PRIMARY PERCOUTANEOUS CORONARY INTERVENTION ON UNPROTECTED LEFT MAIN CORONARY ARTERY WITH STAGED COMPLEX BIFURCATIONAL TREATMENT: A CASE REPORT

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PRIMARNA PERKUTANA KORONARNA INTERVENCIJA NA NEPROTEKTOVANOM GLAVNOM STABLU LEVE KORONARNE ARTERIJE SA ODLOŽENIM KOMPLEKSNIM BIFURKACIONIM TRETMANOM: PRIKAZ SLUČAJA

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ABSTRACT

We present the case of patient with ST elevation myocardial infarction in cardiogenic shock with primary percutaneous coronary intervention of Left anterior descending coronary artery and Left main coronary artery with staged complex procedure on Left anterior descending/Diagonal branch bifurcation in Culotte manner. This case shows that "the simpler, the better" approach of only infarct related artery revascularization may be applied in acute patients with cardiogenic shock and optimal clinical and hemodynamic response on revascularization and intra-aortic balloon pump. But, complete revascularization should be done in staged procedure and later, a control coronary angiography with intravascular ultrasound assistance is mandatory.

Key words: *cardiogenic shock, PPCI, left main, IABP, IVUS*

SAŽETAK

Predstavljamo slučaj pacijenta sa akutnim infarktom miokarda sa elevacijom ST segmenta u kardiogenom šoku i urađenom primarnom perkutanom koronarnom intervencijom na prednjoj levoj silaznoj koronarnoj arteriji i glavnom stablu leve koronarne arterije kao i odloženom kompleksnom procedurom na bifurkaciji prednje leve silazne arterije i dijagonalne grane i to Culotte tehnikom. Ovaj slučaj pokazuje da 'što jednostavnije, to bolje' pristup u smislu revaskularizacije samo infarktne arterije može biti primenjen kod akutnih pacijenata u kardiogenom šoku i optimalnim kliničkim i hemodinamskim odgovorom na revaskularizaciju i primenu intraaortne balon pumpe. Ali, kompletna revaskularizacija bi trebalo da bude učinjena u odloženoj proceduri sa kasnijom kontrolnom koronarnom angiografijom obavezno praćenom intravaskularnim ultrazvukom.

Ključne reči: *kardiogeni šok, PPCI, glavno stablo, IABP, IVUS*

ABBREVIATIONS

DES-drug eluting stent;
DG-diagonal branch coronary artery;
EBU-extra backup catheter;
FFR-fractional flow reserve;
IABP-intraaortic balloon pump;
IVUS-intravascular ultrasound;
LAD-left anterior descending coronary artery;
LCA-left coronary artery;
LCX-left circumflex coronary artery;
LM-left main coronary artery;
NC-noncompliant balloon
PCI-percutaneous coronary intervention;
RCA-right coronary artery;
RI-intermedial branch;
STEMI-ST elevation myocardial infarction

INTRODUCTION

Case report

A 62 year old man was admited to our Coronary Care Unit with chest pain lasting for 2 hours. ECG showed anterior ST elevation myocardial infarction (STEMI). The following risk factors for coronary artery desease were present: hyperlypidaemia, smocking, heredity. Physical examination revealed silent heart sounds, pulmonary crepitant rales and hypotension (TA=100/60 mmHg), prograding to cardiogenic shock. He was quickly trasfered to our Catheterisation Laboratory. Coronary angiography (radial approach) showed (Fig. 1) significant stenosis (70%) of left main (LM), occluded left anterior descending coronary artery (LAD) in proximal part, ostialy reduced intermedial

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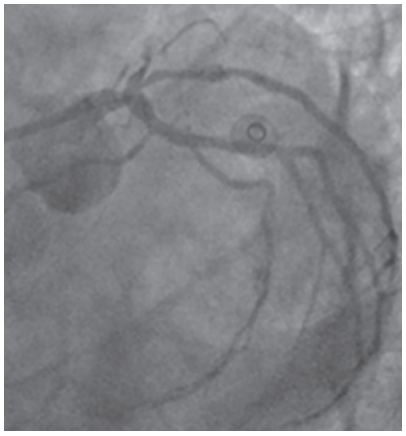

