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Case report

Distal ulnar palmar approach to treat bifurcation stenosis of the left main (Medina 1.1.0) with Culotte technique

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Abstract

Background: Female patients possess a higher risk for poorer outcome in ST segment elevation myocardial infarction (STEMI). There is possibility that transradial access (TRA) for primary percutaneous coronary intervention (PPCI) could provide better outcome than transfemoral access (TFA) in female patients with STEMI.

Methods: During access transition period from 2008 to 2010, 418 female patients (out of 1808 patients) underwent PPCI for acute STEMI. The registry recruited all-comers patients with acute STEMI. Major bleeding and vascular access site complications, death rates, and overall MACE rates (composite of death, stroke, re MI and TVR) after 2 years follow-up were compared between TRA and TFA.

Results: TRA for PPCI was performed in 261 patients and 157 underwent TFA PPCI. The 30-days and 1 year mortality rates were lower in TRA compared to TFA (6.9 vs. 14.6%, p = 0.009, and 8.8 vs. 15.3%, p.0.032, respectively). After 2 years follow-up, the overall MACE rates were similar (26.4% vs. 31.2%, p.0.17). The major bleeding and particularly major vascular access site complications were more favorable for TRA than TFA (4.4 vs. 14%, p< 0.001, and 2.7 vs. 10.8 %, p.0.001, respectively).

Conclusion: Transradial access for primary PCI in female patients provides less bleeding and lower incidence of vascular access site complications, and better early clinical outcome in acute STEMI.

Key words transradial approach; female gender; STEMI

Introduction

Angiography and percutaneous coronary intervention (PCI) through arteries of the upper extremities is superior to femoral approach, and is on a rise due to less bleeding, easier practice of hemostasis, more patient convenience, shorter procedure time, lower cost imposed to patients and health system, and shorter period of hospitalization.[1-4] In addition, patients will sooner restore their routine physical activity in case of an upper extremity approach. Artery size, anatomical variations, arterial loop, hypoplasia, radial artery occlusion (RAO), previous RA harvesting for coronary artery bypass graft (CABG), and so like are the most troublesome issues with trans-radial approach.[2,5,6] In other words, this approach is not always successful with obligatory shift to other routes.[7] Although many investigators have shown that complications of trans-ulnar approach are rather equal to trans-radial approach, and the latter is suggested as an alternative to trans-radial approach,[5,8-10] but trans-ulnar approach has also its own difficulties and limitations; so, more innovative routes with lower complications and higher patient and operator convenience are strongly warranted. In this our clinical case, we presented new access in the upper limb at more distal points in contrast to conventional approaches, i.e.trans-palmar approach. Clinical case from our daily practice of haevily obese patient with unstabile angina. Angyography shown multivessel disease with distal LM disease involving the ostium of LAD and significant in-stent restenosis in prox LCx (Medina 1,1,0). Heart team's conclusion was CABG. Patient refused cardiosurgery and accepted angioplasty. The size of LAD and LCx were approximarely the same with no acute side branch angle, so we decided to do a Cullotte IVUS guided LM stenting by right distal ulnar palmar approach.

Case presentation

A 77 years/old female patient , heavily obese (BMI 44.4 kg/m^2) had following risk factors: diabetes mellitus insulin dependent, hypertension, metabolic syndrome, and positive family history of CAD. She had following coronary procedures: November 2018 - 2 DES implanted in proximal and mid circumflex artery (LCx) due to STEMI, and in December 2018 long tapered DES was implanted in mid left anterior descending artery (LAD). She was symptomatic for a few days prior to hospitalization. ECG showed sinus rhythm, heart rate of 72/min, negative T wave in leads I, aVL, and V5-V6 (Figure 1). Laboratory results were normal. Echocardiography showed large hypokinesia and dilatation of left ventricle with EF 38% (Figure 2). Angiography (Figure 3) was performed through 6F right ulnar approach, due to radial artery occlusion from previous angioplasty. The conclusion was

