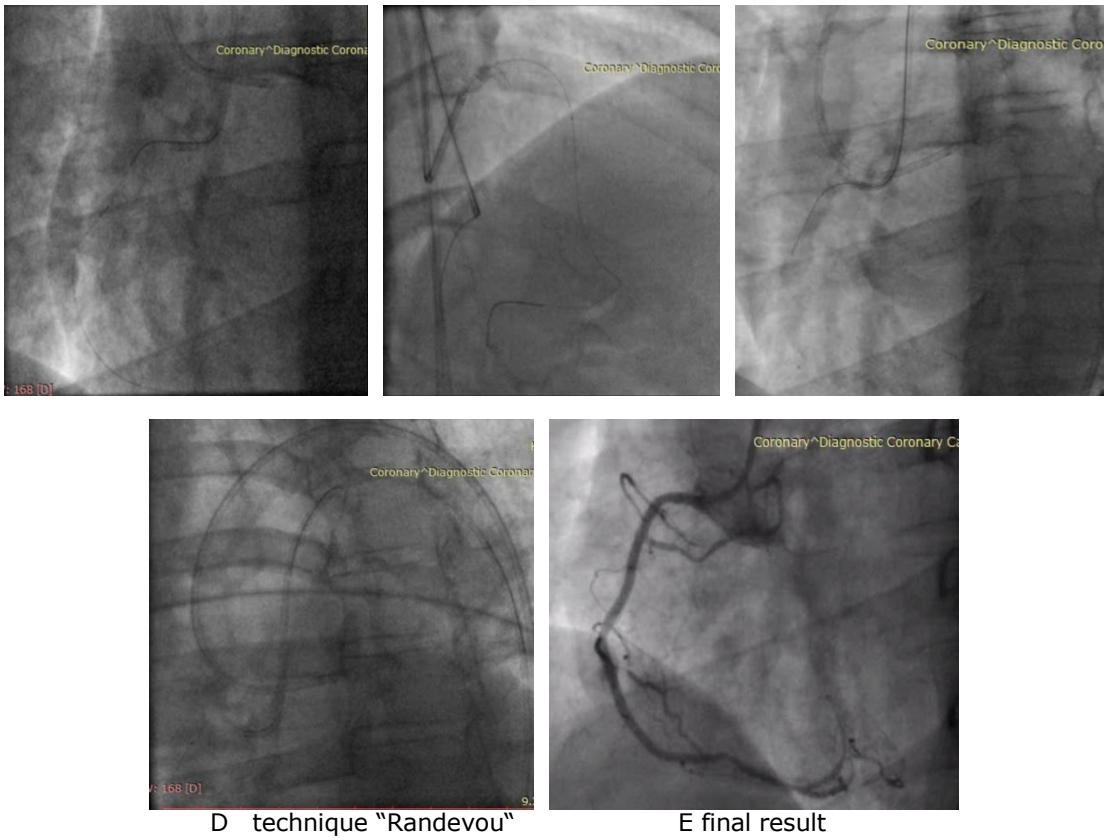
Satisfactory result was obtained without residual narrowing and dissection (Figure 3).

A B C



D final result–caudal E final result-spyder view

Figure 2. A(stenta implatation LM-LAD B stent implatataion LM-Cx (TAP) Ckissing balloon



D technique "Randevou" E final result

Figure 3. Aantegrade attemp wire crossingBretrograde crossing wireC retrograde wire in antegrade catheter

Discussion

Left main coronary artery (LMCA) disease is associated with increased morbidity and mortality.

Optimal treatment for unprotected LMCA, PCI or CABG has been debated for several decades.

Results of large randomized trials NOBEL and EXEL relate to patients in chronic coronary syndrome.

NOBEL (The Nordic-Baltic-British left main revascularization study) published their results in December 2016 in The Lancet and EXCEL (Everolimus-Eluting Stents or Bypass Surgery for Left Main Coronary Artery Disease) published their results in The New England Journal of Medicine. In NOBLE, the primary endpoint of major adverse cardiac and cerebrovascular events (MACCE) was 29% for PCI versus 19% for CABG, even though the all-cause mortality was similar (6). In Excel, the conclusion is that the strategy of PCI for LM, including bifurcation lesions of syntax scores <32, was non-inferior to CABG (5).

European guidelines on myocardial revascularization in chronic setting give a class I recommendation for the patients with low SYNTAX score (0–22), class IIa recommendation for the subgroup of patients with intermediate anatomical complexity (SYNTAX score 23–32) (7).

For PCI unprotected LMCA in acute coronary setting, there are no large randomized trials and optimal revascularization strategy is not obvious.

In the case of hemodynamic stability, treatment approach could be either PCI or surgery

in parallel with guidelines for stable patients (2).

