

Cardiac Computed Tomography for Detecting Intracoronary Thrombotic Structures in Proximal LAD Bare Metal Stents

Anger Thomas, Bender Bernhard, Plachtzik Claudia, Oberhoff Martin, Höher Martin

Anger Thomas, Plachtzik Claudia, Oberhoff Martin, Department of Cardiology, Division of Medicine, Klinikum Calw-Nagold, Germany

Bender Bernhard, Höher Martin, Department of Cardiology, Division of Medicine II, Klinikum Bayreuth, Germany

Correspondence to: Thomas Anger, Department of Cardiology, Division of Medicine, Innere Medizin/ Kardiologie, Klinikum Calw-Nagold, Kliniken Calw, Eduard Conz Straße 6, D-73511 Calw, Germany.

Email: th.anger@arcor.de

Telephone: +49-07051-14-41130 Fax: +49-0-7051-14-42195

Received: July 14, 2014 Revised: January 25, 2015

Accepted: January 26, 2015

Published online: February 10, 2015

© 2015 ACT. All rights reserved.

Key words: Cardiac 256-MDCT; Intraluminal Bare Metal Stent Thrombus; Acetylsalicylic acid; Abciximab

Anger T, Bernhard B, Claudia P, Martin O, Martin H. Cardiac Computed Tomography for Detecting Intracoronary Thrombotic Structures in Proximal LAD Bare Metal Stents. *Journal of Cardiology and Therapy* 2015; 2(1): 269-272 Available from: URL: <http://www.ghrnet.org/index.php/jct/article/view/1034>

ABSTRACT

Thrombus distribution is known part of atrial arrhythmias. We here report a clinical example using cardiac 256-multidetector row computed tomography (256 MDCT) for examination to assess for small intracoronary thrombotic structures in proximal parts of vessels with either big size (> 2,5 mm diameter) and/ or existing bare metal stents on a 70 years old male individual. He was suffering a non ST elevated myocardial infarction due to intracoronary thrombus in bare metal stents in the proximal left artery descending (LAD) in regard to occult atrial fibrillation. Philips 256 iCT documented the small amount of rest thrombus after abciximab pre treatment before discharge of the patient under acetylsalicylic acid (100mg) and phenprocoumon (for 6 months). Summarised, this example proposes and underlines further use of cardiac MDCT for patients with acute chest pain to improve prognostic outcome by reduction of complications. Additionally, even 3 years after bare metal stent implantation in big vessels, here proximal LAD, we are mainly demonstrating the need of continuous antithrombotic acetylsalicylic acid treatment to avoid in-stent thrombosis.

LEARNING OBJECTIVE

Further use of Cardiac CT is the detection of intraluminal thrombotic material in coronary stents.

CASE REPORT

A 70 years old male patient in good health conditions with known coronary artery disease and existing three bare-metal stents (Cobalt-Chromium "Multi-Link Vision Bare-Metal Coronary Stent System, 3.0×12mm, Abbott, Wiesbaden, Germany) in the proximal and mid part of the left anterior descending artery (LAD) implanted 3 years ago, was presented to the Department for Cardiology with acute chest pain for 2 hours following chemically a Non-ST-Elevated Myocardial Infarction (NSTEMI).

In the past, a common drug treatment was established with 100 mg acetylsalicylic acid per day, 2.5 mg bisoprolol per day, 10 mg ramipril per day, 20 mg simvastatin per day and for 4 weeks clopidogrel 7.5 mg per day after bare-metal stent-implantation. The 100 mg acetylsalicylic acid treatment was discontinued due to an elective surgery on the right carotid artery interna 2 weeks before hospital presentation in regard to severely stenosis.

Actually, the Troponin I level raised to 1.5 ng/mL (normal < 0.05ng/

mL) and the ECG demonstrated an paroxysmal atrial fibrillation turning in normal ventricular frequency (to this date unknown). Immediately, an invasive coronary angiography was performed and the coronary status was assessed revealing a remarkable structure in the proximal two stents of the LAD suspected to an intracoronary thrombus while normal perfusion was determined in all stents and the rest of the vessel (TIMI 3), see figure 1 (pre, marked through white arrows).

Due to an intraluminal reduction of only 30% Diameter Stenosis in both proximal LAD stents, abciximab adjusted to the body weight was given intravenously for 12h and a second look was assessed using Philips iCT Cardiac 256-MDCT while the patient spontaneously converted into normal sinus rhythm (Figure 2). Retrospective gating to 75% RR interval was performed (heart rate 65 beats per minute) and only a small rest thrombus in the proximal LAD stent surrounded by non- and calcified plaques as well as the struts of the both “Vision” stent systems (only 0.0032” thick) were observed (see bold white arrow, figure 2). The complete vessel demonstrated further almost inconspicuous perfusion. Caused through additional unspecific symptoms of the patient, we performed a second invasive coronary angiography with complete normal perfusion in all LAD stents (proximal and mid) and ruled out further intravascular thrombotic materials, see figure 1 (post).

