

Journal für Kardiologie

Austrian Journal of Cardiology

Österreichische Zeitschrift für Herz-Kreislauserkrankungen

Acute Cardiovascular Care - Clinical Cases

*Journal für Kardiologie - Austrian
Journal of Cardiology* 2014; 21
(3-4), 106-108

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Krause & Pacherneegg GmbH • Verlag für Medizin und Wirtschaft • A-3003 Gablitz

P.b.b. 02Z031105M,

Verlagsort: 3003 Gablitz, Linzerstraße 177A/21

Preis: EUR 10,-

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Acute Cardiovascular Care – Clinical Cases:

STEMI evolving out of non-STEMI*

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■ Learning Objectives

- To make a diagnosis of a NSTEMI-ACS regarding all possible differential diagnoses
- To choose the right treatment strategy for NSTEMI-ACS and STEMI patients
- To use the recommended antiplatelet and anticoagulant therapies

■ Introduction

A 41 year-old male patient admitted himself in the evening hours to a non-PCI hospital 90 km away from the next PCI centre in an alpine country due to mild angina pectoris since about 3 hours. The patient described the severity of angina as mild (“something is not normal”). His known cardiovascular risk factors include arterial hypertension, hypercholesterolemia, smoking and diabetes mellitus. The ongoing medical

therapy consisted of Ramipril 5 mg bid, Metoprolol 47.5 mg bid, Atorvastatin 20 mg od, Glimepirid 2 mg od and Metformin 1g bid.

The first ECG is displayed in Figure 1.

■ Conclusion

The present case shows a STEMI which evolved out of a NSTEMI.

The treatment strategy was therefore changed from an early invasive to an urgent invasive strategy. As the patients admitted himself to the non-PCI hospital in the evening hours, after daily routine work, and in view of the initially diagnosed NSTEMI-ACS with complete symptom relief after medical therapy, a transfer by ambulance the next day morning in the PCI-hospital was reasonable and in line with the guideline recommendations.

The choice of the antiplatelet and antithrombotic management is discussed referring to the NSTEMI-ACS guidelines 2011 and STEMI guidelines 2012 because the patients’ ACS entity change from a NSTEMI-ACS to a STEMI within two hours.

* Nachdruck aus <http://www.escardio.org/communities/ACCA/education-research/elearning/clinical-cases/Pages/STEMI-evolving-non-STEMI.aspx> (zuletzt gesehen: 13.02.2014) – 1. ACCA Newsletter der European Society of Cardiology, Clinical Cases, mit freundlicher Genehmigung von E. Delaveau, ACCA Administrator der ESC.