Fig. 1 Initial coronary angiography LAO/ CAUD projection

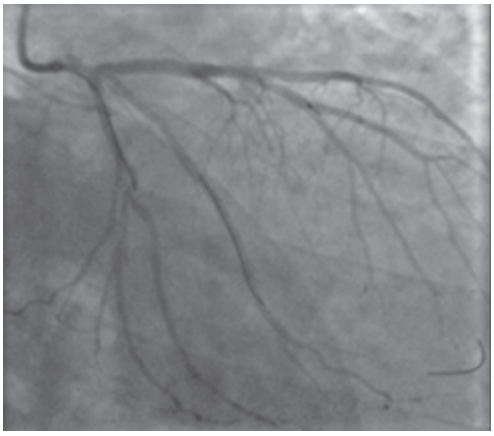

Fig. 2 Suspected hasenes in ostial LAD/ LM

Fig. 3 Post stenting coronary angiography LAO/CAUD projection

branch (RI) (70%), relatively desease free left circumflex (LCX) and borderline stenosis on proximal right coronary artery (RCA). We decided to instantly perform Primary percutaneous coronary intervention (PPCI) on LAD: we placed Intraaortic balloon pump (IABP) via left femoral artery due to cardiogenic shock. We canulate Left coronary artery (LCA) with Extra backup guiding catheter (EBU GC) 3.5 6 Fr. Runthrough guide wire (GW) succesfuly passed occlusion on LAD. Second Runthrough GW was placed in a big diagonal branch (DG). We implanted the stent Liberte Monorail 3.5x20 mm in LAD/DG at 14 atm. Due to suspected hasenes (Fig. 2) in ostial LAD/ LM we implanted another bare-metal stent (in the absence of adequate drug eluting stent), Liberte Monorail 4.5x16mm at 16 atm., with overllap, to the ostium of the Left main and postdilated it with the noncompliant (NC) balloon 4.5x15 mm at 22 atm. The final angiography showed seriously pinchted LAD and RI (Fig. 3, Fig.4). We decided to perform percutaneous coronary intervention (PCI) of these two bifurcations in staged procedure before discharge.

After 3 days in Coronary Care Unit, IABP was removed.

We performed planed PCI on 10th day of hospitalisation, after clinical stabilisation.

Via left femoral access we cannulated LCA with EBU 4.0 7 Fr GC. After numerous atempts Runthrough GW passed through the stents struts and was placed in distal LAD. Second Runthrough GW protects DG. After postdilatation of the first implantet stent in proximal optimisation technique (POT) manner with NC baloon Sprinter 3.75x15mm at 18 atm, we succeded to put the small 1.5 mm balloon in LAD. Then we performed the stent fenestration with Sprinter 2.75x15mm NC baloon, and implanted drug eluting stent (DES) Resolute Integrity 3.0x18mm at 14 atm in LAD in Culotte maner. Final kissing balloon inflation was performed with two NC Sprinter baloons: 3.75x15 mm in DG and 3.0x12 mm in LAD at 10 atm (Fig. 5). Control angiography showed optimal result on LAD/ DG bifurcation (Fig. 6). Then, we put the wire in RI from DG and third wire in LCX. Balloon dilatation on ostial RI was performed with Sprinter balloon 2.5x15 mm at 16 atm. Finally, the post dilatation of stent in LM was done with NC balloon Sprinter 4.5x15mm at 20 atm. The final angiographic results was excellent with TIMI 3 flow in treated arteries.

The control angio performed six months later showed borderline in-stent restenosis in LM and "Culotte" with optimal result (Fig. 7).