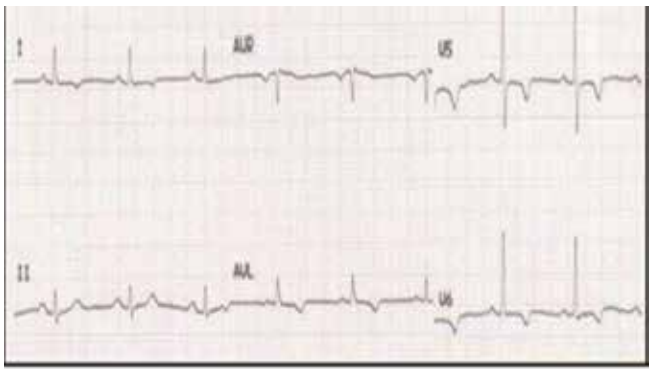
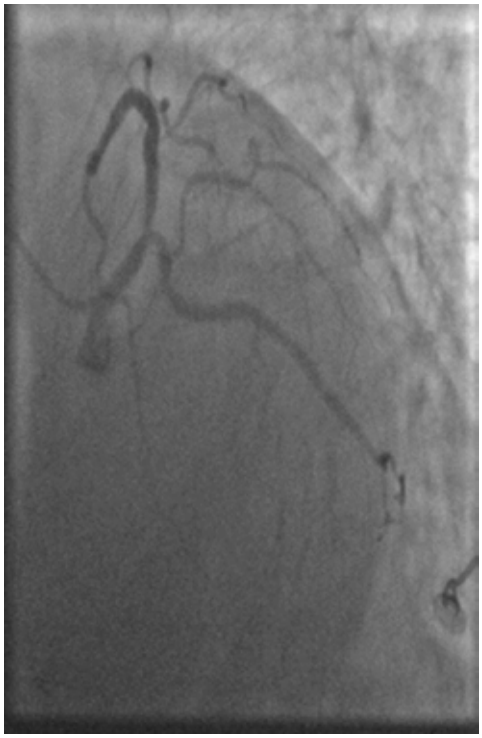


Figure 1. ECG

Figure 2. Echocardiography



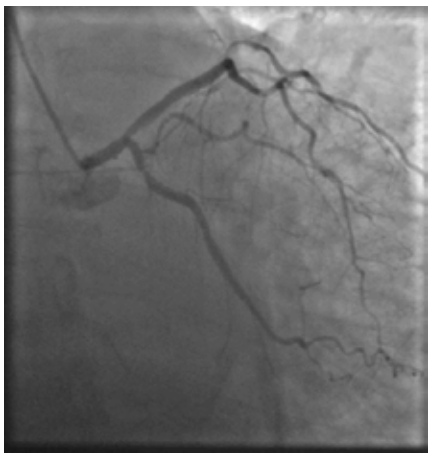


Figure 3-5. LM - distal 60% stenosis involving ostium of LAD (Medina 1,1,0)
LAD - significant ostioproximal stenosis with patent stents in mid LAD, LCx - 80% in-stent restenosis in proximal LCx

multivessel disease with distal LM disease involving the ostium of LAD, and significant in-stent restenosis of proximal LCx (Medina 1,1,0).

Due to radial occlusion and morbid obesity, the procedure was performed by distal ulnar palmar approach with sheathless GC PB 3.5/7.5Fr (Figure 6). The size of LAD and LCx were approximarely the same with no acute side branch angle, so we decided to proceed with a Cullotte technique with IVUS guided left main (LM) stenting. Two "workhorse" wires BMW were placed in LAD and LCx. IVUS in the LM showed significant 60% stenosis in distal segment with minimal luminal area (MLA) of 5.1mm^2, considered to be also functionally significant (Figure 7).

We did pre-dilatations with two semicompliant balloons (3.0x20mm) towards LAD and LCx and kissing balloon inflation with the same ballons (Figure 8). Then, we deployed DES 3.5/24 mm from LM towards LCx (Figure 9). After rewiring LAD and dilatation of the struts toward LAD with non-compliant balloon 2.5/15mm (Figure 10), we implanted DES 3.5/32mm from LM towards LAD, with proximal overlap (Figure 11). We performed proximal optimization with non-compliant balloon (4.0/12 mm, Figure 12), and recrossed the stent to LCX and perform final kissing balloon with 2 non-compliant balloons (3.75/18mm, Figure 13) with final proximal optimization with the same balloon use for the first optimization. The final results showing optimal angiographic result (Figure 14), and nicely opened stents with stent boost technique (Figure 15).

Final IVUS (Figure 16a-c) was done and showed following dimensions: LM (minimal diameter 3.8mm; maximal diameter 4,2mm2, luminal area 12.2 mm^2), LAD (minimal diameter 3.7mm; maximal diameter 4.1 mm2, luminal area 11.4 mm^2), and Cx (minimal diameter 3.7mm; maximal diamater 3.7mm, luminal area 9.3mm^2). The final appearance after PCI of the palmar region is presented in Figures 17a and b.

