

# Percutaneous Coronary Intervention in Cardiogenic Shock [66]

PEDRO FARTO E ABREU

Cardiology Department, Fernando Fonseca Hospital, Amadora, Portugal

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## Intervenção Coronária Percutânea no Choque Cardiogénico

### Palavras-Chave

Choque cardiogénico; Angioplastia coronária

### Key words

Cardiogenic shock; PTCA

**A**cute myocardial infarction (AMI) complicated by cardiogenic shock (CS) has an incidence of 7-10% of patients despite all the advances in reperfusion and antithrombotic therapy. Mortality associated with CS ranges between 45-80%. The commonest cause of CS is primary left ventricular failure, the others being some of the mechanical complications of AMI, namely free wall rupture, papillary muscle rupture or a ventricular septal defect. Studies that enrolled large numbers of patients with AMI, like Gusto I (SK vs tPA), showed that among the 41021 patients included, CS occurred in 7.2% with a 30-day mortality of 55%. Interestingly, the mortality was significantly lower in those patients with CS who underwent coronary revascularisation using PTCA, and the benefit was even more evident at the end of the first year of follow-up. In another exhaustive analysis of the characteristics of 55 000 patients with AMI with ST-elevation (STEMI) randomized into Gusto I and Gusto III the mortality of patients in the latter was higher than the former (55% vs. 62%, respectively). Remarkably, the mortality of patients with CS treated outside the US was higher, in both trials. In both these trials the proportion of patients who underwent revascularization along with implantation of an intra-aortic balloon pump in the US was higher, suggesting a beneficial role for these

two approaches in this clinical scenario. In a report from California, CS occurred in 1.7% of 63 964 patients with a mortality of 56%. On multivariate analysis, age greater than 60 years, previous MI, diabetes and female sex were poor prognostic factors for survival, while hypertension and revascularization were good prognostic factors. Revascularization decreased mortality by about 80% (OR 0.2,  $p < 0.0001$ ). Also in the NRMI, an analysis of about 3000 patients undergoing thrombolysis or PTCA in STEMI, while the results did not confirm superiority of PTCA over thrombolysis for STEMI in patients with CS, in those who underwent PTCA mortality was decreased significantly. Although all this evidence suggested the beneficial effect of these strategies in CS, randomized clinical trials providing conclusive evidence were lacking until S(MASH) and SHOCK, trials led by P. Urban and J. Hochman, respectively. S(MASH), which tested the hypothesis that revascularization improved survival, had to be terminated prematurely due to poor enrolment and in those randomized the hypothesis was not confirmed at 30 days. SHOCK tested the same hypothesis, with 302 patients and results at 30 days and 6 months showed a survival benefit for those revascularized in the cohort that was less than 75 years of age. This benefit was even more pronounced at one year, where revascularisation showed a decrease in

mortality (13.2% less in those revascularised). It is important to emphasize the difference in the enrolment criteria of these two studies. S(MASH) enrolled patients with a systolic blood pressure (SBP) less than 90 mmHg despite inotropic support whereas SHOCK included patients with a SBP of less than 90 mm Hg for 30 minutes with or without inotropic support. This in our opinion suggests that the patients in S(MASH) were hemodynamically more compromised than those in SHOCK.

The current ACC/AHA guidelines for primary PCI in transmural MI are as follows – class I supported by level of evidence A – “ In patients within 36 hours of an acute ST elevation/Q-wave or new LBBB MI who develop cardiogenic shock, are less than 75 years of age, and revascularization can be performed within 18 hours of the onset of shock, by individuals skilled in the procedure (>75 PCI/year) and supported by experienced personnel and appropriate laboratory experience (>200 PCI/ year)”.

However, despite all these advances these patients still have high mortality. What adjuvant therapy can be used to improve survival in these patients? Although controversial, these patients receive inotropic support with amines. Although these substances can increase coronary perfusion, they can also increase oxygen consumption and increase the release of inflammatory cytokines which can decrease LV function. We believe they are useful, although it is difficult to be absolutely certain about this conviction.

The results of STOPAMI and ADMIRAL provided convincing evidence for the benefit of one glycoprotein IIb/IIIa inhibitor in primary PCI during acute MI when a stent was placed in the IRA. A potential beneficial role in the subset of patients with cardiogenic shock has not been established, however. There is some evidence in PURSUIT for a role for these agents in patients with cardiogenic shock. In 9449 patients in this study about 2.5% had shock and the mortality in this group of patients differed based on the use of eptifibatid (58% if it was used compared to 73%, if not used,  $p=0.03$ ). Regarding distal protective devices, the use of which has proved beneficial in saphenous vein grafts by preventing distal embolization, a role for these devices may be envisaged in the setting of no-reflow, as this

clinical situation can initiate and maintain shock. However, even this role needs confirmation.

Equally controversial is the role of intra-aortic balloon pumps – and the SHOCK Registry was particularly important in demonstrating a beneficial effect on mortality especially in the subgroup of patients in conjunction with thrombolysis. Some circulatory assist devices have been tested in CS with promising results – the TANDEM Heart device, which requires a transeptal puncture allowing to rest the LV while maintaining peripheral perfusion effectively. The area of cardiogenic shock is one of the most exciting areas in the field of acute coronary syndromes where considerable advances may be foreseen. Among pharmacological agents, nitric oxide synthase inhibitors may have an important role.

It is important to take home two fundamental ideas in the management of these patients. Those who present with AMI and CS should undergo angiography and revascularization as soon as possible and this applies to those patients who also develop CS in hospital. Despite all the advances it is important to realize that this group of patients often have various comorbid conditions and therefore require intensive care of high quality due to the frequent need for mechanical ventilation and prolonged inotropic support. The management of various clinical situations that can often increase the mortality of these patients while in intensive care should also be the focus of physicians who care for these patients.

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PEDRO FARTO E ABREU

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