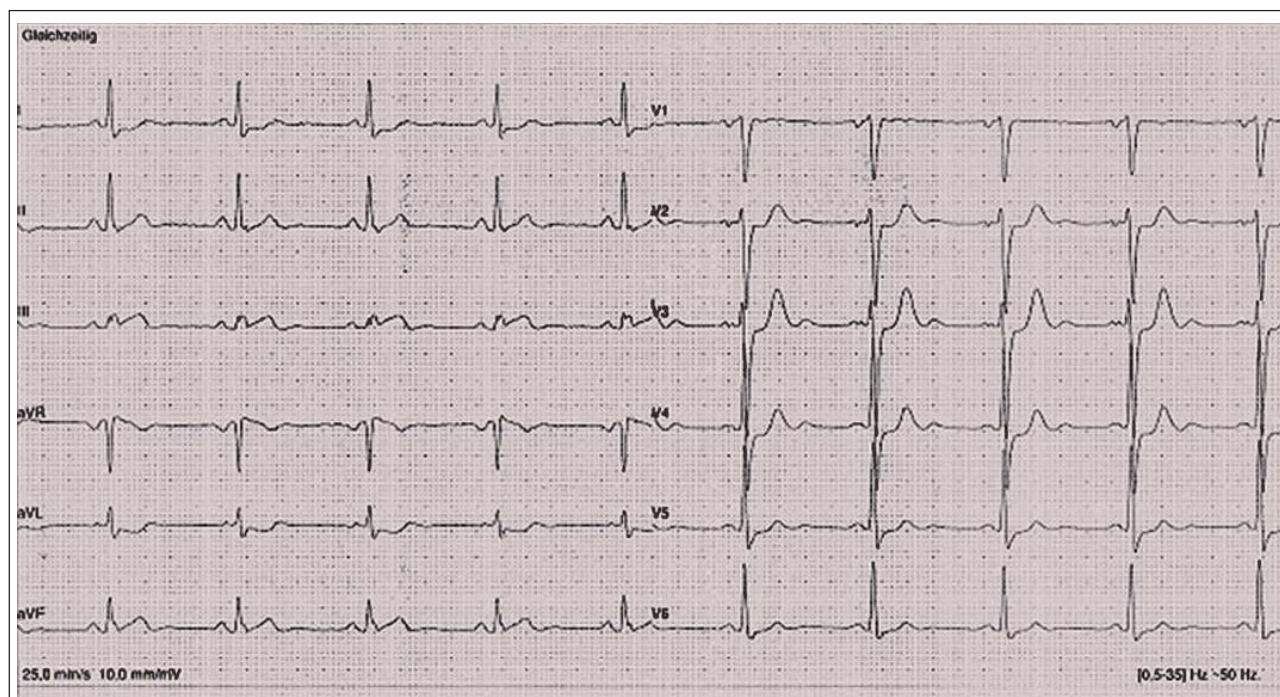


Figure 1. First ECG.

Finally, coronary angiography revealed an occlusion of the right coronary artery. After thrombus aspiration, the culprit vessel was pre-dilated and a drug-eluting stent was successfully implanted. Left ventricular function was preserved with no akinesia or hypokinesia. The patient was discharged at day 6 in good clinical condition.

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■ Questions

- What is the most possible diagnosis?
 - ST segment elevation myocardial infarction (STEMI)
 - Non-ST segment elevation acute coronary syndrome (NSTEMI-ACS)
 - Pericarditis
 - Pulmonary embolism
- Given the most possible diagnosis of a NSTEMI-ACS which would not be the preferred next step in the diagnostic work-up process?
 - Echocardiogram
 - Exercise treadmill test
 - Calculated risk score (GRACE)
 - Biochemistry/troponin
 - Response to antianginal treatment
- Which initial P2Y₁₂ inhibitor is less recommended?
 - Clopidogrel 300–600 mg
 - Ticagrelor 2 × 90 mg
 - Prasugrel 60 mg
- Which initial anticoagulation should not be chosen in the non-PCI hospital in this case?
 - Unfractionated heparin
 - Enoxaparin
 - Fondaparinux
 - Bivalirudin
- Which strategy would not be a recommended option for this patient keeping in mind the localization of the hospital and the time of the day?
 - Stay in non-PCI hospital, coronary angiography (± revascularization) according to results of non-invasive testing the next day
 - Stay in non-PCI hospital, transfer next day to coronary angiography (± revascularization)
 - Transfer to PCI hospital now, but coronary angiography (± revascularization) next day
 - Transfer to PCI hospital now with intention for acute coronary angiography (± revascularization)
- Which anticoagulation should be administered during PCI? (Enoxaparin 2h before)
 - Enoxaparin (± Abciximab)
 - UFH (± Abciximab)
 - Fondaparinux
 - Bivalirudin (± Abciximab)

Answers

Female, low body weight patient with NSTEMI-ACS presenting in a non-PCI capable hospital and suffering from a bleeding complication after discharge*

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■ Learning Objectives

- The diagnostic work up progress of patients with typical angina pectoris – the treatment strategy of NSTEMI-ACS patients
- The recommended antiplatelet therapy for NSTEMI-ACS patients

- The concomitant anticoagulation therapy NSTEMI-ACS patients

■ Introduction

August 15, 2012. A 45 year-old women, 48 kg, 160 cm, admitted herself to a non-PCI hospital about 90 km away from the next PCI-capable hospital separated by mountains due to severe chest pain for the first time in her life lasting for about two hours. The pain is continuous and not dependent on inspiration or body position. The character of the pain is typical of angina pectoris. She had an unremarkable medical history

* Nachdruck aus <http://www.escardio.org/communities/ACCA/education-research/elearning/clinical-cases/Pages/low-weight-NSTEMI-non-PCI-bleeding-complication.aspx> (zuletzt gesehen 07.03.2014) – 1. ACCA-Newsletter der European Society of Cardiology, Clinical Cases, mit freundlicher Genehmigung von E. Delaveau, ACCA Administrator der ESC.