One, 3 and 6 months after revascularization the patient was completely symptom free. Control echocardiogra-

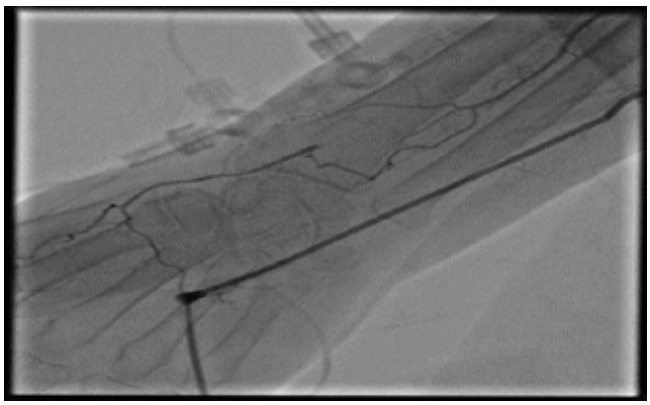


Figure 6.

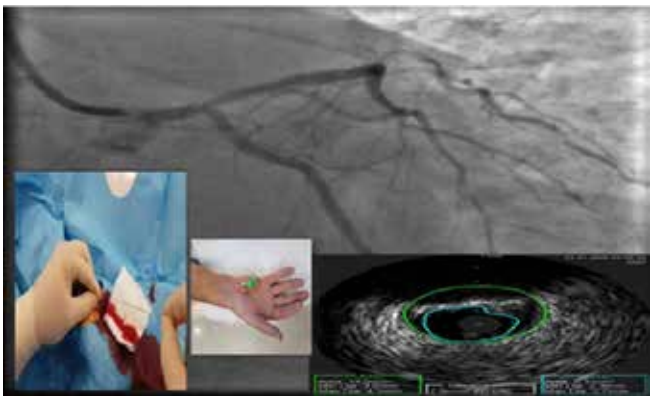


Figure 7.

Figure 8.

Figure 9.

Figure 10.

Figure 11.

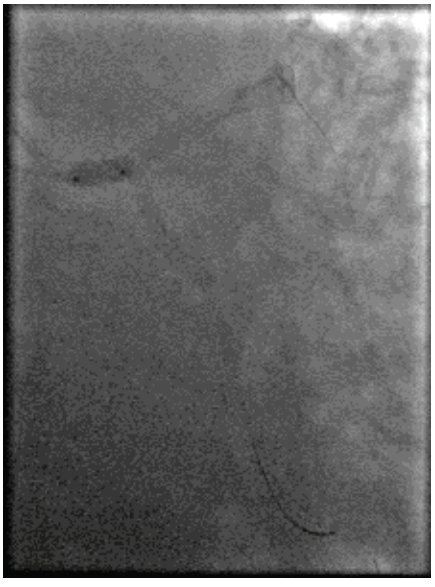


Figure 12.

Figure 13.

Figure 14.

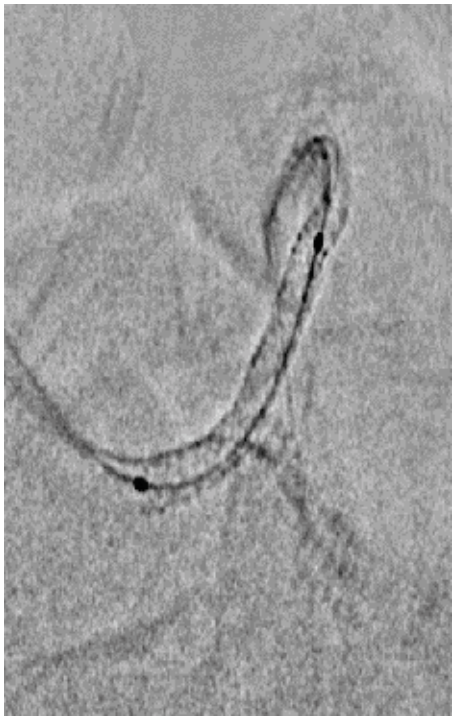


Figure 15.