- We have used Intravascular ultrasound (IVUS) (Fig. 8) for final conclusion – optimal medical therapy:

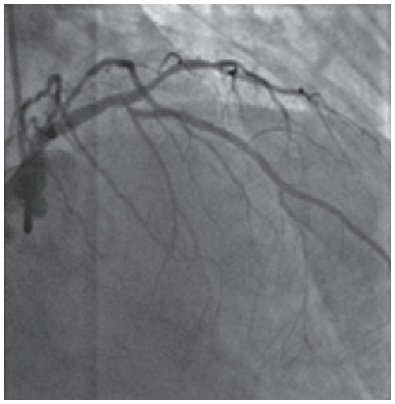

Fig. 4 Post stenting coronary angiography RAO/CRAN projection

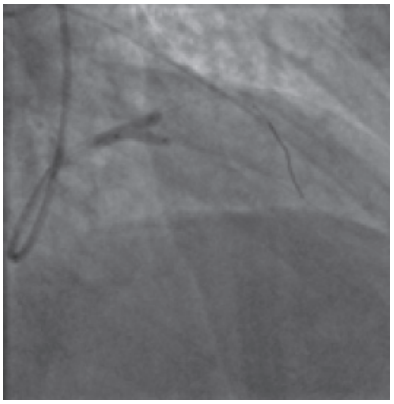

Fig. 5 Final kissing balloon inflation

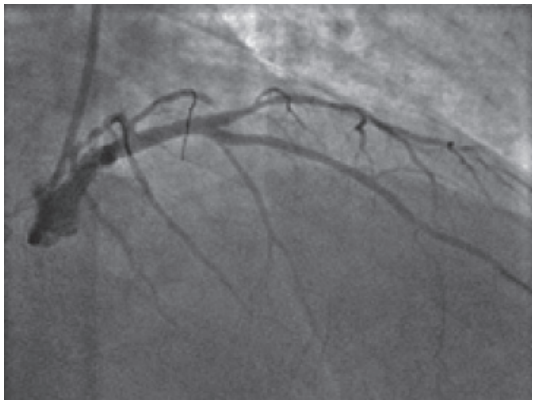

Fig. 6 Final result on LAD/DG bifurcation

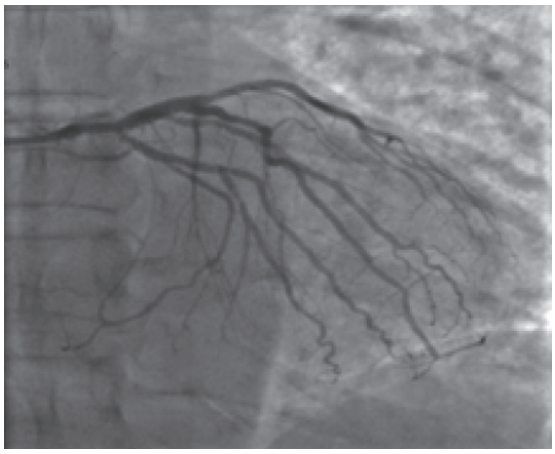

Fig. 7 Control angio - six months later

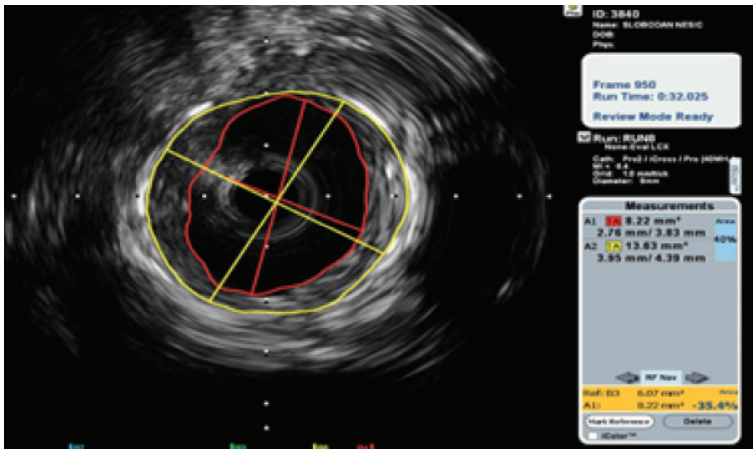

Fig. 8 Intravascular ultrasound measurements

- IVUS LM-LAD: restenosis up to 40%; LM diam. 2.76 mm; min. area 8.22 mm^2
- IVUS LCx: ostial stenosis up to 60%; LM diam. 2.3 mm; min. area 6.07 mm^2

