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MANAGEMENT OF CRISES DURING ANESTHESIA AND SURGERY. PART V: MYOCARDIAL ISCHAEMIA AND INFARCTION

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Close and continuous monitoring of patients at risk of myocardial ischaemia during anaesthesia is necessary as ischaemia represents 1% of all reported anaesthesia incidents[1].

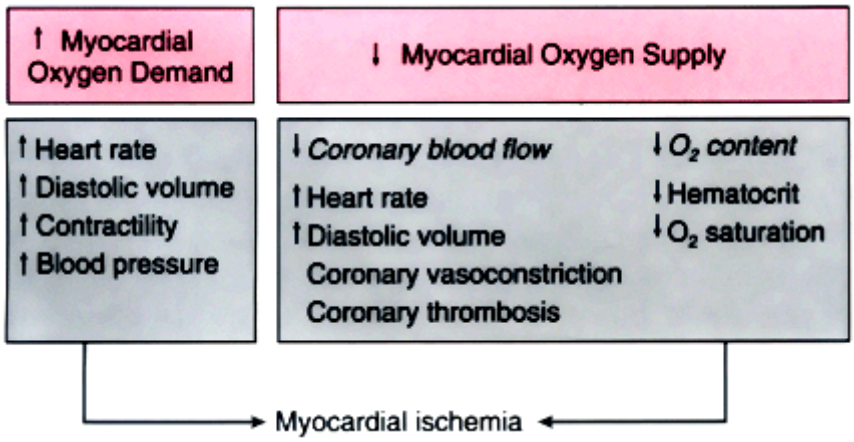
It is well recognized that even sophisticated ECG devices with automated segment analysis detect only a proportion of ischaemic events[1,2]. Furthermore, electronic filtering, lead selection, the number of leads monitored, and only intermittent checking of the ECG trace may reduce this still further[2,3]. Correct lead selection is particularly important and a full 12-lead ECG, although often impractical intraoperatively, remains the ‘‘gold standard’’ if accurate electrical diagnosis is required. For the high risk patient, intraoperative monitoring of leads V5 and V4 and II (in that order of priority) is likely to optimize the chances of ischaemia detection, but requires a more complex system than the usual 3 lead ECG in common use which is insensitive[4,5].

The diagnosis of myocardial ischemia is often difficult because most occur without symptoms in anesthetized or sedated patients, ECG changes are slight and/or transient, and the creatine kinase has limited sensitivity and specificity because of coexisting skeletal muscle injury, but cardiac troponin assays have more specificity[6].

SIGNS OF MYOCARDIAL ISCHAEMIA:
*ST changes: elevation or depression
*T wave: flattening or inversion
*Ventricular dysrhythmias

PRECIPITATING FACTORS:
*Pre-existing cardiovascular disease
*Haemodynamic instability
*Tachy- or bradycardia
*Hyper- or hypotension
*Desaturation, hypoxia
*Pulmonary oedema
*Awareness/light anaesthesia/intubation problems

Myocardial ischemia results from an imbalance between myocardial oxygen supply and demand, for which there are many causes during the perioperative period. The determinants of myocardial oxygen supply and demand are shown in fig.1



EMERGENCY MANAGEMENT
*Inform the surgeon
*postpone, or rapidly complete surgery
*Ensure adequate oxygenation
*Correct any haemodynamic derangement such as hypotension, hypertension, tachycardia and bradycardia

IF ISCHAEMIA DOES NOT RESOLVE RAPIDLY:
*Commence glyceryl trinitrate (50mg in 500ml 5% dextrose) and start at 0.1ml/kg/hr
*Titrate against clinical response
*Consider multilead ECG monitoring
*Monitor ECG continuously
* Correct anemia. Aim for haematocrit 30%
*If the myocardial ischaemia is significant, consider short-acting beta-blocker to cover emergence.

FURTHER MANAGEMENT
*Obtain a 12 lead unfiltered ECG as soon as possible to assist in the diagnosis.
*Admit to ICU/CCU
*Consider invasive monitoring: Blood pressure and cardiac filling pressures
*Further investigations: serial ECG/cardiac enzymes
*Continue oxygen therapy for at least 2 days.

It must be remembered that the ECG may remain normal in the face of severe hypotension, arterial desaturation, hypercarbia and metabolic acidosis, and that it should not be relied upon, in any way, as a monitor of systemic abnormalities[7,8].
Systematic preoperative assessment can identify patients at high risk of cardiac complications and guide the application of appropriate risk reduction strategies.

The addition of biomarkers for ischemia, left ventricular function, and atherosclerosis to classic cardiac risk factors improves the prediction of both short-term and long-term outcome after noncardiac surgery. Intraoperative monitoring, using continuous 12-lead ECG assessment and transesophageal echocardiography, may timely identify treatable myocardial ischemia and arrhythmias. A careful perioperative beta-blocker regimen can reduce cardiac complications and mortality without increasing the risk of stroke in intermediate to high-risk patients[9,10].

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