Peripheral Vestibular Disorders in Children with Post-Concussion Syndrome

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Background: Dizziness is the second most common symptom of post-concussive syndrome (PCS). It has been shown to be the only on-field symptom of sports-related concussion that is independently predictive of a prolonged recovery, with a 6-fold increase in protracted recovery. 1,2 Dizziness after concussion is generally attributed to the concussive effects on the brain itself. However, there are many potentially treatable causes of dizziness in children that can result from trauma to the inner ear following a head injury and may be overlooked in the setting of PCS. 3,4 The objective of this study was to evaluate the role of peripheral vestibular disorders in children with dizziness in the setting of PCS and to determine the timeliness of its diagnosis and management.

Methods: We retrospectively reviewed the medical records of all patients seen at a pediatric vestibular clinic and a multi-disciplinary concussion clinic over a three-year period (November 2012 through July 2015) who presented with symptoms of dizziness in the setting of PCS. Records of patients diagnosed with peripheral vestibular disorders were further reviewed to determine features of presentation, diagnostic testing results, and modes of treatment.

Results: Twenty-eight patients (25.7%) were diagnosed with peripheral vestibular disorders out of 109 patients seen for dizziness in the setting of PCS. Specific diagnoses consisted of benign paroxysmal positioning vertigo (BPPV; n=19), temporal bone fracture (TBF; n=3), perilymphatic fistula (PLF; n=2), superior semicircular canal dehiscence (SSCD; n=2), and labyrinthine concussion (LC; n=2). All patients with BPPV were successfully treated with canalith repositioning maneuvers. Both patients with PLF and one patient with SSCD underwent successful surgical management, while one patient with SSCD was managed non-surgically.

Discussion: We have observed as many as 1 in 4 patients with dizziness in the setting of PCS to have evidence of a peripheral vestibular impairment, the most common being BPPV. The recognition and treatment of these disorders were very delayed in most cases. This likely reflects a lack of awareness among pediatric concussion providers that protracted symptoms of dizziness and imbalance may result from trauma to the peripheral vestibular organs rather than only to the brain itself. We have developed the algorithm below to help guide the identification and timely management of these disorders in children and adolescents with dizziness in the setting of PCS. Bedside maneuvers are used to diagnose and treat patients with BPPV. Screening for other peripheral otologic symptoms may prompt further objective vestibular testing and/or imaging. This could help signal the possible presence of surgically treatable conditions, such as SSCD or PLF, or conditions such as LC or TBF that may benefit from vestibular rehabilitation and possibly oral steroids.

Conclusion: Peripheral vestibular disorders are present in many children with dizziness in the setting of PCS. Many of these disorders are treatable when appropriately diagnosed. An algorithm is proposed to guide the diagnosis and management of children with dizziness resulting from peripheral vestibular disorders in the setting of PCS.

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