

The Dangers of Beta-Blockers and Epinephrine

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Depending on the situation, combining epinephrine and beta-blockers can be completely innocuous in one person and life-threatening in another. This article focuses on identifying the latter type of situation so that disaster can be averted. The 2 most dangerous outcomes of this interaction are hypertensive crisis and anaphylaxis that does not respond to epinephrine. In the first case, an excessive response to epinephrine occurs, and in the latter case, the epinephrine response is inhibited.

What causes the hypertensive reaction?

In the absence of a beta-blocker, a systemic dose of epinephrine does not have much effect on mean blood pressure because it has both alpha-adrenergic effects (producing vasoconstriction) and beta-adrenergic effects (producing vasodilation). If a patient on a nonselective beta-blocker receives a systemic dose of epinephrine, however, the beta-blocker prevents the vasodilation, leaving unopposed alpha vasoconstriction. The resulting hypertensive reaction can be large, with systolic pressure well over 200 mm Hg.

Why is the hypertensive reaction dangerous?

In most people the hypertensive reaction would probably not be dangerous; they may just develop a headache and other discomfort. But in a small number of people, for example, those with a

vascular abnormality in their brain, the hypertensive reaction may produce a stroke. This occurred in one of the first case reports of this interaction about 30 years ago. Unfortunately, it is not possible to identify ahead of time which patients are at risk of a severe reaction such as a stroke. Thus, it would be prudent to avoid the interaction in everybody.

Do all beta-blockers increase the risk of acute hypertension?

No. Cardioselective beta-blockers, such as acebutolol, atenolol, betaxolol, bisoprolol, esmolol, and metoprolol, would not be expected to cause hypertensive reactions following a systemic dose of epinephrine. This is because cardioselective beta-blockers have little effect on the beta-adrenergic receptors in the arterioles. Nonetheless, one should consider the possibility of an interaction of epinephrine with cardioselective beta-blockers if plasma concentrations of the beta-blocker are elevated due to large doses or other factors.

Is the dose of the epinephrine important?

Yes. The small amounts of epinephrine (combined with local anesthetics) that may be used in routine dental procedures are unlikely to be a problem. The same applies to minor dermatologic procedures that involve injection of small amounts of local anesthetics and epinephrine. Nonetheless, some patients undergoing facial or eyelid surgery with lidocaine and epinephrine injections have developed hypertensive reactions. Therefore, patients on nonselective beta-blockers should inform any health professional who will be giving them local anesthetics about their beta-blocker therapy.

What about the anaphylaxis problem?

It is well documented that patients on beta-blockers who develop anaphylaxis are likely to be resistant to the therapeutic effects of epinephrine used to treat the anaphylaxis. Although most of the reports have involved nonselective beta-blockers, it is generally assumed that all beta-blockers can inhibit the response to epinephrine in anaphylaxis. There also is evidence that patients on beta-blockers have an increased incidence and severity of anaphylaxis, which is another reason for concern.

It would be prudent to avoid all beta-blockers in patients who are at risk of anaphylaxis, including those receiving immunotherapy or those who carry epinephrine or self-injection.

Recommendations

Patients on nonselective beta-blockers should generally not receive a systemic dose of epinephrine if they are not already in anaphylaxis; an acute hypertensive reaction is likely to occur. If they do have anaphylaxis, the epinephrine will not be harmful, but it probably will not work.

It would be prudent to avoid all beta-blockers in patients who are at risk of anaphylaxis, including those receiving immunotherapy or those who carry epinephrine for self-injection. The beta-blocker may increase the risk of anaphylaxis and may also inhibit the therapeutic effect of epinephrine in treating anaphylaxis. ■