COMPARATIVE INVESTIGATION OF THE INOTROPIC CARDIAC EFFECT OF AJMALINE AND PROCAINAMIDE*

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It is known that the substances quinine or quinidine and procainamide, most commonly used in disturbances of heart rhythm, cause a reduction of the excitability of the myocardium and the contractility of the heart muscle. With both compounds there is a negative inotropic effect on the heart muscle, and because of this their use in injured hearts is not always free from objection. After detailed clinical and experimental tests, ajmaline was used by us for the treatment of heart rhythm disturbances (Kleinsorge). With this Rauwolfia alkaloid, the action of which we have described in detail elsewhere, Zipf found a positive inotropic effect in hypodynamic warm-blooded hearts. We attempted to check this pharmacological result by clinical investigations, since hitherto uo positive inotropic effect has been observed with substances inhibiting the rhythmic pattern and stimulus transmission of the heart.

For the clinical demonstration of the inotropic effect of ajmaline and procainamide we used Bohlau's "step test". Measurements are made on the air breathed out by the patient over a period of 15 minutes using Bohlau's test apparatus to obtain continuous observations of carbon dioxide and oxygen. During the middle 5 minutes he climbs an 18-cm. high step one hundred times. From the additional oxygen consumption during the load (A) and during the recovery (R) the recovery quotient EQ is found (EQ=A/R); in healthy people this depends on age and sex. From the magnitude of the oxygen deficit during the load, conclusions can be drawn regarding the efficiency of the heart. As standard values we used the mean values obtained by Bohlau at the Leipzig Medical University Clinic.

Since in our investigations two gas analyses are necessary with each patient (i.e. before and after administering the ajmaline or procainamide), we included 10 patients of all ages without any medicaments, so as to be able to determine the mean deviation between the first and second analysis. A difference of -0.3% was found.

To test the effect of ajmaline, 50 mg. of ajmaline (Gilurytmal, manufactured by Giulini G.m.b.H., Ludwigshafen/Rhein) was administered intramuscularly or intravenously to each of 23 patients, of both sexes and all ages in whom a pathological breakdown was observed in the step test, and the test was reapeated 15 minutes p.i. The mean improvement after ajmaline was 32.9%, thus there is a genuine rise of efficiency of the heart. Twenty-three patients selected to cover the same range as those of the ajmaline group were then given 5 ml. (=0.5g.) procainamide intramuscularly, under the same conditions, and the step test was performed. The mean value of the deviations after procainamide was 11%.

As expected, no improvement of the heart efficiency was observed with procainamide. This is also in agreement with the circulation-analysis investigations of McClendon, Hansen and Kinsman, in which a reduction of the cardiac output and the pulmonary pressure as well as of the blood flow velocity was observed after administration of procainamide. On the other hand, circulation-analysis investigations with ajmaline by our co-worker Volkner indicated no reduction of the stroke volume or cardiac output.

Thus our investigations confirmed the pharmacological results of Zipf, and indicate that ajmaline can be given even in cases where the heart is injured, without fear of adverse effect on the efficiency of the heart muscle.

Summary

A total of 46 heart patients were tested by Bohlau's "step test". One group of 23 patients, in whom pathological breakdown was observed with the step test, were each given 50 mg., ajmaline intramuscularly or intravenously, and the step test was repeated 15 minutes. p.i. A mean improvement of 32.9% was observed. A second group of 23 patients were given 0.5 g. procainamide intramuscularly and studied under similar conditions; the mean deviation from the initial value was-11%.

The clinical tests, like the pharmacological studies, indicate a positive inotropic effect of ajmaline on injured hearts.

References

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