The patient got discharged 2 days later set on Phenprocuomon for 6 months due to stable sinus rhythm improved by beta-receptor inhibition (metoprolol 95 mg per day) added to 100 mg acetylsalicylic acid per day.

DISCUSSION

While thrombus distribution is known part of atrial arrhythmias^[1-4], this example reveals cardiac 256-multidetector row computed tomography (256 MDCT) as clinical examination to explore small intracoronary thrombotic structures in proximal parts of vessels with either big size (> 2,5 mm diameter) and/or existing bare metal stents^[5].

The thrombotic structure in the LAD stents is caused through the discontinuing of 100 mg per day acetylsalicylic acid treatment. The obviously distribution of the thrombotic material in the vessel is focusing mainly in the stent regions which excludes coronary embolisms through atrial arrhythmias as reason for the intraluminal thrombus.

We support a further use of cardiac CT detecting intraluminal thrombotic material following (1) coronary calcium scoring^[6], (2) coronary plaque formations^[7-9], (3) coronary artery disease^[10,11], (4) left ventricular function (mass, regional wall motions, ejection fraction)^[12,13], (5) right ventricular function^[14], (6) valve function (aortic valve)^[15], and (7) the detection of the culprit lesion in myocardial infarction^[16-18].

Infusion of abciximab as antithrombotic treatment regimen is part of the drug management in acute coronary symptoms^[19-22]. Here, partial success for thrombus lysis was assessed detected through cardiac 256-MDCT while even complete thrombus abolishment was assumed using conventional invasive coronary angiography (see figure 1, lower panel.).

