

Percutaneous mechanical support in acute coronary syndromes

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ABSTRACT

Despite advances in interventional cardiology, persistently disappointing outcomes in patients with cardiogenic shock complicating myocardial infarction, together with the lack of evidence that intra-aortic balloon pump improves outcomes in this patient population have led to a re-evaluation of other types of mechanical circulatory support. The increase in extracorporeal membrane oxygenation (ECMO) prompted by the H1N1 pandemic led to an increase in experience in using this technique in critically ill adult patients, and its use is now expanding in both respiratory and cardiac failure. Despite enthusiasm for the technique, high-quality evidence is lacking for its benefit. Nonetheless, ECMO and other types of percutaneous mechanical circulatory support do provide critical care clinicians with new supportive therapies that may prove to benefit patients, both from the high level of support that can be offered, and also minimising the use of potentially toxic inotropic agents.

Key words: cardiogenic shock, heart failure, mechanical circulatory support, extracorporeal membrane oxygenation, ECMO, myocardial infarction, acute coronary syndromes

INTRODUCTION

Despite application of contemporary evidence-based medicine in the management of patients with acute coronary syndromes (ACS), the mortality of those complicated by cardiogenic shock remains high (44-59%). (1, 2) In those who survive, however, the subsequent annual mortality, and quality of life is no different from pa-

tients with myocardial infarction who did not have cardiogenic shock. (2) Current ESC guidelines relating to management of patients with cardiogenic shock recommend that short-term mechanical circulatory support (MCS) may be considered in refractory cardiogenic shock depending on patient age, comorbidities and neurological function, (3) whilst American guidelines are more specific. (4) The aims of MCS are to a) resuscitate patients and maintain end-organ perfusion, stabilise in order to allow angiography and prompt revascularisation, and potentially reduce infarct size by unloading the left ventricle and influence cardiac remodelling. The ideal device by which to do this should be safe, simple and rapid to use, provide good haemodynamic support and myocardial protection.

TYPES OF MECHANICAL CIRCULATORY SUPPORT (MCS)

Following the IABP Shock II trial, routine use of intra-aortic balloon pump (IABP) is no longer recommended in patients with ACS complicated by cardiogenic shock, but should be considered in those with shock due to mechanical complications. For this reason, a number of other devices have been devised to provide percutaneous MCS (pMCS), including the TandemHeart, Impella and extracorporeal membrane oxygenation (ECMO). Despite the superior haemodynamic effects of the TandemHeart and Impella (cardiac index, mean arterial pressure and pulmonary capillary wedge pressure) when compared with the IABP, meta-analysis of three small randomised controlled trials demonstrated no survival benefit, with an increased risk of limb ischaemia, bleeding and sepsis. (5) Observational studies with newer devices

are promising, in particular the right-sided Impella (Impella RP), however numbers remain small. (6) In the context of acute disease, the most commonly used MCS is peripheral ECMO, which with its ease of insertion, provision of rapid, high-level support, and reduced cost compared with other pMCS.

EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

Indications for ECMO have extended to include the INTERMACS 1 and 2 categories, provided there is no contraindication to MCS in order to provide a bridge to recovery/transplant/VAD, or in some patients bridge to decision, which may include withdrawal of MCS. Concern has been raised that ECMO may disadvantage patients who subsequently require longer-term MCS/transplantation, however a recent study has demonstrated that in patients with AMI, requirement for pMCS prior to VAD or transplantation does not result in worse outcomes. (7) Although ECMO is increasingly used, there are no randomised controlled studies demonstrating its superiority above conventional treatment, with the best evidence related to superior survival compared with historical control. However during the time period between studies, interventional cardiology changed significantly, and therefore the potential benefit of ECMO for these patients may be overestimated. (8, 9) The quality of data available to inform use of pMCS in patients with MCS was highlighted in a recent meta-analysis, with significant variability in data collected relating to inclusion criteria, definitions of shock, mechanism of pMCS and inclusion of patients post-cardiac arrest.

CONCLUSION

Although potentially promising, the huge expansion in pMCS in the 8 years following the H1N1 pandemic is not supported

by high-quality data. Heterogeneity of patients, devices and pathologies remain a major challenge. However, the infrastructure and cost implications (financial and logistical) are significant, and before wide-

spread implementation, more evidence is required.

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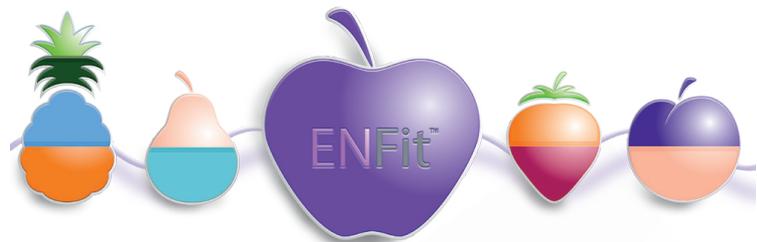
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