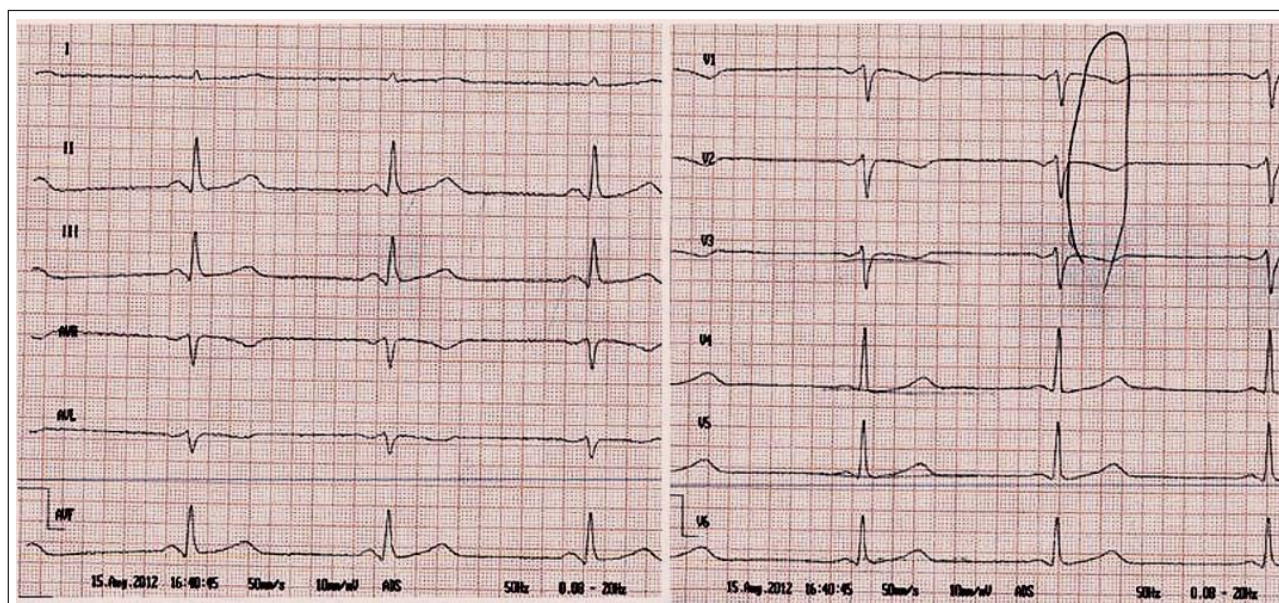


Figure 2. First ECG in the non-PCI hospital with negative T waves in V1–V3 and aVL.

with no relevant prior surgeries or comorbidities and no permanent medical therapy. On admission, the only known cardiovascular risk factor was smoking.

The first ECG at the emergency room of the non-PCI hospital revealed negative T waves in V1–V3 and aVL (Fig. 2).

In the transthoracic echocardiogram with an excellent window no wall motion abnormalities, no signs of pulmonary congestion, a normal aortic root and adjacent ascending aorta and no other pathologies were depicted. The global left ventricular function was normal. Blood chemistry revealed a normal high-sensitivity Troponin T. In addition, the creatin kinase and d-dimer were within the normal range.

■ Conclusion

The present case deals with a patient in a non-PCI hospital suffering from severe typical angina pectoris. Regarding the initial negative T-waves in V1–V3, a NSTEMI-ACS was diagnosed. After receiving a loading dose of ticagrelor, ASA 250 g, 5000 IU heparin and NTG sublingual, the ECG showed no abnormalities any more, but the patient still suffered from angina pectoris. The initial echocardiogram did not show any wall motion abnormality.

An early scheduled second blood chemistry revealed an increase in cardiac enzymes and the patient was transferred to the PCI hospital.

At the PCI-hospital, another ECG again showed no pathologies. Facing the severe pain, a coronary angiography was performed. An occlusion of the circumflex artery (CX) as the culprit lesion was detected. Two thrombus aspirations were performed, and after predilatation a drug eluting stent was successfully implanted. During intervention, bivalirudin was administered according to the NSTEMI-ACS guidelines. The patient was discharged at day 6 with dual antiplatelet therapy consisting of ticagrelor bid and ASA 100 mg od. and was ad-

mitted to a rehabilitation clinic in good health condition without complaints at day 13. There, two episodes of epistaxis, the second requiring nasal tamponade, occurred. Although epistaxis is no hard reason to stop ongoing therapy with ticagrelor, as epistaxis can easily be controlled, but nuisance bleeding may lead to a lower compliance. Therefore it was stopped and the dual antiplatelet therapy was continued with clopidogrel.