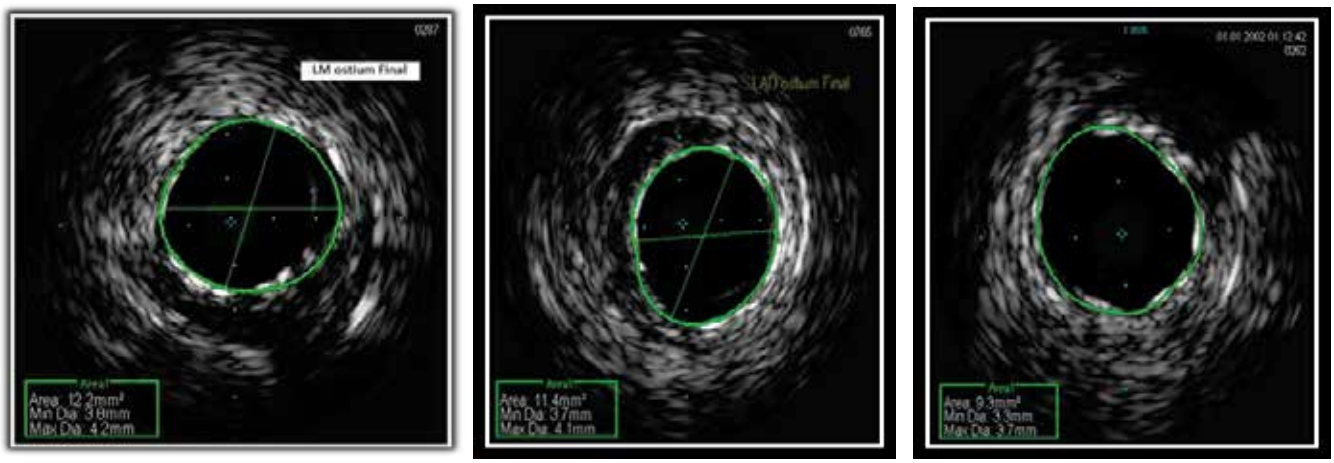


Figure 16. a-c

Figure 17. a, b

phy showed improvement of ejection fraction to 48%. One year follow-up is in progress.

Discussion

As a conclusion, although this new innovative approach could be suggested safe, feasible, and reliable to be used for coronary angiography and/or angioplasty with low complications, but they are at their early stages with about a follow-up period of 1-6 months; so more researches based on large clinical trials are recommended to be conducted in forthcoming months and years. Distal ulnar palmar approach is adequate suitable as the classic approaches/femoral, radial, ulnar, brachial/ for all kind of complex percutaneous interventions.
At the price of a more difficult puncture and risk of access failure, there are possible ergonomic advantages, with lower risk of upstream artery occlusion and shorter hemostasis
In case of complex coronary anatomy indicated for cardiosurgery, and patient refuses operation, PCI/LM/if possible/ is apsolutely indication and adequate solution . Complex Bifurcations remain a challenge for PCI. In such situations, IVUS guidance is preferred. Technique of LM stenting is preferable choise of the operator depending on the anatomy of the vessels and also from the experience of the team, especially experience of the leader of the team, the interventional cardiologyst is crucial for the success of the procedure.

References

1. Liu J, Fu XH, Xue L, Wu WL, Gu XS, Li SQ. A comparative study of transulnar and transradial artery access for percutaneous coronary intervention in patients with acute coronary syndrome. J Interv Cardiol. 2014;27(5):525–30. [PubMed] [Google Scholar]
2. Sallam M, Al-Riyami A, Misbah M, Al-Sukaiti R, Al-Alawi A, Al-Wahaibi A. Procedural and clinical utility of transulnar approach for coronary procedures following failure of radial route: Single centre experience. J Saudi Heart Assoc. 2014;26(3):138–44. [PMC free article] [PubMed] [Google Scholar]
3. Kumar AJ, Jones LE, Kollmeyer KR, Feldtman RW, Ferrara CA, Moe MN, et al. Radial artery access for peripheral endovascular procedures. J Vasc Surg. 2017;66(3):820–5. [PubMed] [Google Scholar]
4. Rao SV, Kedev S. Approaching the post-femoral era for coronary angiography and intervention. JACC Cardiovasc Interv. 2015;8(4):524–6. [PubMed] [Google Scholar]
5. Roghani-Dehkordi F, Hadizadeh M, Hadizadeh F. Percutaneous trans-ulnar artery approach for coronary angiography and angioplasty; A case series study. ARYA Atheroscler. 2015;11(5):305–9. [PMC free article] [PubMed] [Google Scholar]
6. Valsecchi O, Vassileva A, Musumeci G, Rossini R, Tespili M, Guagliumi G, et al. Failure of transradial approach during coronary interventions: Anatomic considerations. Catheter Cardiovasc Interv. 2006;67(6):870–8. [PubMed] [Google Scholar]
7. Dehghani P, Mohammad A, Bajaj R, Hong T, Suen CM, Sharieff W, et al. Mechanism and predictors of failed transradial approach for percutaneous coronary interventions. JACC Cardiovasc Interv. 2009;2(11):1057–64. [PubMed] [Google Scholar]
8. Dahal K, Rijal J, Lee J, Korr KS, Azrin M. Transulnar versus transradial access for coronary angiography or percutaneous coronary intervention: A meta-analysis of randomized controlled trials. Catheter Cardiovasc Interv. 2016;87(5):857–65. [PubMed] [Google Scholar]
9. Gokhroo R, Kishor K, Ranwa B, Bisht D, Gupta S, Padmanabhan D, et al. Ulnar artery interventions non-inferior to radial approach: Ajmer ulnar artery (AJULAR) intervention working group study results. J Invasive Cardiol. 2016;28(1):1–8. [PubMed] [Google Scholar]
10. Roghani-Dehkordi F. Merits of more distal accesses in the hand for coronary angiography and intervention.. Proceedings of the 4th International Cardiovascular Joint Congress in Isfahan; 2016 Nov. 24-25; Isfahan, Iran. [Google Scholar]

