Autonomic Nervous System Dysfunction in Concussion (IN5-2.005)

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OBJECTIVE: To describe the frequency, pattern, and severity of autonomic signs and symptoms following concussion.

BACKGROUND: Autonomic nervous system impairment (ANS) is recognized as a potential complication following severe traumatic brain injury. 'Dizziness', often reported by those who experience concussion (mild traumatic brain injury), is widely considered to be due to vestibular injury/dysfunction, despite normal vestibular testing. Following the clinical observation that the dizziness reported by many concussion patients could be more accurately characterized as postural lightheadedness, exercise intolerance, and pre-syncope, we sought to determine the frequency, pattern, and severity of ANS impairment in a consecutively studied cohort of patients evaluated in the concussion clinic at our institution.

DESIGN/METHODS: A retrospective review of 20 consecutive concussion patients was performed, recording clinical, radiologic, laboratory, and autonomic test findings in this cohort of patients.

RESULTS: Nearly all patients reported symptoms of orthostatic intolerance, including postural lightheadedness, exercise intolerance. Four patients reported a history of syncope. All 20 patients had significant abnormalities on autonomic testing, consisting of excessive tachycardia and/or oscillations or unstable blood pressures with tilt-table testing. These findings were attributed to adrenergic dysfunction. Calculations of adrenergic baroreflex sensitivity demonstrated adrenergic insufficiency in 8 patients, and adrenergic hypersensitivity in 5 patients. Standing norepinephrine levels correlated with adrenergic sensitivity, suggesting the presence of a hyperadrenergic state in some and adrenergic insufficiency in others. Impairment in cardiovagal and postganglionic sympathetic sudomotor function was present in a minority of patients.

CONCLUSIONS: These findings suggest that: 1) ANS dysfunction is a common and previously unrecognized cause of 'dizziness' following concussion; 2) abnormalities can be identified on standard autonomic testing; 3) abnormal adrenergic function is the primary cause of autonomic findings; 4) ANS impairment is a potential biomarker for concussion; and 5) this novel finding has therapeutic implications for patients reporting dizziness following concussion.