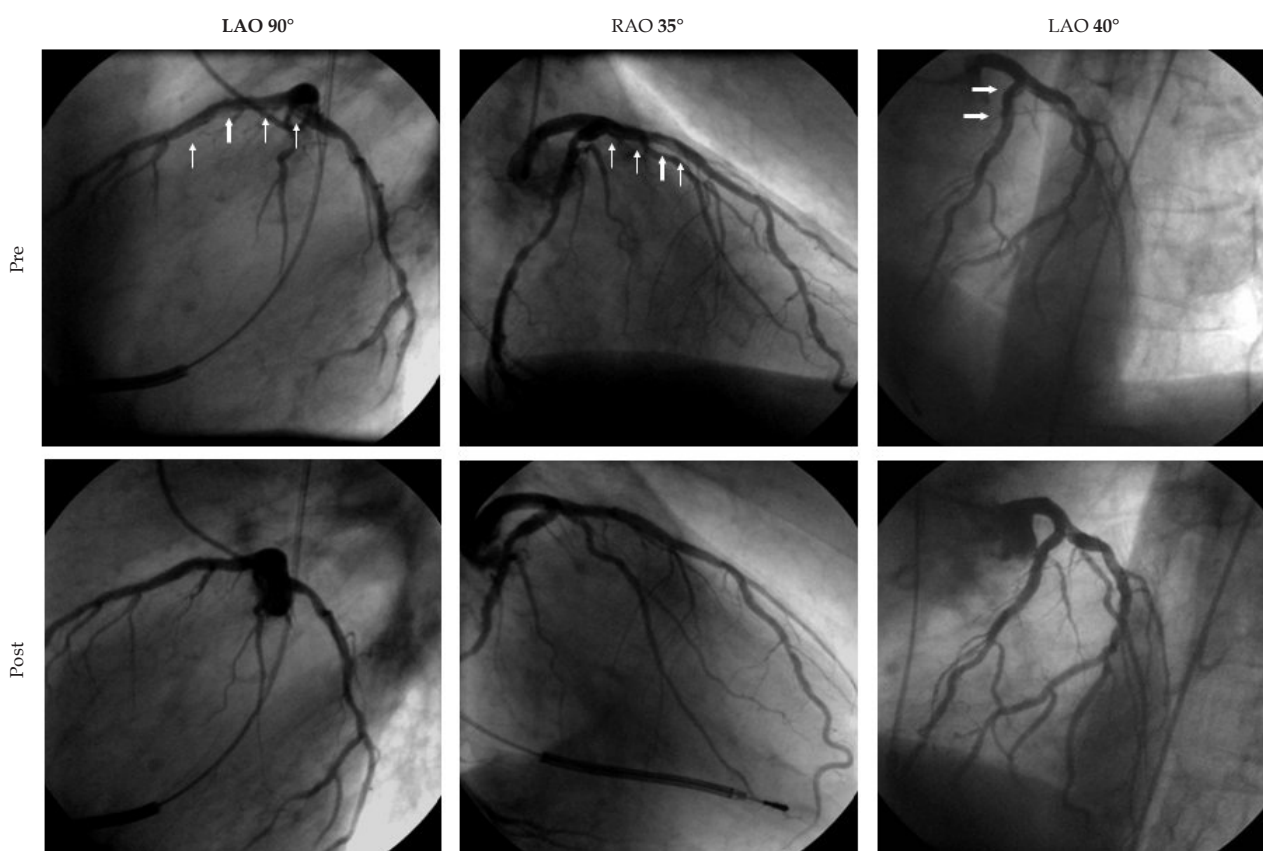


Figure 1 Invasive Coronary Angiography. Demonstrated here are slides from the invasive coronary angiography determining the intracoronary thrombotic structure in the two bare metal stents (Multi Link Vision Coronary Stent System, 3.0x12mm, Abbott, Wiesbaden, German) in the proximal left anterior descendents artery (LAD) as marked with white arrows. The upper panel (pre) shows the coronary status of the LAD in different ankles (LAO90°, RAO35° and LAO40°) as well as of the circumflex artery right after administration of the patient in the Department for Cardiology 2 hours after begin of symptoms (acute chest pain). The lower panel is demonstrating the coronary status after intravenous support of abciximab for 12 hours (post) in same angiographic ankles.