The further course in the rehabilitation clinic was uneventful and the patient was discharged in good health condition.

■ Questions

- Which is the most probable diagnosis?
 - Acute aortic syndrome
 - STEMI
 - Pulmonary embolism
 - Pericarditis
 - NSTEMI-ACS
- Given the most possible diagnosis of a NSTEMI-ACS, which initial anticoagulation has the highest level of recommendation/level of evidence in the recent ESC guidelines?
 - Unfractionated heparin (UFH)
 - Enoxaparin
 - Fondaparinux
 - Bivalirudin
- Which initial P2Y₁₂ receptor antagonist should be chosen for this woman with 48 kg?
 - Clopidogrel 300 mg
 - Clopidogrel 600 mg
 - Prasugrel 30 mg
 - Prasugrel 60 mg
 - Ticagrelor 2 × 90 mg
- Regarding the antithrombotic strategy during PCI, which co-therapy should not be chosen?
 - UFH (± Abciximab)
 - Bivalirudin (± Abciximab)
 - Enoxaparin (± Abciximab)

5. How would you react on this bleeding complication?

- a) Stay on Ticagrelor
- b) Switch to Prasugrel 10 mg
- c) Switch to Prasugrel 5 mg
- d) Switch to Clopidogrel 75 mg

Answers

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A rare case of non-ST-elevation myocardial infarction*

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■ Learning Objectives

- Not to think only in the margins of guidelines, even if signs and symptoms might direct us
- To widen the knowledge in interpretation of special ECG changes
- To become aware of very curious medical cases

■ Introduction

On 20 April 2010 at 11:30 a. m. a 50 year old caucasian woman was admitted to our emergency department due to ongoing typical angina since the morning (onset of pain approximately 3 hours before admittance) as well as nausea, epigastric pain and vomiting. Furthermore the patient reported subjective palpitations the night before. Her blood pressure was in the lower normal range (100/60 mmHg) with a heart rate of 90 bpm. The blood was well saturated with oxygen (99%). Height 165 cm, body weight 80 kg. Physical examination exhibited no rales over the lungs, a rhythmic heart action with a 2/6 holosystolic heart murmur (p. m. Erb) but no further abnormalities. Objectively the patient was tachypnoic and hyperventilating.

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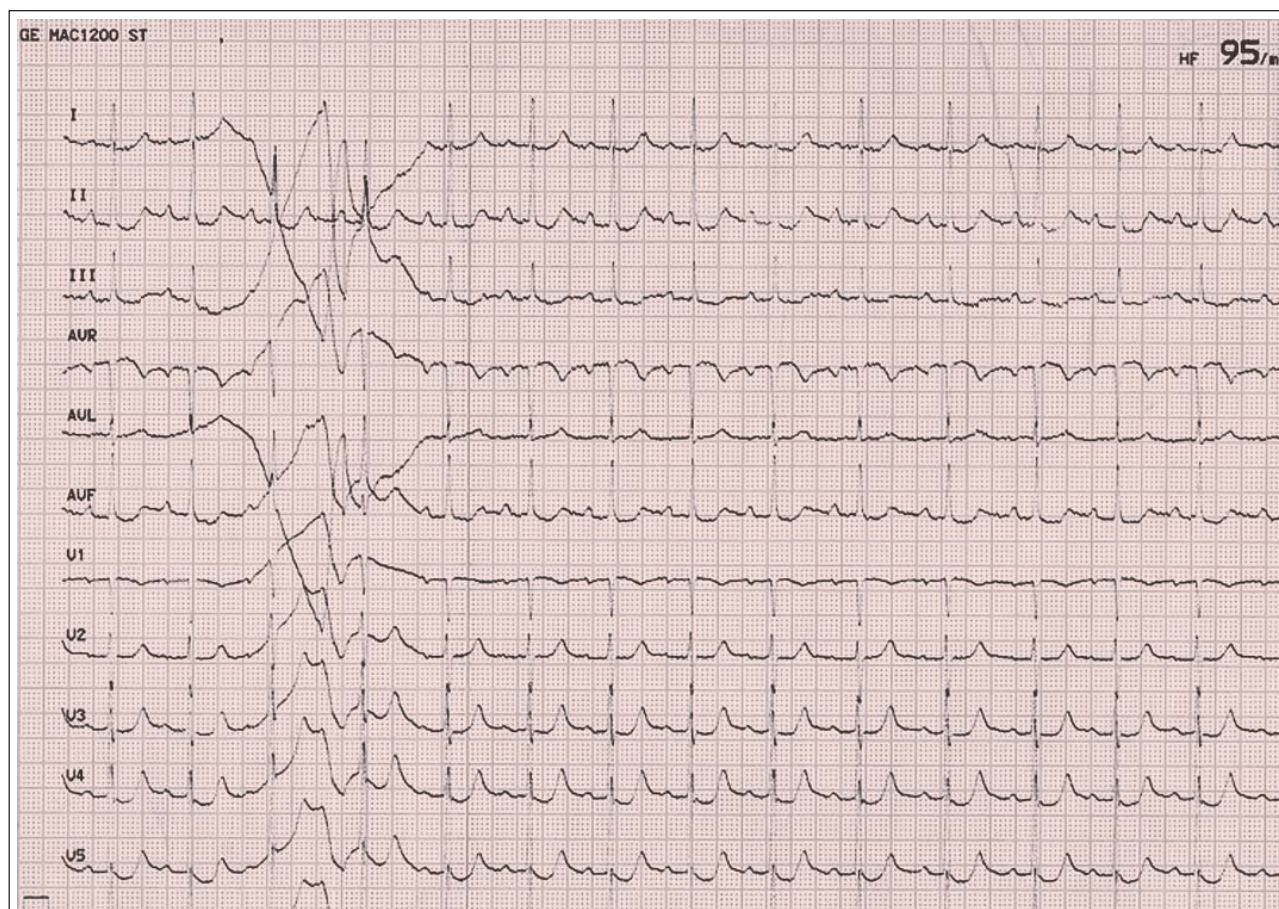


