Dobutamine-norepinephrine, but not vasopressin, restores the ventriculoarterial matching in experimental cardiogenic shock

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Aims: We assessed the haemodynamic effects of guideline therapy in experimental cardiogenic shock and compared this treatment with a combination containing an alternative vasopressor (arginine vasopressin). Our hypothesis was that combined dobutamine-norepinehrine still is the superior inopressor therapy assessed by ventriculoarterial matching in both systole and diastole.

Methods and results: Cardiogenic shock (CS) was induced by coronary microembolization in 16 pigs. Dobutamine (Dobu, 2ug/kg/min) alone and combined with either norepinephrine (NE, 100 ng/kg/min) or the pure vasopressor arginine vasopressin (AVP, 0.001 u/kg/min) were infused. The treatment effects were assessed using ventriculoarterial matching and systemic circulatory responses. In the normal heart, Dobu alone and combined with NE enhanced ventriculoarterial energy transfer and all haemodynamic indexes. In contrast, adding AVP to Dobu resulted in a ventriculoarterial mismatch (decreasing ventricular contractility/increasing systemic vascular resistance). In shock, Dobu increased cardiac output (CO) and $_{S}VO_{2}$ from 74 ± 3 ml/kg and 37 ± 2% to 103 ± 8 ml/kg and 49 ± 3%. Adding NE resulted in a further improvement of CO (125 ± 9 ml/kg) and $_{S}VO_{2}$ (59 ± 4%) due to increased heart rate (HR) and contractility with minimal change in SVR. Also, energy transfer from the ventricle to the arterial system and contractility were partly restored by Dobu and normalized by supplementing NE. In contrast, supplemental AVP further worsened the shock state by decreasing CO (70 ± 6 ml/kg) and $_{S}VO_{2}$ (45 ± 5%) compared to Dobu alone.

Conclusion: Combined dobutamine and norepinephrine have an efficient haemodynamic profile in cardiogenic shock. A pure afterload increasing substance used in acute ischemic cardiogenic shock aggravates the shock state by causing a ventriculoarterial mismatch despite its use in combination with an inotropic compound.

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