Conclusion

Emergency revascularization of patients with acute myocardial infarction, especially hemodynamically unstable ones, is very important. Therefore, percutaneous intervention of unprotected LMCA lesions can be performed with good results in selected patients.

With the developments in stent design, medical therapy and PCI techniques over the past decade in some of the trials showed that PCI was non-inferior to CABG surgery in the long-term benefits.

References

1. .Gagnor A, Tomassini F, Romagnoli E, Infantino V, Rosa Brusin MC, Maria C, et al. Percutaneous left maincoronary disease treatment without on-site surgery back-up in patients with acute coronary syndromes: immediateand 2-year outcomes. Catheter Cardiovasc Interv 2012; 79(6): 979–87. [CrossRef] [PubMed]
2. Lee MS, Sillano D, Latib A, Chieffo A, Zoccai GB, Bhatia R, et al. Multicenter international registry of unprotected leftmain coronary artery percutaneous coronary interventionwith drug-eluting stents in patients with myocardialinfarction. Catheter Cardiovasc Interv 2009; 73(1): 15–21. [CrossRef] [PubMed]
3. Claver E, Curós A, López-Ayerbe J, Serra J, Mauri J,Fernández-Nofrerias E, et al. Clinical predictors of leftmain coronary artery disease in high-risk patients with afirst episode of non-ST-segment elevation acute coronarysyndrome [Article in Spanish]. Rev Esp Cardiol 2006; 59(8): 794–800. [PubMed]
4. Lee MS, Bokhoor P, Park SJ, Kim YH, Stone GW, SheibanI, et al. Unprotected left main coronary disease and ST-segment elevation myocardial infarction: a contemporaryreview and argument for percutaneous coronaryintervention. JACC CardiovascInterv 2010; 3(8): 791–5. [CrossRef] [PubMed]
5. Stone GW, Sabik JF, Serruys PW, Simonton CA, Genereux P, Puskas J, et al; EXCEL Trial Investigators. Everolimus-eluting stents or bypass surgery for left main coronary artery disease. N Engl J Med 2016; 375: 2223–2235. [CrossRef] [PubMed]
6. Makikallio T, Holm NR, Lindsay M, Spence MS, Erglis A, Menown IB, et al, NOBLE Study Investigators. Percutaneous coronary angioplasty versus coronary artery bypass grafting in treatment of unprotected left main stenosis (NOBLE): a prospective, randomised, open-label, non-inferiority trial. Lancet 2016; 388: 2743–2752. [CrossRef] [PubMed]
7. Franz-Josef Neumann, Miguel Sousa-Uva et al. 2018 ESC/EACTS Guidelines on myocardial revascularization: The Task Force on myocardial revascularization of the European Society of Cardiology (ESC) and European Association for Cardio-Thoracic Surgery (EACTS) Developed with the special contribution of the European Association for Percutaneous Cardiovascular Interventions (EAPCI). Eur Heart J. 2019 Jan 7; 40(2): 87-165. [CrossRef] [PubMed]

Prikaz bolesnika

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STRATEGIJA REVASKULARIZACIJE BOLESNIKA SA KRITIČNIM SUŽENJEM GLAVNOG STABLA LEVE KORONARNE ARTERIJE U AKUTNOM KORONARNOM SINDROMU UDRUŽENIM SA HRONIČNOM TOTALNOM OKLUZIJOM DESNE KORONARNE ARTERIJE

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Kritična stenoza glavnog stabla leve koronarne arterije u akutnom infarktu miokarda, praćena kardiogenim šokom, uz hroničnu totalnu okluziju desne koronarne arterije, predstavlja najkompleksniju situaciju za interventnog kardiologa. Urgentna revaskularizacija, hirurška ili perkutana, neophodna je. U našem slučaju, bolesnik muškog pola star 46 godina prezentovan je sa slikom infarkta miokarda bez ST elevacije, praćenog kardiogenim šokom. Hitnom koronarografijom uočena je kritična bifurkaciona stenoza distalnog glavnog stabla leve koronarne arterije i hroničnu totalnu okluziju desne koronarne arterije. Odluka je bila da se uradi intervencija iz dva dela, hitna intervencija na glavnom stablu leve koronarne arterije, a potom za šest meseci rekanalizacija desne koronarne arterije. Na osnovu koronarne anatomije, odluka je bila da se uradi TAP (T and protrusion) tehnika za glavno stablo leve koronarne arterije. Rekanalizacija desne koronarne arterije urađena je nakon šest meseci retrogradnim pristupom preko leve koronarne arterije. *Acta Medica Medianae 2023;62(1): 66-70.*

Ključne reči: *glavno stablo leve koronarne arterije, akutni koronarni sindrom, hirurgija, perkutane koronarne intervencije, hronične totalne okluzije*

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