DISCUSSION

First of all, this case study clearly demonstrated the safety and efficacy of radial access for primary percutaneous coronary intervention in patients with ST segment myocardial infarction (STEMI), even when dealing with complex angiographic finding. Radial access is recommended arterial site in PPCI with class of recommendations IIb and level of evidence B [1]. In the RIVAL study and the RIFLE STE ACS Trial, radial access reduced mortality in patients with STEMI [2, 3]. A meta-analysis of randomized controlled trials demonstrated that in STEMI patients undergo PPCI, the radial approach is associated with better outcome and should be preferred access site for experienced operators [4].

According to the current ESC guidelines, 50% of STEMI patients have significant multivessel disease [1]. It is recommended that only the infarct-related artery should be treated during primary PCI [5,6]. Non-culprit stenosis treatment is possible only in STEMI patients with cardiogenic shock with multiple, subocclusive (>90% diameter reduction) stenoses and with no positive responses on PPCI of culprit lesion. Having in mind above mentioned, we initially performed PPCI on culprit lesion only, but with bailout PCI of LM due to coronary artery dissection. In non-urgent patients, coronary artery bypass grafting (CABG) has been recommended treatment option for significant LM stenosis [7]. SYNergy Between PCI With TAXUS and Cardiac Surgery (SYNTAX) Study demonstrated that MACEs were not significantly higher in PCI group of patients compared with CABG group, with higher incidence of TVR [8]. But, in STEMI patients, primary PCI of unprotected left main coronary artery is still controversial. In systematic review on the available literature and a meta-analysis on the treatment of PPCI of ULMCA, Vis et al. [9], demonstrated that the observed 30-day all-cause mortality was higher in patients presenting with cardiogenic shock (55%) compared with patients without cardiogenic shock (15%)(relative risk: 3.74, 95% confidence interval [CI]: 2.95 to 4.76, p <0.001), regardless of stent type.

Since our patient had good hemodynamic response on PCI and IABP, we did not perform complex PCI on LAD/DG bifurcation and staged this procedure. Intra-aortic balloon pump (IABP) is strongly recommended in patients with cardiogenic shock (Class Ib) in the current ESC guidelines for treatment of STEMI [1]. IABP has hemodynamic benefits as a result of afterload reduction and diastolic augmentation with improvement of coronary perfusion.

When patient was clinically stabilized, before discharge, we performed a complex PCI of LAD in Culotte manner, via right femoral artery and 7 French system. After such complex procedures, we performed control coronary angiography after six months with IVUS assistance. Few studies have validated IVUS measurements as anatomic predictors for the hemodynamic significance of left main lesions [10-12]. Repeated revascularization due to restenosis may be deferred in patients with left main minimal luminal cross-sectional area (MLA) ≥ 6.0 mm^2 (in our case 8,22 mm^2). The IVUS MLA value that best predicted fractional flow reserve (FFR) < 0.80 was 4.8-6 mm^2. There was no advantage of using DES in large vessels (≥3,5 mm) for preventing a hard endpoint, whereas the usage of DES resulted in a significant reduction of TVR in patients with STEMI in the ICAS registry [13]. The routine usage of intravascular imaging in primary PCI remains controversial but we strongly support the mandatory use of IVUS for left main percutaneous coronary interventions and even later evaluation.

CONCLUSIONS

- Prompt intervention can reduce the adverse effects of the most devastating myocardial infarctions.
- Quick establishing of the flow in STEMI is crucial.

- "The simpler, the better"- if possible, the complicated procedures should be prolonged until the patient becomes stable.
- In the settings of good hemodynamic response to revascularization and IABP, there is no need for complet urgent revascularisation of STEMI patients in cardiogenic shock. Complex bifurcational treatement should be avoided initialy but carefully planed.
- IVUS can be of a great assistance for the final decision.

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