Figure 3. ECG at admission.

Table 1. Temporal development of respiratory overcompensated metabolic lactate acidosis.

	20-04-2010 11:39 A.M.	20-04-2010 4:58 P.M.	21-04-2010 8:25 A.M.
pH	7.63	7.50	7.48
pCO ₂ (mmHg)	17.0	33.0	35.2
pO ₂ (mmHg)	90.0	63.5	76.2
Hb (g/dl)	15.1	14.8	14.5
K (mmol/l)	3.5	3.9	3.5
Na (mmol/l)	139	136	139
Ca (mmol/l)	1.18	1.19	1.21
Lactat (mmol/l)	6.0	1.4	0.8
HCO ₃ (mmol/l)	24.2	27.1	27.4

Due to a language barrier there were difficulties to explore the clinical history. However, we were informed by relatives and could reconstruct the history based on former medical reports that there were no relevant preexisting comorbidities with respect to cardiovascular diseases. The cardiovascular risk profile of the patient included current cigarette smoking (30 packyears) and overweight (body mass index – BMI 29). Five years ago she had suffered from a combustion of her face and the upper body, 10 years ago she underwent successful conisation for cervix carcinoma with excellent long-term result. The patient was on no medication for years.

The ECG at admission is illustrated in Figure 3. It shows normofrequent sinus rhythm with regular P waves (0.2 mV/0.10 s), a PQ time in the upper normal range (0.2 s), narrow QRS complexes (0.08 s) and a normal axis. There were no signs of left ventricular hypertrophy. ST-segments were depressed in the anterior and lateral wall leads (V3–V6: 0.1 mV) as well as in the inferior leads (II, III, aVF: 0.1 mV). In aVR the ST-segment was slightly elevated (0.1 mV). In addition to this 12-lead ECG left posterior and right ventricular leads were analyzed but did not reveal any further relevant informations.

Table 1 documents a respiratory overcompensated metabolic lactate acidosis.

Laboratory findings revealed a left shifted-leucocytosis but a normal C-reactive protein. Renal function and liver function parameters were normal. Troponin I as well as creatine-kinase (CK) were elevated, as was blood glucose.

■ Conclusion

Convallaria majalis grows throughout Europe as well as in North America and Asia. It is a perennial plant and might trigger cardiovascular disorders e.g. arrhythmia, angina, tachycar-

dia, first high then low blood pressure, respectively. Severe intoxications can lead to cardiopulmonary arrest. Usually, patients develop nausea, vomiting, diarrhea and vertigo. A specific treatment beside active charcoal (or gastroscopic emptying of the stomach in early hours) does not exist. If intoxication is severe treatment is similar to actions taken in severe digitalis intoxications (temporary pacing, atropin, catecholaminergic therapy, digoxin specific Fab antibody fragments) [1, 2].