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Case report

STEMI with high thrombus burden – two different therapeutic approaches?

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Abstract **Introduction**: High thrombus burden (HTB) in patients presenting with acute ST segment elevation myocardial infarction (STEMI) is related to post-operative complications, adverse effects and worse prognosis.
Case reports: We present two similar patients presenting with STEMI, in whom we used two different strategies to cope with HTB after failed manual thrombus aspirations: in the first case we did immediate stenting of infarct related artery (IRA); in the second case, after persisting of no-reflow phenomenon, despite implantation of two stents, we decided to intracoronary administer low-dose alteplase.
Conclusion: Aldo still controversial, evidence suggest that low-dose intracoronary fibrinolytic therapy could be useful in patients presenting with HTB, especially when manual thrombus aspiration have failed. The experience from our center confirms those statements.

Key words intracoronary fibrinolytics, high thrombus burden, ST segment elevation myocardial infarction.

Introduction

Acute ST elevation myocardial infarction (STEMI) most often occurs in the set of atherosclerotic plaque disruption, with the consequent formation of a thrombus that occludes the epicardial coronary artery.[1] According to literature, presence of thrombus can be angiographicaly verified in 91.6% STEMI patients,[2] while the presence of high thrombus burden (HTB) has been reported in 16.4% of cases.[3] While percutaneous coronary interventions (PCI) have revolutionized the treatment of STEMI and have become the standard of care,[4] preforming percutaneous revascularization in the setting of HTB remains challenging.[5]

Quantification of thrombus burden is usually based on Thrombolysis in Myocardial Infarction Risk Scores (TIMI Risk Scores or TS), according to which TS 0 indicates no thrombus is present, and TS 5 indicates definite thrombus, with the largest dimension ≥4 vessel diameters. HTB is defined as TS ≥ 4.[6] However, since there is a high incidence of coronary occlusion in STEMI, in which thrombus burden cannot be adequately assessed due to the absence of antegrade flow distal to occlusion site, *Sianosand colleagues* have proposed a new classification, in which TS 5 is reclassified after wire crossing and/or small balloon (≤ 1.5 mm) is used to recanalize the infarct related artery (IRA).[7]

Presence of HTB in acute myocardial infarction (AMI) patients is related to larger infarction area, left ventricle (LV) function deterioration, greater incidence of post-operative complications and adverse effects, including malignant arrhythmia and heart failure, and worse prognosis in general. [5,8]

This is particularly due to thrombus shifting and distal (micro)embolization, with consequent severe microvasculature obstruction (MVO) causing the no-reflow phenomenon.[9] While angiographic signs of distal embolization occur in 6–18% of cases of primary PCI in STEMI, the true incidence may be much higher. This is demonstrated by retrieval of visible debris in up to 73% patients in studies such as the Enhanced Myocardial Efficacy and Recovery by Aspiration of Liberated Debris (EMERALD) trial.[10]

No-reflow phenomenon is associated with worsen LV function, adverse clinical effects and death, and is estimated to occur in at least 10% of STEMI patients.[9,11,12] HTB is considered to be one of the major predictors of the no-reflow phenomenon.[13]

Therefore, several strategies in the setting of HTB have been proposed, including thrombectomy devices, with manual thrombus aspiration as the most commonly used, as well as pharmacological pretreatment. Recently, intracoronary-targeted thrombolysis has become popular and efficient in handling coronary thrombotic lesions.[1,14]

Case report 1

A 55-year-old male was referred to emergency room department due to anginal chest pain, which lasted for 5 hours before admission. ECG showed ST segment elevation > 2 mm in inferior leads with contralateral ST

