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Title : HEMODYNAMIC EFFECTS OF VASCULAR CANNULATION BY RESIDENTS

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Introduction: Controversy has surrounded the practice of placing intravascular cannulae in unanesthetized patients with coronary artery disease (CAD). Because cardiovascular stimulation resulted from percutaneous radial and pulmonary arterial catheterization in one recent study, some recommend placement of these cannulae after anesthetic induction.[1] We have shown that experienced personnel can place intravenous, radial arterial and pulmonary arterial catheters in such patients without causing significant hemodynamic changes or consuming excessive time.[2] The question of whether or not similar results can be obtained when trainees perform these procedures has not previously been addressed. We sought to answer that question with this study.

Methods: Approval was obtained from the institutional Human Studies Committee. Fifteen patients scheduled for elective coronary revascularization were premedicated with diazepam (8.5±2.3 mg, $\bar{X}$±SEM) p.o., morphine (7.7±1.7 mg) and scopolamine (0.3-0.4 mg) IM, and topical nitroglycerin ointment (1-2 in.). All patients received propranolol (117±22 mg/day) until 12 hours preoperatively, and 5 received additional propranolol (20 mg p.o.) at the time of premedication. In the operating suite, an ECG (V_5) and a blood pressure cuff were connected to each patient, and control observations of heart rate (HR), systolic arterial pressure (SAP), rate-pressure product (RPP), ECG and adequacy of premedication were recorded. After skin preparation and infiltration with 1% lidocaine, 2 intravenous (IV) and a radial arterial (RA) catheter were inserted. Study measurements were recorded just before and 1 and 2 minutes after placement of each cannula. The same variables plus elapsed time were recorded during pulmonary artery catheter (PAC) insertion at the following intervals: skin preparation and 1% lidocaine infiltration, draping of the neck, right internal jugular vein identification with a 22-ga. needle, introducer placement in the vein, PAC inserted 20 cm, and PAC tip in the wedge position. Patients who appeared anxious or complained of discomfort received IV supplements of morphine and diazepam after placement of the first IV catheter. All cannulae were placed by 5 anesthesiology residents (PGY 2,3 and 4) rotating through the Cardiac Anesthesia service. Staff anesthesiologists supervised all 15 PAC placement procedures, and participated minimally in 4 of the 15.

Results: Ten patients were judged adequately premedicated on arrival in the operating room. The other 5 patients received IV supplements of morphine (5±0 mg) and diazepam (5.5±1.2 mg). No significant changes in HR, SAP or RPP occurred during placement of the various cannulae (Fig). No patient experienced chest pain or ECG changes indicating myocardial ischemia. PAC insertion time (skin preparation to wedge position) was 11.9±4 minutes (range 8-24 minutes).

Discussion: Because profound cardiovascular changes can occur during anesthetic induction, hemodynamic monitoring during this period is often helpful. While experienced personnel can insert intravascular cannulae efficiently without causing important hemodynamic disturbances,[2] inexperienced residents must learn invasive monitoring techniques while caring for patients who require such monitoring. Many of these patients have severe CAD. This study demonstrates that closely supervised anesthesiology residents can insert monitoring cannulae in such patients without causing significant cardiovascular stimulation or consuming undue time. Adequate premedication, maintenance of nitrates and β blockers, good patient rapport and adequate supervision contribute to smooth cannulation. With these precautions, we believe that the insertion of monitoring cannulae by anesthesiology residents before anesthetic induction can be safe.

References:

1. Lunn JK, Stanley TH, Webster LR et al: Arterial blood-pressure and pulse-rate responses to pulmonary and radial arterial catheterization prior to cardiac and major vascular operations. Anesthesiology 51: 265-269, 1979

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