POSTER VI—CIRCULATION

A105

Title: REGIONAL VENOUS OUTFLOW, SYSTEMIC BLOOD VOLUME AND SYMPATHETIC NERVE ACTIVITY DURING HYPERCAPNIA AND HYPERCAPNIC HYPOXIA IN DOGS.

Authors: S Hota, MD, H Ariauna, MD, ZJ Bosnjak, PhD, and JP Kamping, MD, PhD

Affiliation: Department of Anesthesiology, The Medical College of Wisconsin and VA Medical Center, Milwaukee, Wisconsin 53295

Introduction. Hypercapnia and hypoxia are pathological states which are commonly seen during anesthesia. Although there have been many studies concerning circulatory response to hypercapnia and hypoxia, the alteration in vascular capacitance and venous return are not clear. The purpose of this study was to examine the effects of acute hypercapnia and hypercapnic hypoxia on total systemic vascular capacitance, sympathetic efferent nerve activity (SENA) and blood flow distribution in three parallel compartments: splanchic (SP), coronary (COR) and other vascular beds, using cardiopulmonary bypass.

Methods. 12 mongrel dogs (20-34 kg) were anesthetized with sodium pentobarbital, intubated, and mechanically ventilated. Dogs were paralyzed with pancuronium bromide, and cardiopulmonary bypass was instituted using a Sarns roller pump and a Shiley reservoir oxygenator. Cardiac output and central venous pressure were maintained constant. Five venous outflow cannulae were placed so that venous return flow from SP, COR and other beds could be separated and flow measured. A large cannula was introduced into the inferior vena cava to the level of diaphragm to collect SP venous drainage. Three additional cannulae were placed into the superior vena cava, left ventricle and femoral vein to collect other venous drainage. COR venous drainage was collected through a cannula placed in the right ventricle. The changes in reservoir volume were measured to evaluate the changes in total vascular capacitance. Hypercapnia and hypercapnic hypoxia were produced by changing the gas mixture for 3-4 min. The responses were examined before and after chemoreceptor denervation. SENA was measured simultaneously from ansa subclavian nerve or splenic nerve. A two-way analysis of variance and the paired t-test were used for statistical comparison.

Results. Baseline blood pressure, total perfusion flow, SP flow and COR flow were 97±5 mmHg, 113±9, 59±4 and 6±2 ml/min per kg (means ± SE), respectively. Hypercapnia (Pco2 106 mmHg) and hypercapnic hypoxia (Pco2 105 and Po2 20 mmHg) caused a decrease in systemic blood volume of 14±3 and 16±5 ml/kg before chemoreceptor denervation, and 22±1 and 5±3 ml/kg after denervation (P<0.01; before vs. after), respectively. Fig. 1 and 2 show percent changes in SP and COR venous outflows, respectively. Hypercapnia increased SP and COR flows. In contrast, hypercapnic hypoxia caused a marked decrease in COR flow (P<0.01; hypercapnia vs. hypercapnic hypoxia). There was an increase in SENA with hypercapnia (Fig. 3) with signifi-

Figure 1

Figure 2

Figure 3

Reference.

Downloaded From: http://anesthesiology.pubs.asahq.org/pdfaccess.ashx?url=/data/journals/jasa/931395/ on 12/14/2018