

Orthostatic Syndromes Differ in Syncope Frequency

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ABSTRACT

BACKGROUND: There are conflicting opinions on whether postural tachycardia syndrome predisposes to syncope. We investigated this relationship by comparing the frequency of syncope in postural tachycardia syndrome and orthostatic hypotension.

METHODS: We queried our autonomic laboratory database of 3700 patients. Orthostatic hypotension and postural tachycardia syndrome were defined in standard fashion, except that postural tachycardia syndrome required the presence of orthostatic symptoms and a further increase in heart rate beyond 10 minutes. Syncope was defined as an abrupt decrease in blood pressure and often, heart rate, requiring termination of the tilt study. Statistical analysis utilized Fisher's exact test and Student's *t* test, as appropriate.

RESULTS: Of 810 patients referred for postural tachycardia syndrome, 185 met criteria while another 328 patients had orthostatic hypotension. Of the postural tachycardia syndrome patients, 38% had syncope on head-up tilt, compared with only 22% of those with orthostatic hypotension ($P < .0001$). In the postural tachycardia group, syncope on head-up tilt was associated with a clinical history of syncope in 90%, whereas absence of syncope on head-up tilt was associated with a clinical history of syncope in 30% ($P < .0001$). In contrast, syncope on head-up tilt did not bear any relationship to clinical history of syncope in the orthostatic hypotension group (41% vs 36%; $P = .49$).

CONCLUSION: Our results demonstrate that syncope (both tilt table and clinical) occurs far more commonly in patients who have postural tachycardia syndrome than in patients with orthostatic hypotension. These findings suggest that one should be clinically aware of the high risk of syncope in patients with postural tachycardia syndrome, and the low-pressure baroreceptor system that is implicated in postural tachycardia syndrome might confer more sensitivity to syncope than the high pressure system implicated in orthostatic hypotension.

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Postural tachycardia syndrome is a disorder characterized by orthostatic symptoms such as dizziness, lightheadedness, palpitation, and blurred vision. In addition, postural tachycardia syndrome is often accompanied by nonorthostatic

symptoms such as fatigue, nausea, vomiting, constipation, diarrhea, and migraine headaches.¹ Postural tachycardia syndrome is defined as a >30 beats-per-minute increase in heart rate in the first 10 minutes of upright tilt, accompanied by orthostatic symptoms and sustained throughout the test in the absence of orthostatic hypotension. Postural tachycardia syndrome is diagnosed on the basis of clinical suspicion and usually confirmed by the tilt table test, which is the gold standard.¹

Reflex syncope is an orthostatic disorder characterized by a brief loss of consciousness due to inadequate brain perfusion. Symptoms accompanying reflex syncope are lightheadedness, blurred vision, dizziness, weakness, sweating, and nausea,² similar to symptoms experienced by pos-

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tural tachycardia syndrome patients. Typical findings on tilt table test include a rapid decrease in blood pressure and, often, a decrease in heart rate resulting from inhibition of the sympathetic or activation of the parasympathetic nervous systems.³ The duration of the decrease in heart rate and blood pressure has not been clearly defined.

Expert opinion in the field differs. Some believe that postural tachycardia syndrome predisposes to syncope, and others believe the opposite. To evaluate this disagreement, we examined the occurrence of syncope in patients with postural tachycardia syndrome, compared with patients with orthostatic hypotension with regards to frequency of syncope on tilt table test.

MATERIALS AND METHODS

Inclusion Criteria

A retrospective, Institutional Review Board-approved review of the Autonomic Laboratory database identified patients with postural tachycardia syndrome, those with orthostatic hypotension, and those with tilt-table-induced syncope in each group. All diagnoses were defined by the findings on a tilt table test, in the appropriate clinical setting. All enrolled had undergone full autonomic testing.

Postural tachycardia syndrome was defined as an increase in heart rate >30 beats per minute within the first 10 minutes of upright tilt, unaccompanied by any decrease in blood pressure. Because this criteria set is sometimes viewed as excessively inclusive, we required 2 additional inclusion criteria: the heart rate had to continue rising during the remainder of the tilt study, and orthostatic symptoms had to be present during the tilt study. Orthostatic hypotension was defined by a decrease in systolic pressure of >20 mm Hg or a decrease in diastolic blood pressure of >10 mm Hg within the first 3 minutes of upright tilt and sustained during the remainder of the tilt study. Reflex syncope was defined as a sudden decrease in blood pressure and sometimes heart rate over a period of <3 minutes on upright tilt.

To assess the clinical relevance of the occurrence or nonoccurrence of tilt syncope, we also determined the presence or absence of a clinical history of syncope in each group through review of the chart, clinical questionnaire, or referral diagnosis.

Autonomic Testing

Autonomic testing included the tilt table test, the cardiac responses to deep breathing and to the Valsalva maneuver,

and the Quantitative Sudomotor Axon Reflex Test. The tilt table test consisted of 20 minutes of supine rest on a motorized tilt table before an upright tilt to 70° . Continuous blood pressure and heart rate were monitored noninvasively in the supine position for 3 minutes, and upright for 10–40 minutes. The diastolic blood pressure normally decreases <10 mm Hg, and the systolic blood pressure <20 mm Hg, and heart rate should increase <30 beats per minute.⁴

Deep breathing consists of 5 deep breaths per minute, with the heart rate variation calculated from the best 5 of 15 cycles.⁴ Results are reported as the average difference between inspiration and expiration of the 5 best breaths. For the Valsalva maneuver, the subject maintains a 40-mm Hg pressure gradient with an open glottis for 15 seconds, while heart rate and blood pressure are continuously monitored. The Valsalva ratio consists of the fastest heart rate during pressure exertion (termed phase II, sympathetically mediated) divided by the lowest heart rate after pressure release (termed phase IV, parasympathetically mediated).

Normal values depend on age.⁵

Sudomotor axon reflex response to the iontophoresis of acetylcholine (10% with a 2-mA current for 5 minutes, recording sweat output for 10 minutes) across the skin of the feet, calves, hands, and upper arms, was measured by standard methods.⁶ Normal values vary by body site and sex and were not considered abnormal unless abnormal axon reflex response found in 2 sites were outside of the range of normal, defining the presence of an autonomic neuropathy.

Data Analysis

Fisher's exact test was used to determine the statistically significant difference between the presence of tilt syncope in postural tachycardia syndrome patients compared with that in orthostatic hypotension, and to determine the difference between other categorical values. Demographic differences (age) between groups, as well as the difference in tilt table duration before syncope between the 2 groups, was determined with an unpaired Student's *t* test.

Etiology of Orthostatic Hypotension

Patients with orthostatic hypotension were classified according to probable neuraxis localization of the underlying disorder (central, such as multiple system atrophy;

CLINICAL SIGNIFICANCE

- Syncope occurs with a higher frequency in patients with postural tachycardia syndrome than in patients with orthostatic hypotension.
- Tilt syncope might be a useful predictor of clinical syncope in postural tachycardia syndrome patients.
- Lack of concordance between clinical history of syncope and tilt syncope in orthostatic hypotension patients supports the view that the lack of symptoms in orthostatic hypotension patients might make a clinical diagnosis more difficult.

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