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segment depressions, as well as ST segment elevation > 1 mm in V4R lead.
On physical examination, patient was eupnoeic, normotensive. After administering 300 mg of acetylsalicylic acid and 60 mg of Prasugrel, in a hemodynamically stable state, patient was transferred to catheterization lab.
Coronary angiography showed proximally occluded right coronary artery (RCA). (Fig. 1A) After passing the guide wire (GW), TIMI II flow occurred with large residual thrombus burden – TS 4. (Fig. 1B) After several unsuccessful manual thrombus aspirations, DES XiencePro 3,5x38 mm (Boston Scientific, Massachusetts, USA) was primo-implanted in medial RCA at 12 atmospheres (atm), after which DES ResoluteOnyx (Boston Scientific, Massachusetts, USA) 4,5x30 mm was primo-implanted in proxo-medial segment at 12 atm, with overlap. Coronary angiography performed after stent implantations showed migrations of thrombus masses in proximal and distal segment. (Fig. 1C) After implantation of DES Resolute Onyx 4,5x15 mm in ostio-proximal segment at 12 atm and intracoronary administering of nitroglycerin, coronary angiography showed entrapped thrombus masses. (Fig. 1D)
After several postdilations using non-compliant balloons and repeated intracoronary administration of nitroglycerin, final coronary angiogram showed optimal result with TIMI III flow in RCA. (Figure 1E)
In a hemodynamically stable state patient was transferred to Intensive care unit for further treatment. Control coronary angiography, planned 6 months after the procedure, is yet to be conducted.

Case report 2

A 45-year-old male was referred to emergency room department due to chest pain which lasted for 5 hours before admission.ECG showed ST segment elevation > 2 mm in inferior leads with contralateral ST segment depressions. On physical examination, patient was upset, eupnoeic, normotensive. After administering 300 mg of acetylsalicylic acid and 180 mg of Ticagrelor, in a hemodynamically stable state, patient was transferred to catheterization lab.
Coronary angiography showed proximally occluded RCA. After passing the GW, TIMI II flow occurred with large residual thrombus burden – TS gr 4. (Fig. 2-A)
After several unsuccessful manual thrombus aspirations, POBA was performed using the semi-compliant balloon.Control angiogram showed no-reflow phenomenon from medial part of RCA, with presisting thrombus masses in proximal segment. (Fig. 2-B) Procedure was continoued by implanting DES Resolute Onyx3,0x26 mm (Boston Scientific, Massachusetts, USA) in proximal segment, which resulted only in shifting of the starting point of the no-reflow bellow the distal edge of the stent. (Fig. 2-C) We implanted DES Orsiro 3,0x26 (Biotronik, Switzerland)distal segment, after which no-reflow persisted below the crux. (Fig. 2-D) At that point, considering the persisting no-reflow, we decided to intracoronary administer 10 mg of alpteplase in a slow manual infusion over 10 minutes. After restoration of coronary flow and resolution of initial ST segment elevations, we finished the procedure by implanting DES Orsiro 2,5x18 mm (Biotronik, Switzerland) in PL branch. Final angiogram showed optimal result with TIMI III flow. (Fig. 2-E)
In a hemodynamically stable state patient was transferred to Intensive care unit for further treatment. Control coronary angiography, planned 6 months after the procedure, is yet to be conducted.

Discussion

Aldo HTB is recognized to be associated with greater incidence of post-operative complications and adverse effects,[5,8]there are currently no proven recommendations for intervention in this setting. Several strategies have been advocated, including utilization of pharmacological agents and interventional strategies.[1,14] One of the most commonly used interventional strategy is manual thrombus aspiration. However, due to its failure in randomized clinical trials (RCT), the current European Society of Cardiology (ESC) guidelines recommend against the routine use of thrombus aspiration in percutaneous interventions, with consideration in specific cases where there is a HTB and risk of embolization.[4] In both patients, due to significant thrombus burden, we have performed several manual tromboaspirations, but they were without success.
In the first case, after failed thrombus aspirations, we went for immediate stenting of IRA. After implantation of two stents, we witnessed shifting of thrombus masses in both proximal and distal direction, as well as entrapped thrombus masses. This could indicate distal embolization and, possibly, a significant MVO, causing further myocardial injury.[9] Another therapeutic approach in this setting could be deffered stenting, which has showed beneficial effect in several single center experiences and non-randomized trials,[15] as well as in DEFER-STEMI trial (A Randomized Trial of Deferred Stenting Versus Immediate Stenting to Prevent No- or Slow-Reflow in Acute ST-Segment Elevation Myocardial Infarction).[16] However, the largest RCT, the DANAMI 3-DEFER trial (The Third DANish Study of Optimal Acute Treatment of Patients with ST-segment Elevation Myocardial Infarction: DEFERred stent implantation in connection with primary PCI) failed to show any benefit of deferred stenting on clinical outcomes.[17] Possible alteration that could lead to more beneficial results when deffering the stent implantation could be dosing and duration of GP IIb/IIIa inhibitors, as well as the time period of stenting delay.[15]
In the second case, after failed thrombus aspirations, we have again went for immediate stenting of IRA. After POBA and DES implantation of proximal RCA segment, we witnessed no-reflow phenomenon bellow the distal edge of the stent. In further course of the procedure, and implanting stent in distal segment, no-reflow persisted, only with shifting the starting point of the no-reflow to the lower edge of the distal stent. At that point, we decided to intracoronary administer alteplase in a total dose od 20 mg. Intracoronary thrombolysis has gained some popularity over the past decade, but is still controversial. The

