SHORT REPORTS

Comparison of antianginal actions of verapamil and propranolol

Verapamil is a slow calcium channel blocker that has been in clinical use for almost 20 years as an antiarrythmic agent. It also has an antianginal action,1 but inconsistent results have been obtained in clinical trials owing to insufficient dosage.2 We found that the drug produced a significant decrease in the number of anginal attacks and the consumption of glyceryl trinitrate with improvement in exercise tolerance and ST changes when used in a dose of 300 mg daily.3 We have now compared the potency and mode of action of verapamil with those of propranolol, a standard beta-adrenergic-receptor-blocking drug, using fixed high doses of each.

Patients, methods, and results

Twenty-two patients (age range 41-69 years) with confirmed chronic stable angina completed a double-blind cross-over trial designed as a direct objective comparison between verapamil and propranolol in which exercise data were measured.4 After a two-week run-in period when they took a placebo the patients were treated over four-week periods with verapamil 120 mg thrice daily or propranolol 80 mg thrice daily (at 0800, 1400, and 2000).

Exercise tests on a treadmill (Quinton) were repeated after the placebo and each treatment period (90-150 minutes after the last dose of the drug). The tests were performed in a temperature-controlled laboratory and stopped when the patient developed angina or could not continue owing to fatigue, dyspnoea, or claudication. Electrocardiographic monitoring was performed using a mini-computer system, and the protocol was identical throughout the trial.5 Two bipolar leads (CM5 and CC5) were continuously recorded with 25-beat averaging during and after exercise, and the values for heart rate, ST-segment levels, and ectopic counts were printed out every minute. At the end of each test a continuous trend plot was evolved for each variable. The ST-segment level was measured at the J-point in relation to the PR interval. Standards as outlined by the American Heart Association were observed throughout.6 Statistical analysis was performed using Student's t-test (two-tailed). The table shows the variables calculated.

Both drugs were well tolerated with few side effects. Constipation was a constant feature with verapamil and tiredness or lethargy with propranolol. Four patients became free of angina with propranolol and 10 with verapamil. Propranolol improved the exercise time by 40%; its primary effect appeared to be to reduce heart rate (resting heart rate was reduced by 26%, and maximum exercise heart rate by 23%). The heart rate recovery was not altered. The maximum ST-segment depression corrected for exercise time was significantly reduced (p<0.001). Verapamil had a different effect: it reduced the resting heart rate by only 6.5%, and the maximal exercise heart rate by 3%. The heart rate recovery was not altered. The maximum ST-segment depression remained the same. The exercise time, however, increased by 66%, and the maximum heart rate and ST-depression—seen during placebo treatment at 5.5 minutes—now occurred at 9.1 minutes. These figures suggest an improved exercise tolerance with no adverse effect on ischaemia. ST-segment recovery was also unchanged.

Comment

Verapamil has little negative chronotropic effect but improves exercise tolerance more than propranolol, probably because of decreased coronary vasomotion and improved myocardial oxygen consumption. On the other hand, propranolol seems to act predominantly through its negative chronotropic effect. These observations are important to clinicians. Patients with resting bradycardia and a poor chronotropic response to exercise would be expected to respond better to verapamil, while those with resting tachycardia and an appreciable chronotropic response to exercise would respond better to propranolol. These observations have obvious practical implications in choosing treatment rationally.

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5 Ellestad MH, Chairman MD, Blomqvist CG, Naughton JP. Standards for adult exercise testing laboratories. Circulation 1979;58:421-30A.

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Colonisation of ventriculostial shunt with Brucella abortus

Bacterial colonisation of ventriculostial shunts is a well-recognised complication with a reported incidence as high as 24%.1 The organisms most commonly isolated are coagulase-negative staphylococci (Staphylococcus albus). Although other organisms—for example, diphtheroids and Bacillus species—have been isolated,2 ventriculostial shunt colonisation with Brucella species has not been reported. We report such a case.

Case report

A 4-month-old boy with hydrocephalus secondary to aqueductal stenosis underwent uneventful placement of a right ventriculostial shunt using a Holter valve. At the age of 5 years he was admitted to this hospital with a two-month history of lethargy, vomiting, headache, and fever. Physical examination showed an irritable, poorly nourished child with a temperature of 39 C. The upper part of the valve was exposed owing to skin necrosis. Liver and spleen were palpable 4 cm below the costal margin. He lived in a rural area and his father was a farmer. Cows' milk produced on the farm was sometimes consumed in the home.

Laboratory investigations showed haemoglobin 9.7 g/dl and white cell count 6.4 x 10^9/L (differential count neutrophils 37%, lymphocytes 61%, and

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<thead>
<tr>
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<th>Placebo</th>
<th>Propranolol (240 mg)</th>
<th>Verapamil (360 mg)</th>
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</thead>
<tbody>
<tr>
<td>Exercise time (min)</td>
<td>5.5 ± 0.4</td>
<td>7.8 ± 0.5</td>
<td>9.1 ± 0.5</td>
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<tr>
<td>Resting heart rate (beats/min)</td>
<td>76 ± 2</td>
<td>71 ± 3</td>
<td>71 ± 3</td>
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<tr>
<td>Maximum heart rate (beats/min)</td>
<td>135 ± 3</td>
<td>104 ± 3</td>
<td>130 ± 3</td>
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<tr>
<td>Heart rate recovery at 5 mins (beats/min)*</td>
<td>51 ± 2</td>
<td>39 ± 2</td>
<td>39 ± 2</td>
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<tr>
<td>Maximum ST depression (mm) in CM5</td>
<td>24 ± 0.2</td>
<td>17 ± 0.1</td>
<td>22 ± 0.2</td>
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<tr>
<td>Maximum ST depression (CM5)/exercise time (mm/min)</td>
<td>0.48 ± 0.06</td>
<td>0.24 ± 0.03</td>
<td>0.01 ± 0.04</td>
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<tr>
<td>ST recovery at 5 mins in CM5 (mm)</td>
<td>1.9 ± 0.2</td>
<td>1.3 ± 0.1</td>
<td>1.4 ± 0.2</td>
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*Heart rate recovery is the difference between maximum exercise values and values five minutes after exercise.

Comparison of antianginal effects of verapamil and propranolol (values expressed as means ± SEM)