The intraaortic cannula pump (IACP) : a novel circulatory support system

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Background
The IACP is a catheter pump which expels blood from the left ventricular cavity and provides pulsatile flow in the ascending aorta. It is driven by a bedside installed pulsatile driving console. The device can easily be implanted by a minimal invasive approach, similar to the Hemopump.

Purpose
To demostrate the hemodynamic performance of this new intracardiac support system.

Methods
In a series of 9 sheep, hemodynamic evolutions were recorded in various conditions of myocardial contractility (the non-failing, the moderately failing and the severely failing heart). Heart failure was induced by injection of microspheres in the coronary arteries.

Results
Introduction of the cannula through the aortic valve was feasible in all cases. Pump flow by the IACP was gradually increased to a maximum of 3.5 L/min. Diastolic (and mean) aortic blood pressure is significantly increased in the non-failing and moderately failing condition (counterpulsation mode). In heart failure, cardiac output is significantly increased by the pump (p<0.0001). A drop in left atrial pressure (indicating unloading) is achieved in all conditions but reaches significant levels only during heart failure (p=0.0068).

Conclusions
This new intraaortic cannula pump contributes to stabilization of the circulation in the presence of cardiac unloading. In heart failure it actually supports the circulation by increasing cardiac output and perfusion pressure.