largest meta-analysis about the issue, conducted by S. Agrawal, showed that low-dose intracoronary fibrinolytic therapy is, in general, safe and effective, with a reference that it could be used in the setting of HTB and failed thrombus aspiration.[18] Contrary to that, a RCT - *Effect of Low-Dose Intracoronary Alteplase During Primary Percutaneous Coronary Intervention on Microvascular Obstruction in Patients With Acute Myocardial Infarction*, in which intracoronary alteplase was administered after reperfusion and before stent implantation, showed that adjunctive low-dose intracoronary alteplase given early during the PCI did not reduce MVO.[19] The study included all STEMI patients with impaired blood flow and evidence of thrombus (TS ≥ 2). Therefore, in the authors opinion, the methodology of the study was not adequately set to examine the true clinical use of intracoronary fibrinolytic therapy, for it is reserved, and should be examined, in the setting of HTB and failure of other recommended approaches. In this manner, adequate patient selection and the time point of administering intracoronary fibrinolytic should be defined. Currently, there are two ongoing RCT to evaluate intracoronary low-dose alteplase: the "*Adjunctive Low-dose tPA in Primary PCI for STEMI*" (STRIVE, NCT03335839) study, and "*the Restoring Microcirculatory Perfusion in STEMI"* (RESTORE-MI; ACTRN 12618000778280) trial. Finally, the utility of low-dose intracoronary fibrinolytic was recognized by the actual 2019 Canadian Cardiovascular Society/Canadian Association of Interventional Cardiology Guidelines on the Acute Management of ST-Elevation Myocardial Infarction.[20]

Conclusion

HTB in STEMI patients is challenging, and there is still no strong recommendations to help us safely and effectively lead these procedures.

Manual thrombus aspiration has been downgraded in the actual ESC guidelines and is now not routinely recommended, but reserved to be considered in STEMI patients with HTB. Still, at least in our clinical experience, thrombus aspiration is usually not effective.

Aldo still controversial, evidence suggest that low-dose intracoronary fibrinolytic therapy could be useful in patients presenting with HTB, especially when manual thrombus aspiration have failed. The adequate patient selection and the time point of administering intracoronary fibrinolytic should be defined.

