CASE REPORT

Acute myocardial infarction and heart block: a challenge to emergency physicians

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SUMMARY

We present the case of a patient who underwent an acute ST-elevation myocardial infarction of the inferior wall and transitory total heart block in the first hours of his clinical presentation. There was no haemodynamic instability before the thrombolytic therapy was performed 8 h after the onset of pain. There was no block recurrence. The current case shows a possible complication during the thrombolytic therapy and the urge for a quick decision by the emergency physician. Pacemaker implantation should be considered in the event of the patient's haemodynamic worsening once the success of the therapy is a reflex of the arrhythmia reversion most of the times.

BACKGROUND

Acute myocardial infarction (AMI) is a highly prevalent disease in the USA. Data from the National Registry of Myocardial Infarction-4 estimate that there are 500 000 cases of infarction with ST-segment elevation in the USA per year.¹

Heart block is the complication that may accompany AMI, especially if it is in the inferior wall. Its importance lies in the fact that it is the turning point in the treatment of infarction, once a pacemaker implantation may prove to be necessary during the thrombolytic therapy. This fact has been a reason to attempt to establish a clinical prediction score of its occurrence.²

However, this event may be transitory. As it may be an ischaemic symptom, when it is solved the arrhythmia stops, and thus the pacemaker may be later removed.³

Around 20% of all AMI of the inferior wall cases can occur with heart block.⁴

CASE PRESENTATION

A 47-year-old male patient, smoker of 20 cigarettes/day for 20 years, was admitted to the emergency department of São Bernardo do Campo Hospital Complex, Brazil, with precordial pain reported as an intense squeezing sensation that started while he was watching TV at home. He presented to the department 8 h after the onset of pain with the following vital signs: blood pressure 160/90 mmHg, heart rate 80 bpm, respiratory rate 14/min and an oxygen saturation of 96% on ambient air. There were no alterations in the cardiac or pulmonary auscultation. The patient showed good peripheral perfusion in extremities.

A 12-lead ECG was performed and the result is shown in figure 1.

First laboratory exams revealed haemoglobin 15 g/dl (13.5–18), 14 700 leucocytes (5000–10 000), 242 000 platelets (150 000–550 000), MB creatine phosphokinase 225 U/l (<25), creatine phosphokinase 2960 U/l (26–189), troponin >2000 ng/l, creatinine 0.9 (0.4–1.4), urea 28 mg/dl, sodium 135 mEq/l (135–145) and potassium 4 (3.5–5.5).

The patient did not show haemodynamic instability at any time during his stay at the emergency department.

He was administered 200 mg of aspirin, 300 mg of clopidogrel and a full dose of enoxaparin along with an intravenous attack dose of 30 mg. The firstly noticed total atrioventricular block (AVB) associated with the ST-segment elevation in the inferior wall was no longer present, and a first-degree AVB arose.

During the administration of reperfusion therapy with streptokinase, the patient presented non-sustained ventricular tachycardia without haemodynamic repercussion. He evolved with signs of early reperfusion and then underwent percutaneous transluminal angioplasty.

OUTCOME AND FOLLOW-UP

The cinecoronarioangiography revealed stenoses of 95% and 80% in the initial and the middle thirds of the right coronary artery, respectively. Two stents were implanted in each segment with TIMI III distal flow after the placement.

The Doppler-colour bidimensional echocardiography showed posterobasal hypokinesis of the left ventricle with preservation of the systolic function. He was discharged from hospital 7 days later.

DISCUSSION

Heart blocks are common complications in the event of an AMI. The incidence rate reaches up to 20% in patients who suffer from inferior AMI, depending on the adopted criteria in the studies.⁴

Sinus bradycardia is the most common arrhythmia associated with the inferior AMI, occurring in up to 40% of the cases in the first 2 h and decreasing to 20% at the end of the first day. Initially it may be attributed to the increase of vagal tone in the first 24 h of AMI. After this period it may be the consequence of sinus node ischaemia or atrial ischaemia.⁵ The first-degree AVB can be originated in the atrioventricular node (AVN), the bundle of His or the right or left bundle branches.

AVN blocks are very common after the occlusion of the right coronary artery from where the AVN

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Figure 1 ECG. Blue arrows showing the P waves and its dissociation from the QRS complex. Red arrows showing the ST elevation of the inferior wall derivations.

artery arises. The increase in acetylcholine released by the infarcted inferior wall and the increase in the sensitivity of AVN to acetylcholine may be other AVB mechanisms, usually transitory, with no need for treatment. The circumflex artery occlusion can directly affect the AVN in 10% of the cases. More rarely, the occlusion of the anterior descending artery can cause AVB below the AVN, a fact that should arouse suspicion when AVB and wide QRS complex occur.³

Independent risk factors for the occurrence of heart blocks are inferior infarction, advanced age, cardiac insufficiency symptoms, female gender, smoking, hypertension and diabetes mellitus.^{4 5}

A cohort with 106 780 patients over 65 years of age showed an incidence of second-degree and third-degree AVB of 4.7%, being 1.5% in the initial presentation of AMI and 3.2% during hospitalisation. These patients were of advanced age with a high Killip class. Their heart rate and blood pressure were lower at admission and they presented a higher rate of diabetes mellitus. The presence of heart block was more frequent in the inferior AMI cases (7.3%) than in the anterior AMI cases (3%), and it occurred mostly in patients who underwent reperfusion therapy (8.3%).⁶

The presence of secondary AVB in the setting of inferior AMI increased the mortality rate from 10% to 25% in 30 days according to Aplin *et al.*⁷

In conclusion, it is important to verify the complications involved in the event of inferior AMI, like a third-degree AVB, as well as their proper identification and treatment.

Competing interests None.

Patient consent Obtained.

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REFERENCES

- 1 Antmann EM, Anbe DT, Armstrong PW, *et al.* ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction—executive summary. *Circulation* 2004;110:588–636.
- 2 Lamas GA, Muller JE, Turi ZG, *et al.* A simplified method to predict occurrence of complete heart block during acute myocardial infarction. *Am J Cardiol* 1986;57:1213–19.
- 3 Ramamurthy S, Anandaraja S, Matthew N. Percutaneous coronary intervention for persistent complete heart block complicating inferior myocardial infarction. *J Invasive Cardiol* 2007;19:372–4.
- 4 Dubois C, Pierard LA, Smeets JP, *et al.* Long-term prognostic significance of atrioventricular block in inferior acute myocardial infarction. *Eur Heart J* 1989;10:816–20.
- 5 Feigl D, Ashkenazy J, Kishon Y. Early and late atrioventricular block in acute myocardial infarction. *J Am Coll Cardiol* 1984;4:35–8.
- 6 Rathore SS, Gersh BJ, Berger PB, *et al.* Acute myocardial infarction complicated by heart block in the elderly: prevalence and outcomes. *Am Heart J* 2001;141:47–54.
- 7 Aplin M, Engström T, Vejstrup NG, *et al.* Prognostic importance of complete atrioventricular block complicating acute myocardial infarction. *Am J Cardiol* 2003;92:853–6.

Learning points

- ▶ Acute myocardial infarction in the territory irrigated by the right coronary artery may evolve with conduction disturbances.
- ▶ Thrombolytic infusion can lead to remission of the third-degree heart block. The need for temporary pacemaker implantation should be marked by the presence of instability signs associated with a low heart rate.
- ▶ Sustained or non-sustained ventricular tachycardias during the thrombolytic infusion indicate a higher rate of myocardial reperfusion.

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