■ Questions

- Based on the information given what would you suspect to be responsible for the symptoms and the clinical state of the patient.
 - Acute non ST elevation myocardial infarction (NSTEMI)
 - Pericarditis
 - Infectious disease of the lung
 - Pulmonary embolism
- What would you suggest to be the next step in diagnosis and management of the patient?
 - Coronary angiography within 24 hours
 - Primarily conservative medical therapy and coronary angiography within 72 hours
 - Echocardiography
 - CT-angiography of the heart
- What is the suggested diagnosis after angiographic exclusion of coronary artery disease?
 - ACS due to vasospastic angina
 - Pericarditis
 - Unknown effects (non-mentioned medicaments, alimentation)
 - Primarily rhythmologic disorder

Answers

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Acute transmural myocardial ischemia caused by severe emotional stress*

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■ Learning Objectives

- Not every typically presenting STEMI is by definition a STEMI
- Emotional stress as trigger is not always detectable in so-called stress-induced cardiomyopathy
- Wall motion abnormalities usually disappear after some weeks in stress-induced cardiomyopathy
- Urgent diagnostic catheterization is important for diagnosis
- Takotsubo-syndrome is an equivalent name for stress-induced cardiomyopathy

■ Introduction

We describe a rare case presenting as ST-elevation myocardial infarction (STEMI) after emotional stress at our emergency department. Despite clear clinical signs of STEMI including massively elevated troponin and easy to detect wall motion abnormalities by an acutely performed echocardiogram coronary arteries were free of stenoses or thrombus. Such cases are rare but increasingly diagnosed due to better methods and a better knowledge of this disease.

A 69-year-old woman with a history of bipolar disorder was transferred to the interventional cardiology department from the neuropsychiatric department after an acute psychotic episode of unknown cause presenting with ECG abnormalities. The physical examination showed 115 bpm heart rate and 130/80 mmHg arterial pressure. Heart sounds were tachycard and regular, with no murmurs. The lung auscultation was normal, lower extremities showed no sign of edema. An ECG examination revealed Sinustachycardia and ST elevation in leads II, III, aVF, V3–V5 (Fig. 4). Cardiac enzymes were elevated: Troponin I 7.250 ng/ml (ULN 0.160 ng/ml), CPK 491 U/l (ULN 140 U/l) and CK-MB 46 U/l (ULN 24.0 U/l).

As ECG changes and elevation of cardiac biomarkers were indicative for an acute ST-elevation myocardial infarction, the patient received immediately an acute coronary angiography, where normal coronary arteries with no obstructive lesion or angiographic evidence of acute plaque rupture could be seen (Fig. 5).

A transthoracic echocardiogram revealed akinesia in all apical segments of the left ventricle (apical ballooning) with severely reduced left ventricular ejection fraction (< 30 %) (Fig. 6).

Speckle tracking confirmed visual assessment of the regional dysfunction and showed a reduced maximal longitudinal strain in all segments of the left ventricle, except for the basal

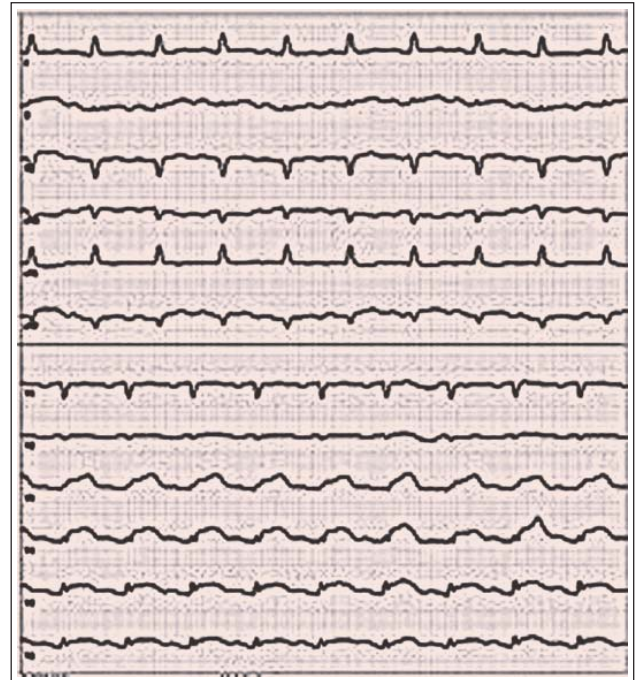


Figure 4. 12-lead ECG in the acute phase.

