Date :

Title : EFFECTS OF DOBUTAMINE INFUSION IN THE PREGNANT EWE

Authors : Bradley E. Smith, M.D. and Darel G. Hess, Ph.D.

Affiliation: Department of Anesthesiology, Vanderbilt University, Nashville, Tennessee 37232

Introduction. The search continues for a vasoactive substance which can reverse or reduce the ill effects of low flow and hypotensive conditions during general or regional anesthesia in the pregnant woman and at the same time improve or at least not further hamper uterine blood flow. Although at present ephedrine is the most accepted agent for this purpose, an ideal substitute should not have ephedrine's side effects or should exhibit even more desireable actions. Dobutamine is a new $beta_1$ adrenoceptor agonist which has few side effects and has been thought to exhibit only slight action on alpha and $beta_2$ receptors.[1] The following study was undertaken to explore both the maternal and fetal cardiovascular responses to dobutamine in the pregnant ewe to learn if it might have advantages for use during pregnancy.

Methods. Nine crossbred Dorset-Suffolk ewes near term pregnancy were studied after thiopental induction, under 0.75% halothane, 50% nitrous oxide, and curare anesthesia. Uterine artery blood flow was directly measured after emplacement of square wave electromagnetic flow probes on the dominant uterine artery. Maternal cardiac output was measured by thermal dilution technique through a catheter in the pulmonary artery. Maternal and fetal blood pressures, blood gases and acid-base status were monitored through carotid arteries.

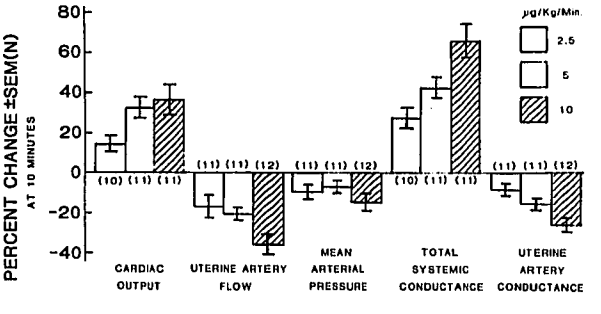
All direct measurements were recorded in real time on an eight channel physiologic tape recorder for later replay and study and for interface for various computer assisted calculations. Uterine and abdominal incisions were closed and all maternal and fetal functions were allowed to stabilize before test infusions were begun. Infusions of 2.5, 5.0, and 10.0 µg/kg of dobutamine were studied at 2.5, 5.0, 10.0 and 20.0 minutes total duration of infusion. At least an additional 20 minutes was allowed for stabilization and return to control values after each infusion before a new test was started.

Results. The major findings are summarized in the graph. Since maximal responses were usually obtained after 10 minutes of infusion and generally remained stable until 20 minutes infusion, changes at 10 minutes are presented in the graph. Response was generally proportionate to dose. Example responses include a mean increase of 35.1% in cardiac output at 10 minutes during 10 µg infusion, mean decrease in uterine artery blood flow of 26.4% at 10 minutes, a mean increase in systemic vascular conductance of 35.0% at 10 minutes, with a concommittant decrease of uterine artery conductance of 27.6%. Although systolic pressure was usually elevated over control values, a concommittant decrease in diastolic pressure led to a net fall in mean arterial pressure of 10% at 10 minutes. Mean fetal acid-base and blood gas status was unaffected. However, it should be noted that dobutamine infusion was discontinued on two occasions at 15 minutes when fetal acid-base readings indicated severe acute deterioration.

Discussion. Typical $beta_1$ adrenoceptor agonist responses were observed in cardiac output, mean arterial pressure and total systemic conductance in the mother. Since uterine artery conductance was depressed and mean arterial pressure was low, uterine artery flow was significantly depressed. Although this effect is probably due to a weak alpha agonist stimulation, it could also reflect the result of baroreceptor response to the mild decrease in mean maternal arterial pressure. No studies were done to explore this question.

Conclusions: Dobutamine did exhibit $beta_1$ adrenoceptor agonist responses in the pregnant ewe, but the combination of a slight resulting decrease in mean arterial pressure with a significant decrease in uterine artery conductance combined to markedly lower uterine artery blood flow. Although detrimental effects on fetal acid-base status were minimal under the careful conditions of this study, dobutamine would not appear to have usefullness for control of blood pressure during anesthesia during pregnancy.

CARDIOVASCULAR RESPONSE TO DOBUTAMINE INFUSION IN THE PREGNANT EWE



References. [1]Sonnenblick et al., N Engl J Med 300:17-22, 1979