December 1998 (Volume 39, Number 4)

E. Coli Bacteremia-Induced Changes in the Skeletal Muscle Microcirculation Vary with Anesthetics

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Aim. To test if anesthetic procedures change the hemodynamic pattern in animals with experimental septic shock.
Methods. The effect of two anesthetics on systemic hemodynamic and skeletal muscle microcirculatory responses in high cardiac output live E. coli bacteremia was studied in rats and compared to the effect of two other anesthetic procedures in previously published studies.
Results. Baseline blood pressures and cardiac outputs were similar in rats with decerebrate, ketamine/xylazine, pentobarbital or urethane/chloralose anesthesia. There was a relative baseline tachycardia in decerebrate rats. Ketamine/xylazine anesthetized rats had reduced blood pressure, cardiac output, and heart rate. In decerebrate, pentobarbital, and urethane/chloralose anesthesia, cardiac output increased initially during bacteremia but did not remain elevated in pentobarbital anesthesia. Blood pressure and heart rate remained constant in pentobarbital, decerebrate, and urethane/chloralose anesthesia. During bacteremia, cardiac output, blood pressure, and vascular resistance did not change with ketamine/xylazine, but the heart rate increased. Baseline diameters of cremaster muscle large (A1) arterioles were higher in decerebrate anesthesia. A1 arterioles constricted during high cardiac output bacteremia in decerebrate rats, and pentobarbital or urethane/chloralose-anesthetized rats. A4 arterioles in bacteremia dilated in decerebrate and pentobarbital anesthesia, but did not change under urethane/chloralose and ketamine/xylazine anesthesia.
Conclusion. Anesthetics influence baseline systemic variables and the response of systemic hemodynamics of rats to E. coli bacteremia. During bacteremia, anesthetics primarily affect the reactivity of skeletal muscle small arterioles. Ketamine/xylazine anesthesia has the most pronounced effect on systemic and microcirculatory variables and seems to be an inappropriate choice in sepsis experiments in rats.

Key words: anesthesia; arterioles; bacteremia; chloralose; decerebrate state; ketamine; microcirculation; pentobarbital; sepsis; shock; urethane; venules; xylazine