

The Hyperdynamic Beta Adrenergic State A Case Report

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The episodic occurrence of jitteriness, tachycardia with cardiac awareness, sweating, anxiety, and related symptoms often provides a diagnostic and therapeutic dilemma. This symptom complex has many descriptive epithets applied to it, such as, irritable heart syndrome, cardiac neurosis, neurocirculatory asthenia, etc. The most functional and physiologic term to be used is the "hyperdynamic beta adrenergic circulatory state," coined by Frohlich et al in 1966.¹⁻³ This term implies specific therapeutic measures, ie, beta adrenergic blockade. The following is a case report depicting this syndrome.

Case Report

A 30-year-old white female registered nurse reported a strange sensation in her head associated with cardiac awareness and followed by general feelings of anxiety. The first such episode had occurred during pregnancy seven years previously. A second, similar episode, which the patient associated with the use of prochlorperazine, (Compazine) occurred four years later. Approximately 1½ years later the symptom complex returned and for the past nine months these symptoms had become more frequent until they were occurring daily. A typical episode was described as an abrupt onset of lightheadedness unassociated with activity, meals, hunger, fatigue, or stimulant ingestion. This progressed to a dull, full feeling in the head, nausea, muscle tremulousness, cardiac awareness, and a general feeling of fatigue. She had counted her pulse over 100 on several occasions.

A general systems review and her past health and family history were otherwise unremarkable. Physical examination was entirely normal except for a tachycardia of 100 beats per minute. Blood pressure was 110/70 mm Hg.

Laboratory investigation in the hospital disclosed a hemoglobin value of 11.5 gm/100 ml and a T_4 value of 6.0 $\mu\text{g}/100$ ml. The findings from the following laboratory tests were normal: 5-hour glucose tolerance; electrolytes; blood urea nitrogen (BUN); and Chem-Screen 12. Laboratory tests for urinary VMA (vanillylmandelic acid), catecholamines, and 5-HIAA (5-hydroxyindoleacetic acid) showed normal values. Results of a chest x-ray, skull x-ray, electroencephalogram (EEG), and brain scan were all within normal limits.

With neurological consultation an isoproterenol infusion test^{6,7} was performed. An infusion rate of 0.7 μg per

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minute caused reproduction of a typical episode to a moderate degree. When the rate was increased to 2.0 μg per minute it caused intense symptoms and heart rate of 138 beats per minute. The symptoms were then rapidly reversed with a slow intravenous injection of 4 mg of propranolol. The patient was started on oral propranolol up to a dose of 40 mg q.i.d. One year after discharge she remains symptom-free on a daily dosage of between 120 and 240 mg propranolol.

Discussion

This patient presented as distinctly different from a chronically anxious patient. Her symptoms were intermittent and not associated with anxiety-provoking events. The symptoms, response to infusion of small doses of isoproterenol, and resolution with propranolol are typical of the syndrome described by Frohlich. The physiologic basis for this may be a "hyperresponsive" beta receptor. There is a criticism of this diagnosis as a distinct entity by Bourne et al.⁴ One of the criticisms is that the isoproterenol infusion test is not standardized. There are now two reports of a standardized isoproterenol stimulation test which may answer some of

these criticisms.^{5,6} Further documentation of the entity and its response to propranolol has recently been related by Easton and Sherman.⁷

The efficacy of the use of propranolol for relief of anxiety-associated symptoms has been reported in the past from England.⁸⁻¹⁰ It seems to be particularly efficacious for the somatic symptoms of anxiety but is of very little benefit to the psychic component.¹¹ No claim of beta adrenergic hyperresponsiveness is made in these studies.

When evaluating a patient with symptoms compatible with a hyperdynamic state, laboratory tests should be performed to rule out other endocrine abnormalities. Disorders which could present with similar symptoms include pheochromocytoma, hyperthyroidism, hypoglycemic episodes, and possibly even carcinoid syndrome. Although hypertension was not present in this patient, it may occur either along with or as a part of the picture of hyperdynamic circulation. In patients described with hypertension thus far, the blood pressure has been normalized with the addition of propranolol.

The use of propranolol is gaining popularity for relieving anxiety-associated symptoms. It would seem

that definite goals and indications should be kept in mind when prescribing propranolol for anxiety to prevent indiscriminate use. The isoproterenol stimulation test may be one means of establishing the diagnosis of a hyperdynamic beta adrenergic state and therefore strengthening the indication for the use of propranolol.

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