TITLE: EFFECT OF SPINAL ANESTHESIA IN GERIATRIC PATIENTS WITH HEART DISEASE: HEMODYNAMIC AND BLOOD VOLUME PROFILE

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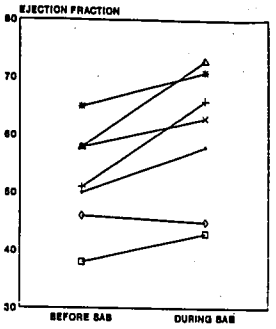
Introduction. Cardiac function, peripheral hemodynamics and the distribution of blood volume during spinal anesthesia have been previously studied in healthy volunteers. However, the use of spinal anesthesia in geriatric patients with heart disease is controversial. This study was designed to quantify the cardiovascular response to spinal anesthesia in this high risk patient population.
Methods. Seven men, aged 60 to 76 years, ASA 3 or 4, with coexisting heart disease requiring arterial and pulmonary artery catheter monitoring for their surgical care gave institutionally approved informed consent. Variables measured before and during spinal anesthesia were heart rate (HR), thermodilution cardiac output (CO), mean systemic arterial pressure (MAP), pulmonary artery pressure and central venous pressure. Radionuclide imaging was used to determine the ejection fraction (EF) of the left ventricle and to determine blood counts of the upper leg and liver as indices of extremity and splanchnic blood volume. Calculated variables were stroke volume (SV), systemic vascular resistance (SVR) and left ventricular end-diastolic volume (LVEDV). Spinal anesthesia between T3 and T10 (average T5) was achieved with 30-50mg lidocaine in D7.5W via a 27g catheter placed at the L3-4 interspace.
Results. Mean systemic arterial pressure fell in proportion to the decrease in SVR (Table). Blood volume shifts were minimal with only modest decreases in LVEDV and increases in leg volume. Central venous and pulmonary artery occlusion pressures decreased minimally (0 to 5 torr) and there was no correlation between the decrease in filling pressures and the change in LVEDV or cardiac output. In every patient but one the ejection fraction increased (Figure).
Discussion. In these elderly patients with heart disease the decrease in systemic pressure associated with spinal anesthesia was not due to a major shift in blood volume nor due to impaired cardiac function because ejection fraction improved and cardiac output was essentially unchanged. It is concluded that spinal anesthesia provides minimal additional stress to the elderly myocardium.

TABLE. Percentage change from control during spinal anesthesia.

HR	↓ 2% (NS)
SV	↓ 4% (NS)
CO	↓ 6% (NS)
SVR	↓24% (P<.01)
MAP	↓29% (P<.01)
EF	↑11% (P<.02)
LVEDV	↓15% (P<.01)
LIVER	↓ 1% (NS)
LEG	↑ 6% (P<.01)



TITLE: EFFECT OF SPINAL ANESTHESIA IN GERIATRIC PATIENTS WITH HEART DISEASE: CHOICE OF VASOPRESSOR THERAPY TO REVERSE HEMODYNAMIC CHANGES

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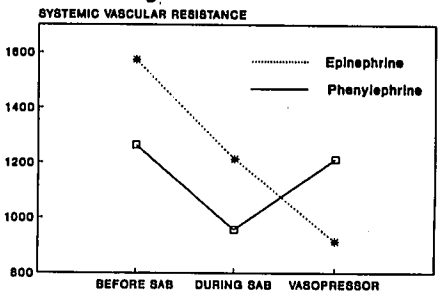
Introduction. Patients with coexisting heart disease can potentially be at risk from the hypotension associated with spinal anesthesia. Rapid volume loading has been the traditional therapy. Vasopressor support is an alternative but it is uncertain whether or not phenylephrine or epinephrine infusions would unduly stress the geriatric myocardium and make the hemodynamic profile worse.
Methods. In an on-going study, seven men, aged 60 to 76 years, ASA 3 or 4, with coexisting heart disease requiring arterial and pulmonary artery catheter monitoring for their surgical care gave institutionally approved informed consent. Measured variables were heart rate (HR), thermodilution cardiac output (CO), and mean systemic arterial pressure (MAP). Radionuclide imaging was used to determine the ejection fraction (EF) of the left ventricle and to determine blood counts of the upper leg and liver as indices of extremity and splanchnic blood volume. Calculated variables were stroke volume (SV), systemic vascular resistance (SVR) and left ventricular end-diastolic volume (LVEDV). During T10 to T3 (average T5) spinal anesthesia, measurements were obtained before and during an infusion of phenylephrine, 1 $\mu cg \cdot kg^{-1} \cdot min^{-1}$ (n=3) or epinephrine, 0.1 $\mu cg \cdot kg^{-1} \cdot min^{-1}$ (n=4).
Results. Both drugs increased LVEDV. Systemic pressure was more effectively restored by phenylephrine because of a pronounced increase in SVR (Figure) without a concomitant decrease in CO. Even though epinephrine significantly (P<.05) increased CO and EF, the net increase in systemic pressure was small because of peripheral vasodilation. Only small decreases in leg blood volume were observed with either drug.
Discussion. In these preliminary results it appears that phenylephrine is more effective than low dose epinephrine at reversing hypotension during spinal anesthesia in a high risk geriatric population. Equally important is the observation that phenylephrine did not worsen cardiac performance. Epinephrine did improve cardiac function but the peripheral vasodilation limited the increase in systemic pressure. Volume loading appears to be unnecessary because either drug restores ventricular filling.



The increase in SVR by phenylephrine was different (P<.05) from the decrease in SVR by epinephrine.