Title: BLOOD PRESSURE RESPONSE TO AN EPINEPHRINE TEST DOSE IN BETA-BLOCKED SUBJECTS

Authors: M. Hom, M.D., P. Johnson, M.D., M. Mulroy, M.D.

Affiliation: Department of Anesthesiology, Virginia Mason Clinic, Seattle, WA 98111

INTRODUCTION: Moore and Batra reported the use of 15 micrograms of epinephrine as a reliable and safe test for intravascular injection during epidural anesthesia. They found a 40% increase in mean HR. Unfortunately, the reaction of patients receiving beta adrenergic blocking drugs was not documented. Moore noted two such patients in his study, and observed that their blood pressure did rise with a second injection of epinephrine, but the extent, reliability and duration of that increase were not measured.

METHOD: Informed consent was obtained from six unpremedicated healthy volunteers, ages 24 to 36. After stable supine baseline measurement of blood pressure and pulse, 3 ml saline with 1:200,000 epinephrine were injected at a rate of 1 ml/sec. Heart rate and blood pressure changes were noted every 5 secs. for 3 minutes by EKG and by continuous non-invasive finger blood pressure plethysmography (Finapres machine, Ohmeda). Subjective sensations were also recorded. Over the course of the next 12 hours, all subjects received 80 mg of oral propranolol in divided doses. The epinephrine challenge was then repeated. The systolic and diastolic blood pressures, as well as the pulse rates, were then analyzed by analysis of variance in the baseline and beta-blocked groups.

RESULTS: Our data confirmed the previously described epinephrine induced tachycardia in unblocked subjects. There was a variable response in blood pressure, from marked hypertension to only a modest increase from baseline. Some subjects experienced a brief hypotension prior to onset of tachycardia. The blood pressure peak occurred at 100 sec. and remained elevated at least 180 sec. following injection (Graph 1). After beta-blockade, all subjects displayed a rise in systolic blood pressure at 40 sec. in response to epinephrine infusion, from a mean of 125 to 162 mmHg, a 30% increase from baseline. The mean diastolic increase (40%) was proportionately greater than the systolic (Graph 2). These changes were significant. The overall blood pressure elevation was shorter. These young patients also experienced a bradycardia from a mean HR of 59 to 39, a 36% decrease.

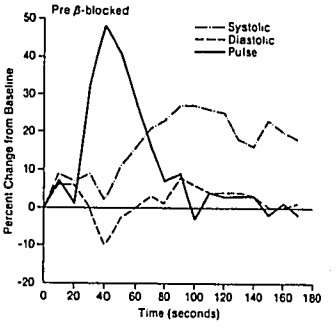
DISCUSSION: Our data confirm that pulse rate increase cannot be expected in response to an epinephrine-containing test dose in the presence of moderate beta-blockade in healthy young patients. In fact, hypertension with an associated fall in heart rate may be expected. In the normal unblocked healthy subject, tachycardia is transient (lasting 60-80 sec.) and hypertension sustained (~2 min.). With moderate beta-blockade the test dose produces transient 30% hypertension (~1 1/2 min.) and a sustained bradycardia (~2 min.) This response is likely due to unopposed alpha adrenergic stimulation and baroreceptor response to the resultant rise in blood pressure. This secondary bradycardic response may be significantly blunted in the elderly,[2] where blood pressure elevation may be the only indication of intravascular injection. Further studies are needed.

Subjective responses were essentially the same before and after beta-blockade. In the clinical setting, however, where the patient will likely be sedated, these signs may be unreliable.[1]

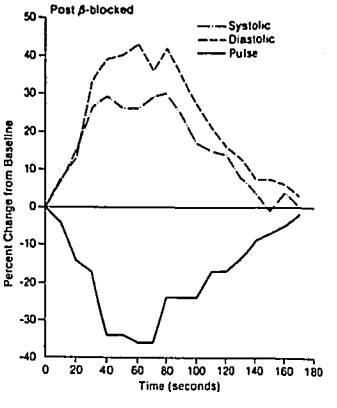
Although the presence of hypertension and bradycardia detected by Finapres measurement in these young beta-blocked volunteers was a reliable indicator of intravascular epinephrine injection, further study is needed to identify the appropriate monitoring of epinephrine-containing test doses in older beta-blocked patients or in those with variable degrees of beta blockade.

REFERENCES:

1. Moore DC, Batra MS: The components of an effective test dose prior to epidural block. Anesthesiology 55:693-6, 1981.
2. Vestal RE, Wood AJJ, Shand DG: Reduced adrenoceptor sensitivity in the elderly. Clin Pharmacol Ther 26:181-8, 1979.



GRAPH 1



GRAPH 2