Rapid reversal of heart failure in a patient with phaeochromocytoma and catecholamine-induced cardiomyopathy who was treated with captopril

Matthias Salathe, Philipp Weiss, Rudolf Ritz

Abstract
A patient with a phaeochromocytoma and severe left ventricular heart failure caused by a catecholamine-induced cardiomyopathy is described. The clinical signs of congestive heart failure resolved rapidly on treatment with captopril and myocardial performance became normal within two weeks of medical treatment with captopril for one week and with captopril in combination with phenoxybenzamine for another week.

Despite active secretion of catecholamines phaeochromocytoma is associated with normotension or even with considerable hypotension in up to 30% of cases. We report the case of a patient with a phaeochromocytoma and acute and severe left ventricular heart failure caused by a histologically confirmed catecholamine-induced cardiomyopathy.

Case report
A 42 year old man was admitted to a district hospital complaining of a chronic unproductive cough. Five years earlier his heart size had been normal, but two months before admission a slight cardiac enlargement had been noticed on a chest x ray. During a flexible bronchoscopy (to rule out a bronchial adenoma) he became tachycardic and hypertensive (220/120 mm Hg). Propranolol (1 mg) was injected intravenously. Respiratory distress rapidly developed and he needed artificial ventilation. A chest x ray showed pulmonary oedema and an enlarged heart, and the electrocardiogram showed sinus tachycardia and ST segment elevations in leads V1 to V6. M mode and cross sectional transthoracic echocardiography showed global hypokinesia of the left ventricle. Treatment with glyceryl trinitrate, dopamine, dobutamine, and diuretics was started. The patient was transferred to the intensive care unit in our hospital.

A coronary angiogram did not show left main stem disease. Left ventriculography showed global hypokinesia despite inotropic stimulation. The left end diastolic pressure was increased to 17 mm Hg and the ejection fraction was reduced to 46%. An endomyocardial biopsy specimen showed focal fibre necrosis and infiltration of monocytes and lymphocytes (figure).

During the next two days the patient's blood pressure fluctuated considerably. On the third day extubation could be performed and treatment with vasopressors was stopped. The patient showed again a hypertensive; systolic blood pressure peaked at over 230 mm Hg. Medical treatment with diuretics and nifedipine was unsuccessful. Captopril, however, controlled blood pressure and improved the clinical signs of left ventricular failure within eight hours.

A tenfold increase in the catecholamine concentration in a 24 hour urine sample confirmed the suspected phaeochromocytoma. A computer tomogram of the abdomen showed a mass of 5.5 x 3.5 cm in diameter in the region of the left adrenal gland. This mass was the only area to show increased uptake of 131I-meta-iodobenzyl-guanidine. The appearance of the endomyocardial biopsy specimen was consistent with a catecholamine-induced cardiomyopathy. One week later treatment with captopril was started and the patient was also given increasing doses of the α antagonist, phenoxybenzamine (up to 60 mg a day). A week later, a radionuclide angiocardiography showed a complete normal myocardial performance and the calculated ejection fraction was 65%.

The phaeochromocytoma was removed one week later without complication. One week after operation the serum and urinary concentrations of catecholamines were within the normal ranges.

Discussion
Acute heart failure caused by a catecholamine-induced cardiomyopathy may be the only symptom of a phaeochromocytoma. Heart enlargement two months before admission suggested the development of cardiomyopathy in our patient. Furthermore, the endomyocardial biopsy findings were consistent with the diagnosis of a catecholamine-induced cardiomyopathy (figure). Treatment with a β blocker rapidly led to pulmonary oedema in our patient, because of unopposed α adrenergic stimulation.

Catecholamine-induced cardiomyopathy has been improved or reversed by surgical removal of the catecholamine-secreting tumour or by medical with α blockers over...
between captopril and hydralazine can be explained by their different influences on the local cardiac renin-angiotensin system. Angiotensin increases the growth and proliferation rate of myocytes in vitro. Hydralazine activates myocyte proliferation, which in turn stimulates cardiac hypertrophy. In contrast, captopril inhibits the cardiac renin-angiotensin axis. This is one possible mechanism, by which captopril may counteract catecholamine-induced cardiomyopathy. Furthermore, free radicals from long chain fatty acids, which act as direct myocardial toxins, have been described in phaeochromocytoma. Captopril, an angiotensin converting enzyme inhibitor with sulfhydryl groups, may be able to scavenge these free radicals.

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