

Title: EPIDURAL MORPHINE DECREASES POST-OPERATIVE HYPERTENSION BY ATTENUATING SYMPATHETIC NERVOUS SYSTEM HYPERACTIVITY

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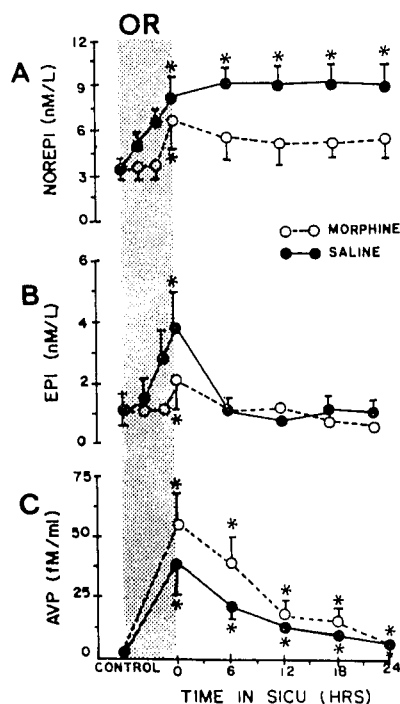
Introduction. Hypertension occurs commonly following major vascular operations and may contribute to postoperative morbidity. Although postoperative hypertension is often attributed to neuroendocrine changes associated with anesthesia and surgery, this relationship has not been clearly established. To investigate the role of sympathetic nervous system activation, adrenal medullary epinephrine secretion and pituitary vasopressin (AVP) secretion in mediating this hypertensive response following aortic surgery, patients were enrolled in a randomized, double blind, placebo controlled study in which epidural morphine was used to attenuate the stress response.

Methods. Twenty-four adults undergoing operation on the abdominal aorta were randomized to receive either saline or morphine (6 mg) into the epidural space prior to induction of anesthesia. All patients were anesthetized similarly utilizing a standardized protocol for pre and intraoperative narcotic administration. Heart rate, blood pressure and plasma norepinephrine, epinephrine and AVP levels were followed intraoperatively and for 24 hours postoperatively. All complaints of pain were treated with parenteral morphine by the ICU nurses. Hypertension (mean blood pressure > 110 mm Hg) was treated with Labetalol. Hydralazine was substituted if heart rate was less than 65. Plasma catecholamine and AVP levels were measured by high performance liquid chromatography after alumina extraction and radioimmunoassay, respectively. Fisher's exact test was used for determining whether the need for antihypertensive medications was less in the epidural morphine group compared to the untreated controls, and changes in plasma catecholamines and AVP were evaluated by analysis of variance procedures.

Results. Patients receiving epidural morphine required less parenteral morphine in the 24 hours following surgery and had lower analog pain scores when compared to patients in the saline group. Epidural morphine resulted in lower plasma norepinephrine levels but had no effect on plasma epinephrine or AVP levels (Fig. 1). Four of 12 patients receiving epidural morphine vs. 9 of 12 patients receiving epidural saline required treatment for hypertension. In addition, patients in the morphine group had lower blood pressures in the 24 hours following surgery.

Discussion. These data suggest that sympathetic nervous system activity and not adrenal epinephrine or pituitary AVP secretion is responsible for development of hypertension follow-

ing aortic surgery. Furthermore, epidural morphine can attenuate the sympathetic response to surgery and decrease the incidence of postoperative hypertension. Whether this effect of epidural morphine is the result of superior analgesia or to central effects on sympathetic outflow is not known, nor is it known whether epidural narcotics can also decrease the incidence of other serious perioperative complications such as myocardial infarction.



Arterial plasma concentrations of norepinephrine (A), epinephrine (B) and arginine vasopressin (C) prior to induction of anesthesia (control), at two points during surgery, and 0, 6, 12, 18 and 24 hours following aortic surgery. Norepi, norepinephrine; AVP, arginine vasopressin; SICU, surgical intensive care unit; OR, operating room; Data are mean \pm SE, * = $p < 0.05$ compared to preinduction value.