References

1. Kumar V, Sharma AK, Kumar T, et al. Large intracoronary thrombus and its management during primary PCI. Indian Heart J 2020;72:508-516.
2. Guardiola FM, Rossi A, Serra A, et al, on behalf of the Spanish AMI Cath Registry. Angiographic quantification of thrombus in ST-elevation acute myocardial infarction presenting with an occluded infract-related artery and its relationship with outcomes of percutaneous intervention. J Interven Cardiol 2009;22:207-215.
3. D. Fukuda, A. Tanaka, K. Shimada, et al. Predicting angiographic distal embolization following percutaneous coronary intervention in patients with acute myocardial infarction. Am J Cardiol 2003;91:403-407.
4. Ibanez B, James S, Agewall S, et al.2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J 2018;39:119–177.
5. Ren H, Zheng Y, Hu X, et al. High thrombus burden: a review of mechanisms and treatments. Int J Clin Exp Med 2019; 12:13068-13078
6. Gibson CM, de Lemos JA, Murphy SA, et al. Combination therapy with Abciximab reduces angiographically evident thrombus in acute myocardial infarction: A TIMI 14 substudy. Circulation 2001;103:2550–2555.
7. G. Sianos, M.I. Papafaklis, J. Daemen, et al. Angiographic stent thrombosis after routine use of drug-eluting stents in ST-segment elevation myocardial infarction: the importance of thrombus burden. J Am Coll Cardiol 2007;50:573-583
8. Han YL. Interpretation of 2016 Chinese percutaneous coronary intervention therapy guide. J Clin Military Med Surg 2016;44:441-443.
9. Jaffe R, Charron T, Puley G, et al. Microvascular obstruction and the no-reflow phenomenon after percutaneous coronary intervention. Circulation 2008;117:3152–3156.
10. Stone GW, Webb J, Cox DA, et al. Enhanced myocardial efficacy and recovery by aspiration of liberated debris (EMERALD) Investigators. Distal microcirculatory protection during percutaneous coronary intervention in acute ST-segment elevation myocardial infarction: a randomized controlled trial. JAMA 2005; 293:1063-1072.
11. Harrison RW, Aggarwal A, Ou FS, et al. Incidence and outcomes of no-reflow phenomenon during percutaneous coronary intervention among patients with acute myocardial infarction. Am J Cardiol 2013;111:178–84.
12. S. Prasad, I. T. Meredith. Current approach to slow flow and no Reflow. Cardiac Interventions Today 2008:43-49.
13. Fajar JK, Heriansyah T, Rohman MS. The predictors of no reflow phenomenon after percutaneous coronary intervention in patients with ST elevation myocardial infarction: A meta-analysis. Indian Heart J 2018;70(Suppl 3):S406-S418.
14. Xiao Y, Fu X, Wang Y, et al. Effects of different strategies on high thrombus burden in patients with ST-segment elevation myocardial infarction undergoing primary percutaneous coronary catheterization. Cor Artery Dis 2019;30:555-563.
15. Pradhan A, Bhandari M, Vishwakarma P, et al. Deferred stenting for heavy thrombus burden during percutaneous coronary intervention for ST-Elevation MI. Eur Cardiol 2021;16:e08.
16. Carrick D, Oldroyd KG, McEntegart M, et al. A randomized trial of deferred stenting versus immediate stenting to prevent no- or slow-reflow in acute ST-segment elevation myocardial infarction (DEFER-STEMI). J Am Coll Cardiol 2014;63:2088-2098.
17. Kelbæk H, Høfsten DE, Køber L, et al. Deferred versus conventional stent implantation in patients with ST-segment elevation myocardial infarction (DANAMI 3-DEFER): an open-label, randomised controlled trial. Lancet 2016;387:2199-206.
18. Agarwal SK, Agarwal S. Role of intracoronary fibrinolytic therapy in contemporary PCI practice. Cardiovasc Revasc Med 2019;20:1165-1171.
19. McCartney PJ, Eteiba H, Maznyczka AM, et al. Effect of low-dose intracoronary alteplase during primary percutaneous coronary intervention on microvascular obstruction in patients with acute myocardial infarction: A randomized clinical trial. JAMA 2019;321:56–68.
20. Wong GH, Welsford M, Ainsworthet C, al. 2019 Canadian Cardiovascular Society/CanadianAssociation of Interventional Cardiology Guidelines on the acute management of ST-Elevation myocardial infarction: Focused update on regionalization and reperfusion. Can J Cardiol 2019;35:107e132

Sažetak

STEMI sa velikim trombom – dva različita dijagnostička pristupa

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***Uvod**: Kod pacijenata koji se prezentuju infarktom miokarda sa elevacijom ST segmenta (STEMI), veliko trombotsko opterećenje se dovodi u vezu sa post-opreativnim komplikacijama, neželjenim događajima i gorom prognozom.*
***Prikaz slučaja**: Prezentujemo dva pacijenta sa infarktom miokarda sa ST elevacijom, a kod kojih smo koristili dve različite strategije u cilju rešavanja problema velikog trombotskog opterećenja nakon neuspešne trombo-aspiracije: kod prvog pacijenta odlučili smo se za neposredno stentiranje infarkne arterije; kod drugog pacijent, nakon perzistiranja no-reflow fenomena, čak i nakon implantacije dva stenta, odlučili smo se za intrakoronarnu aplikaciju niske doze alteplaze.*
***Zaključak**: Iako još uvek kontroverzno, dokazi ukazuju na to da bi niske doze intrakoronarno ordiniranih fibrinolitika mogle biti korisne kod pacijenata sa velikim trombotskim opterećenjem, naročito nakon neuspešne trombo-aspiracije. Iskustvo iz našeg centra saglasno je sa tim tvrdnjama.*

***Ključne reči:** intrakoronarna fibrinoliza, veliko trombotsko opterećenje, infarkt miokarda sa ST elevacijom.*