TITLE: DOES INTERPLEURAL LOCAL ANESTHETIC ADMINISTRATION PRODUCE A SYMPATHETIC BLOCK?

AUTHOR: DA Pelligrino, Ph.D.; C.E. Laurito, M.D.; R.F. Albrecht, M.D.

AFFILIATION: University of Illinois-Chicago/Michael Reese Hospital

It has been speculated that at least some of the analgesic effects accompanying interpleural (IP) local anesthetics may be a function of a sympathetic afferent (SA) blockade. The present study, in dogs, was designed to test the hypothesis that IP bupivacaine (B) may act directly on the thoracic sympathetic chain and/or the post-ganglionic splanchnic nerves thus involving both SA (sensory) and sympathetic efferent (SE) fibers. We employed a measure of SE blockade to assess the presence of an SA block. The rationale for these experiments was based on 2 physiologic principals, supported by the literature, that SE blockade would impair the hypoxia-associated: 1) epinephrine (E) and norepinephrine (NE) release from the adrenals and 2) the splanchnic vasoconstriction and redistribution of the cardiac output (CO) to essential organs such as the heart. The study was IACUC approved. Adult male mongrel dogs(~30kg) were used. Following induction with thiamylal Na (8 mg/kg) and institution of 1.5 MAC halothane anesthesia, paralysis and artificial ventilation, catheters were inserted into both femoral arteries and veins, the left ventricle, the portal vein (PV), and the right IP space (over 7th rib), as well as placement of electromagnetic flow probes on the pulmonary artery (CO measurements) and PV. The dogs were maintained on 0.8% halothane/50% N_2O and 50% O_2 (normoxia) or 10% O_2/40% N_2 (hypoxia) for study. P_aCO_2 and rectal temperature were maintained at normal levels throughout. CO, PV flow and pressure, central venous pressure, and MAP were continuously monitored. Blood flows via the liver (LV) arterial supply and to the pancreas (PN), spleen (SP), small intestine (SI), and heart (HT) were measured using radiolabeled microspheres (RM). RM injections were made at the following times: 1) control; 2) 20-30 min hypoxia; 3) restored normoxia 1 hr (20 min post-IP B); and 4) 20-30 min 2nd hypoxia. Plasma samples for E and NE analysis were obtained following each RM injection. As shown in fig. 1, IP B was accompanied by a ~50% reduction in the vascular resistance, in the presence of hypoxia, in the PN, SI, and PV. Curiously, IP B appeared to convert a reduced resistance in the LV arterial supply during hypoxia to one of greatly increased resistance. IP B appeared to blunt the hypoxia-induced E and NE release (fig. 2). Results for 1 dog given a 10 ml L_1-T_{10} epidural B injection, an established model for sympathetic blockade, demonstrate that an SE block prevents the release of E and NE. The results of this study suggest some degree of sympathetic block in association with IP local anesthetic administration. Whether this occurs as a result of B gaining access to the sympathetic chain or post-ganglionic nerves (or both) remains to be determined.

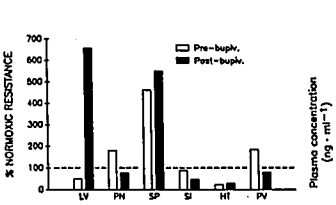

Figure 1

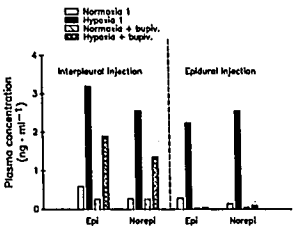

Figure 2

TITLE: CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEM EFFECTS OF CO-ADMINISTERED LIDOCAINE AND BUPIVACAINE IN PIGLETS

AUTHORS: J. Kytta, M.D., J. Heavner, Ph.D., J.M. Badgwell, M.D., P. Rosenberg, M.D.

AFFILIATION: Anesthesiology Departments, TTUHSC, Lubbock, TX 79430 and University of Helsinki, Finland

The toxicity of local anesthetics apparently is additive[1] but there is evidence that lidocaine (LIDO) can be used to treat bupivacaine (BUPI) induced cardiac arrhythmias.[2] The objective of this study was to determine if the toxic profile of BUPI is modified by giving BUPI and LIDO together.

After approval from the Animal Care and Use Committee, we studied 12 pigs aged two-days. Anesthesia was induced using halothane or isoflurane and the trachea intubated. Ventilation was controlled to maintain arterial PCO_2 at 32-36 mmHg. The electrocardiogram, electroencephalogram (EEG), and arterial blood pressure were continuously recorded. The pigs were paralyzed with pancuronium and stabilized for 30 minutes on 70% N_2O/30% O_2.

One group of pigs (n=6) was continuously infused with BUPI at a rate of 1 mg/kg/min. The other group of pigs (n=6) was given a bolus iv injection of LIDO 1 mg/kg followed immediately by constant iv infusion of a mixture of BUPI and LIDO at a rate of 1 mg/kg min for each drug. Results were examined using one-way ANOVA and the Student-Newman Keuls test.

All animals given BUPI alone had cardiac dysarrhythmias (DYS), seizures (SZ), isoelectric EEG (ISO EEG), and asystole (ASYS). All animals given the local anesthetic combination had SZ, ISO EEG and ASYS but only 3/6 had DYS. The variety of DYS in both groups was similar to what BUPI induces in non-anesthetized adult sheep[3] except that none of our animals developed ventricular fibrillation. If BUPI-equivalent doses of LIDO plus BUPI (determined by adding 1/4 of the LIDO dose to the BUPI dose) are considered, threshold doses in the two groups are almost equal (figure).

The results indicate that administration of LIDO along with BUPI reduces the incidence of DYS but otherwise does not produce a toxic profile different from what is observed when BUPI alone is infused iv.

References

1.Anesthesiology 54:177-181, 1981.
2.Reg Anesth 6:99-103, 1981.
3.Anesthesiology 60:10-18, 1984.