TITLE: MIXED VENOUS OXIMETRY FOLLOWING CARDIAC ARREST

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INTRODUCTION: There is litte information regarding the physiologic effects of short periods of cardiac arrest in man. More frequent application of the automatic implantable cardioverter/defibrillator (AICD)[1] focusses attention on the need for this information. We investigated the effects of short periods of cardiac arrest on mixed venous oxygen saturation.

METHODS: With institutional approval, data were collected during scheduled AICD implantation in 5 patients. Routine monitoring for AICD implantation at our institution includes an arterial catheter and a pulmonary artery (PA) oximetry catheter, in addition to necessary electrophysiologic monitors.[2,3] Three of 5 patients underwent aortocoronary grafts following AICD implantation; all patients were normothermic during the study period. All patients received narcotic-oxygen anesthesia supplemented with volatile anesthetics as needed. Additional muscle relaxant assured complete paralysis during the study period.

For each episode of induced ventricular tachycardia or fibrillation, we measured the duration of asystole as indicated by absence of phasic pressure on the arterial pressure display. The mixed venous oxygen saturation (SvO2) was continually observed beginning with onset of arrest and continuing until its return to pre-arrest values. The initial SvO2 and the nadir of its descent provided data from which to calculate the maximal decrease of SvO2 following arrest. In one patient, time to return to pre-arrest SvO2 was also noted.

RESULTS: No dysrhythmias occurred during PA catheter placement. These 5 patients provided 39 episodes of induced arrest lasting from 4 to 33 seconds. SvO2 measured in the PA remained unchanged during cardiac arrest. With restoration of phasic pressure, SvO2 decreased steadily reaching a nadir within 30-45 seconds. The change in SvO2 correlated well with the duration of arrest (figure 1, r=0.84). The time for return to pre-arrest SvO2 also correlated with duration of arrest in the patient studied (figure 2, r=0.73, N=13).

DISCUSSION: SvO2 reflects the balance of arterial oxygen supply and tissue oxygen demands. The Fick principle predicts that SvO2 decreases following a period of low flow. This study demonstrates the expected correlation between decrease in SvO2 and duration of arrest.

How long following an episode of arrest for AICD testing should one wait before proceeding with the next episode? We interpret return of SvO2 to pre-arrest levels as an indicator of sufficient tissue recovery from the no-flow state. The correlation between duration of arrest and return to baseline is good, considering that successive episodes of induced arrest over a brief time span might influence the rate of SvO2 return owing to unpaid oxygen debt. PA oximetry provides a safe and effective monitor to guide the timing of induced cardiac arrest for AICD implantation.

REFERENCES:
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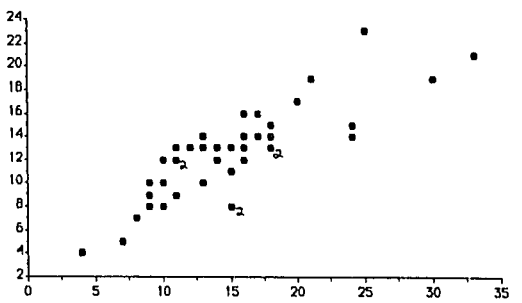

Fig 1: Decrease in Svo2 (%) vs duration of arrest (sec). "2" denotes 2 coincident data points. N=39.

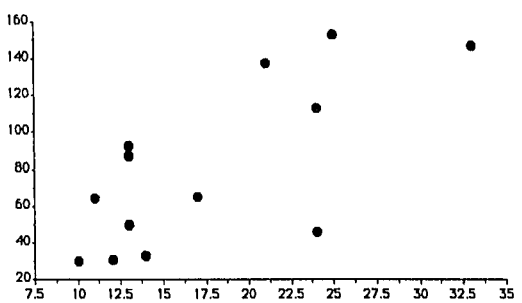

Fig 2: Time to SvO2 recovery (secs) vs duration of arrest (secs) in one patient. N=13.