

Investigation and treatment of myocardial ischaemia in critical care

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A 49-year-old man required a prolonged intensive care unit (ITU) stay for sepsis and multiorgan failure (MOF) following a laparotomy for gangrenous appendicitis. He had a history of myocardial infarction and previous coronary stent insertion. During attempts to wean from mechanical ventilation during his second week in ITU, he developed unstable angina associated with bradyarrhythmias and complete heart block.

The dilemma was how best to investigate and manage myocardial ischaemia in the critically ill.

Myocardial ischaemia occurs in 10–35% of critically ill patients and delays or prevents weaning from ventilatory support, with a high subsequent mortality rate (Hurford and Favorito, 1995; Srivastava et al, 1999). Many survivors of MOF have prolonged weaning secondary to other causes, such as critical illness polyneuropathy, myopathy, infection or electrolyte and metabolic disturbances. This can make the accurate diagnosis of weaning failure difficult.

Table 1 discusses the benefits and disadvantages of different approaches to identifying and treating ischaemia in these patients. No single test can accurately identify myocardial ischaemia.

MANAGEMENT OPTIONS

Treat as for ischaemia: Standard anti-anginal treatment (e.g. β -blockade, angiotensin-converting enzyme inhibitors) or thrombolysis may be relatively contraindicated in a population with organ dysfunction.

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TABLE 1.
Approaches to identify and treat ischaemia

	Advantages	Disadvantages
Clinical and biochemical	Cheap, easy, non-invasive	Non-specific, non-therapeutic. Troponin results affected by acute renal failure
Holter monitoring	Easy to carry out. Detects silent ischaemia or arrhythmia. Multiple reviews possible	Retrospective diagnosis. Non-therapeutic
Continuous ECG analysis	Contemporaneous diagnosis	Interpretation affected by drugs, posture and respiration. Misses up to 80% of ischaemic episodes*. Non-therapeutic
Echocardiography	Transthoracic echocardiography is easy to perform. Wall movement abnormalities may precede ST segment changes on ECG	Transoesophageal echocardiography requires sedation. Operator dependant. Intermittent investigation. Resting echocardiography poorly predictive of dynamic function. Non-therapeutic
Radioisotope investigations	More sensitive and specific for silent ischaemia than ECG	Logistically difficult for mechanically ventilated patients. Intermittent investigation. Non-therapeutic
Coronary angiography	Allows anatomical diagnosis and intervention	Invasive. Logistically more complex than non-invasive testing

ECG = electrocardiography. * Biagini et al (1984)

General management: Aside from appropriate nutrition, treatment of infections and physiotherapy, evidence-based guidelines for weaning from mechanical ventilation (Macintyre et al, 2001) can optimize the chances of successful weaning. Ischaemic changes may be reduced during weaning if sedation is continued until after extubation (Conti and Smith, 1998).

This patient underwent Holter monitoring followed by insertion of a permanent pacemaker (despite recurrent infections), maximal medical therapy, then angiography and insertion of a coronary stent. Within a few days, he resumed unassisted respiration, and was discharged from critical care to a rehabilitation facility 3 months after initial admission. The authors feel that it is unlikely he would have weaned without such aggressive interventions.

CONCLUSIONS

Myocardial ischaemia in the critically ill is common, frequently undetected,

and may require several different investigations to confirm its presence.

Medical management of myocardial ischaemia in critical illness remains key, but selected patients justify more aggressive investigation and treatment. **HM**

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Conti J, Smith D (1998) Haemodynamic responses to extubation after cardiac surgery with or without continued sedation. *Br J Anaesth* **80**: 834–6

Hurford WE, Favorito F (1995) Association of myocardial ischaemia with failure to wean from mechanical ventilation. *Crit Care Med* **23**: 1475–80

Macintyre N, Cook D, Ely W et al (2001) Evidence based guidelines for weaning and discontinuing ventilatory support. *Chest* **120**(6): 375–95

Srivastava S, Chatila W, Amoateng-Adjepong Y, Kanagasegar S, Jacob B, Zarich S, Manthous CA (1999) Myocardial ischaemia and weaning failure in patients with coronary artery disease: an update. *Crit Care Med* **27**: 2109–12

Anaesthetic and critical care dilemmas are coordinated by **Dr Robert Self** and **Dr Pete Bishop**, Research Fellows at the Centre for Anaesthesia, UCL, London

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