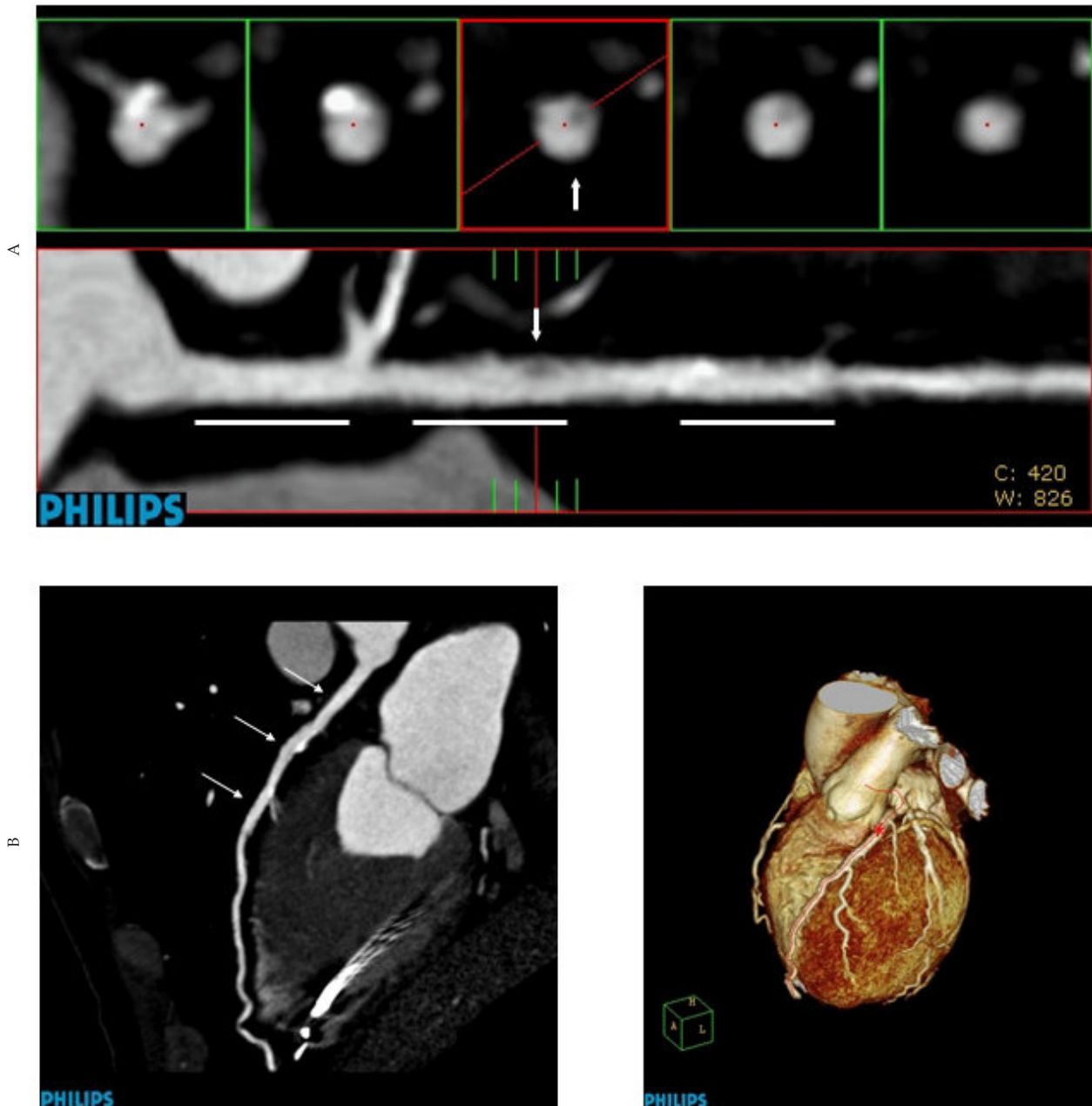


Figure 2 Cardiac 64-MDCT. Retrospektives Gating in 75% RR interval, heart rate 65/min in sinus rhythm revealed 12 hours after abciximab treatment demonstrated slides exploring small dark structure suspected for rest thrombotic material as marked with white arrow in the proximal LAD stent (marked with white lines). A. Demonstrated here are computer based reconstruction of strengthen LAD vessel (lower panel, axial cut) with the three stents (white lines) and the suspected thrombotic material (dark structure, marked with white arrow). In the upper panel, cross axial cuts are demonstrating only the 30% Diameter Stenosis caused through the thrombus in the LAD stent. B. Coronary curved section cuts demonstrating reconstructed contrast perfusion in the LAD. Highlighted here are the three stent positions (left panel, white arrows) and the 3D reconstruction with the red coloured marked LAD (right panel).

This example proposes and underlines further use of cardiac MDCT for patients with acute chest pain to improve prognostic outcome by reduction of complications^[23]. Additionally, even 3 years after bare metal stent implantation in big vessels, here proximal LAD, we are mainly demonstrating the need of continuous antithrombotic acetylsalicylic acid treatment to avoid in-stent thrombosis.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

REFERENCES

- 1 Hughes M, Lip GY. Stroke and thromboembolism in atrial fibrillation: a systematic review of stroke risk factors, risk stratification schema and cost effectiveness data. *Thromb Haemost* 2008; **99**(2): 295-304
- 2 Jackson K, Gersh BJ, Stockbridge N, Fleming TR, Temple R, Califf RM, et al. Antithrombotic drug development for atrial fibrillation: proceedings, Washington, DC, July 25-27, 2005. *Am Heart J* 2008; **155**(5): 829-840