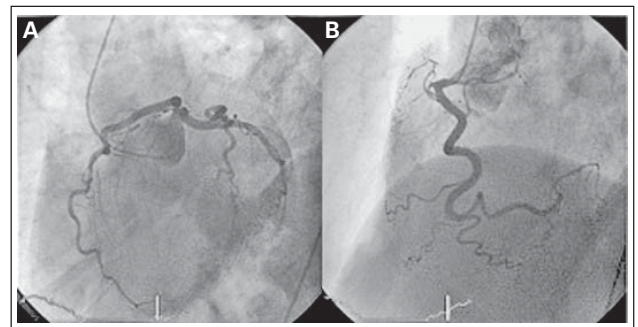


Figure 5. Coronary angiography revealing normal epicardial arteries (A = LCA, B = RCA).

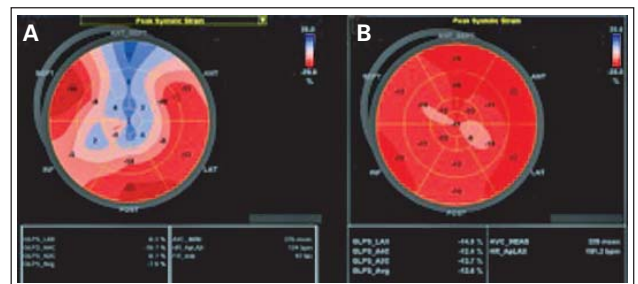


Figure 6. Speckle tracking in the acute phase (A) and after 12 days (B). Bulls-eye-view.

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inferoseptal and basal anterolateral segment. Global longitudinal strain was severely reduced (-7.0%).

A control echocardiography after 12 days showed rapid improvement of the heart failure with normal systolic function and recovery of the regional wall motion abnormalities only with a discreet hypokinesia in the apical region.

■ Conclusion

This case report shows a typical case of Takotsubo syndrome. It is characterised by acute onset of left ventricular dysfunction, accompanied by ECG changes and elevation of cardiac biomarkers indicative for an acute myocardial infarction [1–11]. A preceding acute and severe stress event is often present (either physical or emotional) [10, 11]. No obstructive stenosis in epicardial coronary arteries or angiographic evidence of plaque rupture can be seen in acute coronary angiography. Typically regional left ventricular wall motion abnormalities in the apical region (apical ballooning), that extend beyond a single coronary artery distribution are shown with cardiac imaging (eg. ventriculography, echocardiography, cardiac MR). Previous studies have defined 4 different types of Takotsubo Syndrome according to different regional wall motion abnormalities [11]. As the left ventricular dysfunction is transient, all pathological findings resolve within a few days to weeks, but there seem to be cases with a delayed recovery of the left ventricular dysfunction [10, 11]. The Takotsubo syndrome affects in most cases elderly women, with no history of cardiovascular diseases. Up to now, the pathophysiology of this increasing clinical syndrome remains still unclear.

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■ Questions

1. What is the most reliable diagnosis?
 - a) Acute coronary syndrome
 - b) Acute myocarditis
 - c) Takotsubo syndrome
 - d) Aortic dissection
2. What is the most possible differential diagnosis for an acute myocardial infarction in this case?
 - a) Takotsubo syndrome
 - b) Acute severe myocarditis
 - c) Epicardial vasospasm
 - d) Coronary embolus
3. What is the most important symptom for the diagnosis of a Takotsubo syndrome beside normal coronary arteries?
 - a) Preceding stress event
 - b) Elderly woman
 - c) Regional wall motion abnormalities that extend beyond a single coronary distribution
 - d) Complete recovery of the pathological findings within a few days

Answers

Correct answers p. 2: 1b; 2b; 3a; 4d; 5a; 6d

← Back

Correct answers pp. 3, 4: 1e; 2c; 3e; 4c; 5d

← Back

Correct answers p. 5: 1a; 2a; 3c

← Back

Correct answers p. 7: 1a; 2a; 3c

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