

## President's Page

# Acute Coronary Syndromes and Anaemia

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**A**naemia is a common problem in patients hospitalised for acute coronary syndromes, with a prevalence that ranges from 6.4 to 45%. Anaemia in patients with acute coronary syndromes is associated with a poor prognosis. Anaemia aggravates myocardial ischaemia by reducing the blood's oxygen content and increasing myocardial oxygen requirements, so that a higher cardiac output is required to maintain adequate tissue oxygenation. The reduction in haemoglobin concentration disrupts the supply of oxygen to the ischaemic myocardium, and can lead to arrhythmias, hypotension and an increase in infarct size. Anaemia has been associated with the activation of inflammatory mechanisms, including the release of cytokines and erythropoietin, resulting in endothelial dysfunction, destabilisation of atherosclerotic plaque and the creation of a procoagulant state.<sup>1</sup>

Patients with anaemia are often elderly, female, with a low body mass index, and have a higher prevalence of cardiovascular risk factors such as diabetes and chronic kidney disease. In addition, anaemia is associated with other comorbidities, such as hypertension, peripheral artery disease, and heart failure. Patients with anaemia often receive less aggressive therapy for acute coronary syndromes, both medication and invasive treatment. Specifically, the administration of drugs that improve the prognosis in acute coronary syndromes, such as aspirin, beta-blockers and statins, as well as angioplasty, is less frequent in patients with anaemia. Patients with anaemia also have an increased risk of major haemorrhage.<sup>2</sup>

Anaemia is associated with a higher risk of short- and long-term mortality over the entire spectrum of patients with coronary heart disease, which includes chronic stable angina, ST-segment elevation myocardial infarction (STEMI), acute coronary syndrome

without ST-segment elevation (NSTEMI-ACS), and patients undergoing percutaneous coronary intervention. The relation between baseline haemoglobin and the risk of major ischaemic adverse events has been found to be a U-shaped curve, with the risk being lowest at haemoglobin levels of about 15 g/dL and rising when the haemoglobin is above or below this threshold. From the pathophysiological point of view, the unfavourable effect of high haemoglobin concentrations could be related to the fact that an increase in haemoglobin may be accompanied by an increase in blood viscosity, resulting in an increase in coronary vascular resistance and reduced coronary blood flow. This promotes thrombosis and increases myocardial work.<sup>3</sup>

In many studies, anaemia has been strongly associated with an adverse prognosis in patients with acute coronary syndromes. Low haemoglobin on admission is a strong and independent predictor of major adverse cardiovascular events at 30 days in patients with STEMI and NSTEMI-ACS, including congestive heart failure, recurrent ischaemia, and cardiovascular death.<sup>4</sup> In high-risk patients with acute coronary syndromes, anaemia on admission and a drop in haemoglobin during hospitalisation increase the risk of cardiogenic shock or in-hospital death. In patients with NSTEMI-ACS, low initial haemoglobin has been independently associated with recurrent ischaemia on continuous electrocardiographic monitoring.<sup>5</sup> In addition, low admission haemoglobin is an independent predictor of major bleeding, and anaemic patients who undergo angioplasty have a higher risk of bleeding complications.<sup>6</sup>

In patients with acute coronary syndromes, it is necessary to clarify the cause of anaemia, especially if it is due to occult bleeding, because of the need

for administration of anticoagulant therapy. The performance of coronary angiography, the choice of access (radial access is preferred), and the need for revascularisation should be assessed very carefully to avoid further blood loss. Before antithrombotic treatment is selected, the ischaemic and haemorrhagic risk should be assessed and drugs with a reversible effect or a short half-life should be preferred. In the case of anaemia of unknown or untreatable aetiology, the use of drug-eluting stents should be avoided because of the need for long-term dual antiplatelet therapy.<sup>7</sup>

Approximately 10% of patients with acute coronary syndromes receive blood transfusions. Transfusions are more frequent in patients with anaemia on admission, the elderly, women, diabetic patients with advanced renal dysfunction, those with a history of myocardial infarction or heart failure, and those with multivessel coronary disease. In patients with acute coronary syndromes, regardless of bleeding complications, the need for blood transfusion is associated with a fourfold increase in premature mortality and a threefold increase in death or myocardial infarction. Platelet activation accompanying transfusions probably contributes to the increase in ischaemic complications. The oxygenation of tissue is unchanged or may even be reduced after a transfusion. In patients with acute coronary syndromes, blood transfusion is associated with an increased risk of adverse events, including death. Most studies have compared the strategy of liberal transfusion (when haemoglobin is  $<9$  g/dL) with that of restrictive transfusion (when haemoglobin is  $<7$  g/dL). Liberal transfusion appears to be associated with greater mortality compared with restrictive transfusion. In patients with haematocrit  $\leq 24\%$  transfusion has been associated with lower in-hospital mortality. For haematocrit values between 25% and 30%, transfusion appears to have a neutral effect, whereas when haematocrit is  $>30\%$  there is a significant increase in mortality. The European guidelines for NSTEMI-ACS recommend blood transfusion in patients with anaemia and no evidence of active bleeding, in the case of haemodynamic instability, or when haematocrit is  $<25\%$  or haemoglobin  $<7$  g/dL. Along

similar lines, the US guidelines do not recommend the strategy of blood transfusion in haemodynamically stable patients with haemoglobin  $>8$  g/dL.<sup>8</sup>

Anaemia is a common problem in patients with acute coronary syndromes and is strongly associated with a poor prognosis. These patients are at increased risk of recurrent ischaemia, haemorrhagic complications, and cardiovascular death, and often receive less aggressive therapy. In such cases it is necessary to take account of the ischaemic and haemorrhagic risk in order to design the optimal therapeutic strategy.

## References

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