- 3 Noheria A, Kumar A, Wylie JV, Jr., Josephson ME. Catheter ablation vs antiarrhythmic drug therapy for atrial fibrillation: a systematic review. *Arch Intern Med* 2008; **168**(6): 581-586
 - 4 Donnan GA, Fisher M, Macleod M, Davis SM. Stroke. *Lancet* 2008; **371**(9624): 1612-1623
 - 5 Schlosser T, Scheuermann T, Ulzheimer S, Mohrs OK, Kuhling M, Albrecht PE, et al. In vitro evaluation of coronary stents and in-stent stenosis using a dynamic cardiac phantom and a 64-detector row CT scanner. *Clin Res Cardiol* 2007; **96**(12): 883-890
 - 6 Schlosser T, Hunold P, Voigtlander T, Schmermund A, Barkhausen J. Coronary artery calcium scoring: influence of reconstruction interval and reconstruction increment using 64-MDCT. *AJR Am J Roentgenol* 2007; **188**(4): 1063-1068
 - 7 Nikolaou K, Becker CR, Muders M, Babaryka G, Scheidler J, Flohr T, et al. Multidetector-row computed tomography and magnetic resonance imaging of atherosclerotic lesions in human ex vivo coronary arteries. *Atherosclerosis* 2004; **174**(2): 243-252
 - 8 Achenbach S, Moselewski F, Ropers D, Ferencik M, Hoffmann U, MacNeill B, et al. Detection of calcified and noncalcified coronary atherosclerotic plaque by contrast-enhanced, submillimeter multidetector spiral computed tomography: a segment-based comparison with intravascular ultrasound. *Circulation* 2004; **109**(1): 14-17
 - 9 Schmid M, Achenbach S, Ropers D, Komatsu S, Ropers U, Daniel WG, et al. Assessment of changes in non-calcified atherosclerotic plaque volume in the left main and left anterior descending coronary arteries over time by 64-slice computed tomography. *Am J Cardiol* 2008; **101**(5): 579-584
 - 10 Pohle K, Achenbach S, MacNeill B, Ropers D, Ferencik M, Moselewski F, et al. Characterization of non-calcified coronary atherosclerotic plaque by multi-detector row CT: comparison to IVUS. *Atherosclerosis* 2007; **190**(1): 174-180
 - 11 Achenbach S, Hoffmann U, Ferencik M, Wicky S, Brady TJ. Tomographic coronary angiography by EBCT and MDCT. *Prog Cardiovasc Dis* 2003; **46**(2): 185-195
 - 12 Hundt W, Siebert K, Wintersperger BJ, Becker CR, Knez A, Reiser MF, et al. Assessment of global left ventricular function: comparison of cardiac multidetector-row computed tomography with angiocardiology. *J Comput Assist Tomogr* 2005; **29**(3): 373-381
 - 13 Schlosser T, Mohrs OK, Magedanz A, Voigtlander T, Schmermund A, Barkhausen J. Assessment of left ventricular function and mass in patients undergoing computed tomography (CT) coronary angiography using 64-detector-row CT: comparison to magnetic resonance imaging. *Acta Radiol* 2007; **48**(1): 30-35
 - 14 Plumhans C, Muhlenbruch G, Rapae A, Sim KH, Seyfarth T, Gunther RW, et al. Assessment of global right ventricular function on 64-MDCT compared with MRI. *AJR Am J Roentgenol* 2008; **190**(5): 1358-1361
 - 15 Gilkeson RC, Markowitz AH, Balgude A, Sachs PB. MDCT evaluation of aortic valvular disease. *AJR Am J Roentgenol* 2006; **186**(2): 350-360
 - 16 Nikolaou K, Knez A, Sagmeister S, Wintersperger BJ, Boekstegers P, Steinbeck G, et al. Assessment of myocardial infarctions using multidetector-row computed tomography. *J Comput Assist Tomogr* 2004; **28**(2): 286-292
 - 17 Huang WC, Chiou KR, Liu CP, Lin SK, Huang YL, Mar GY, et al. Multidetector row computed tomography can identify and characterize the occlusive culprit lesions in patients early (within 24 hours) after acute myocardial infarction. *Am Heart J* 2007; **154**(5): 914-922
 - 18 Litmanovitch D, Zamboni GA, Hauser TH, Lin PJ, Clouse ME, Raptopoulos V. ECG-gated chest CT angiography with 64-MDCT and tri-phasic IV contrast administration regimen in patients with acute non-specific chest pain. *Eur Radiol* 2008; **18**(2): 308-317
 - 19 De Servi S, Mariani M, Vandoni P, Dellavalle A, Politi A, Poletti F, et al. Use of glycoprotein IIb/IIIa inhibitors in invasively-treated patients with non-ST elevation acute coronary syndrome. *J Cardiovasc Med (Hagerstown)* 2006; **7**(3): 159-165
 - 20 Iijima R, Ndrepepa G, Mehilli J, Neumann FJ, Schulz S, Ten Berg J, et al. Troponin level and efficacy of abciximab in patients with acute coronary syndromes undergoing early intervention after clopidogrel pretreatment. *Clin Res Cardiol* 2008; **97**(3): 160-168
 - 21 Mehilli J, Ndrepepa G, Kastrati A, Neumann FJ, ten Berg J, Bruskina O, et al. Sex and effect of abciximab in patients with acute coronary syndromes treated with percutaneous coronary interventions: results from Intracoronary Stenting and Antithrombotic Regimen: Rapid Early Action for Coronary Treatment 2 trial. *Am Heart J* 2007; **154**(1): 158 e1-7
 - 22 Ndrepepa G, Kastrati A, Mehilli J, Neumann FJ, ten Berg J, Bruskina O, et al. One-year clinical outcomes with abciximab vs. placebo in patients with non-ST-segment elevation acute coronary syndromes undergoing percutaneous coronary intervention after pre-treatment with clopidogrel: results of the ISAR-REACT 2 randomized trial. *Eur Heart J* 2008; **29**(4): 455-461
 - 23 Gani F, Jain D, Lahiri A. The role of cardiovascular imaging techniques in the assessment of patients with acute chest pain. *Nucl Med Commun* 2007; **28**(6): 441-449
- Peer reviewers:** Wilbert S Aronow, Cardiology Division, New York Medical College, Macy Pavilion, Room 138, Valhalla, NY 10595, USA; Christopher X. Wong, Research Fellow, Clinical Trial Service Unit, University of Oxford, Richard Doll Building, Old Road Campus, Roosevelt Drive, Oxford OX3 7LF, England.