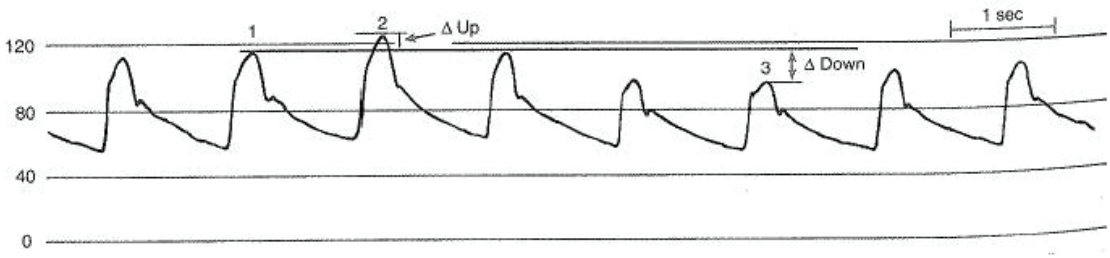
First 2010
VIVA 3

This is a trace of the arterial blood pressure in a mechanically ventilated patient. It is well known that variations in blood pressure can occur with respiration. Outline the physiology that explains why these blood pressure changes occur? Candidates were asked to explain the physiological principles that contribute to these blood pressure changes, in addition to the cardiovascular consequences of positive pressure ventilation, regulation of myocardial contractility and a series of questions relating to invasive pressure monitoring. These included being asked to describe a transducer, accuracy and calibration



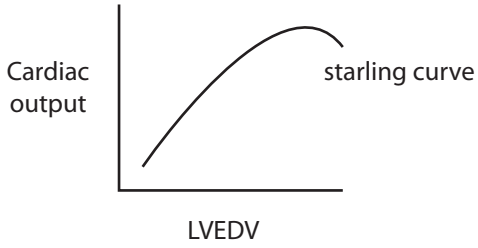
"Describe the arterial trace"

the patient is undergoing PPV, with normal ventricular function the variability is dependent on preload
when the breath is delivery intrathoracic pressure increases and there is less venous return (preload)
when there is a pause the preload increases and the arterial pressure also increases
in abnormal ventricular function the increased afterload of the PPV also impacts of arterial pressure

"What are the cardiovascular consequences of IPPV?"

There is normally a negative intrathoracic pressure with inspiration and this acts as a pump
becuase this is lost, there is reduced RV filling and the result is decreased preload
the increase in afterload is also noted, and this is exacerbated in the RV and dysfunctional LVs

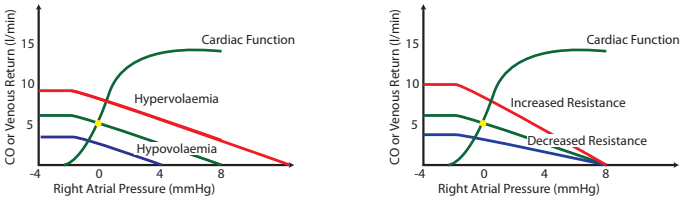
"Discuss how changes in preload affect myocardial contractility"



with changes in preload (surrogate marker LVEDV) there is an increase in CO due to moving along the starling curve

"Explain how changes in peripheral resistance and volume status affect cardiac output"

it is important here to draw the vascular function curves to explain the answer



"What is the definition of a transducer?"

something that converts one type energy into another, the strain gauge is the most common in IABP

"How would you calibrate an invasive BP measurement?"

static calibration - zeroing the transducer to atmospheric pressure, adjusting gain, levelling
dynamic calibration - adjusting the damping the resonant frequency

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