Studies have demonstrated that hypopituitarism, and in particular growth hormone deficiency (GHD), is common among survivors of traumatic brain injury (TBI) tested several months or years following head trauma. In addition, it has been shown that post-traumatic neuroendocrine abnormalities occur early and with high frequency. These findings may have significant implications for the recovery and rehabilitation of patients with TBI. The subjects at risk are those who have suffered moderate-to severe head trauma although mild intensity trauma may precede hypopituitarism also. Particular attention should be paid to this problem in children and adolescents. GH deficiency is very common in TBI, particularly isolated GHD. For the assessment of the GH-IGF axis in TBI patients, plasma IGF-1 concentrations plus GH response to a provocative test is mandatory. Growth retardation secondary to GHD is a predominant feature of GHD after TBI in children. Clinical features of adult GHD are variable and in most obesity is present. Neuropsychological examinations of patients with TBI show that a significant portion of variables like attention, concentration, learning, memory, conceptual thinking, problem solving and language are impaired in patients with TBI. In the few case reports described, hormone replacement therapy in hormone deficient head-injured patients resulted in major neurobehavioral improvements. Improvements in mental-well being and cognitive function with GH replacement therapy in GHD adults have been reported. The effect of GH replacement in posttraumatic GHD needs to be examined in randomized controlled studies [1)].

Case series

2016

A study examined the prevalence of growth hormone deficiency (GHD) in patients with traumatic brain injury (TBI) during the post-acute phase of recovery and whether GHD was associated with increased disability, decreased independence, and depression. A secondary objective was to determine the accuracy of Insulin like growth factor-1 (IGF-1) levels in predicting GHD in patients with TBI. Anterior pituitary function was assessed in 235 adult patients with TBI through evaluation of fasting morning hormone levels. GH levels were assessed through provocative testing, specifically the glucagon stimulation test. GHD was diagnosed in a significant number of patients, with 45% falling into the severe GHD (≤3 µg/L) category. IGF-1 levels were not predictive of GHD. Patients with GHD were more disabled and less independent compared with those patients who were not GHD. Those patients with more severe GHD also showed decreased levels of cortisol and testosterone. Symptoms of depression were also more prevalent in this group. In addition, patients with severe GHD had delayed admission to post-acute rehabilitation. This study confirms the high prevalence of GHD in patients with TBI and the necessity to monitor clinical symptoms and perform provocative testing to definitively diagnose GHD [2)].

2015

Twenty male veterans with mild TBI incurred during combat 8-72 months prior to enrollment.

GHD was defined by a GH peak <3 µg/L during glucagon stimulation test. Differences in neuropsychological, emotional, and quality of life of the GHD Veterans were described using Cohen's d. Large effect sizes were considered meaningful.

Mean age was 33.7 years (SD 7.8) and all subjects had normal thyroid hormone and cortisol levels. Five (25%) exhibited a subnormal response to glucagon. Sixteen participants (80%) provided sufficient effort for valid neuropsychological assessment (12 GH-sufficient, 4 GHD). There were large effect size differences in self-monitoring during memory testing (d = 1.46) and inhibitory control (d =

0.92), with worse performances in the GHD group. While fatigue and post-traumatic stress disorder were comparable, the GHD group reported more depression (d = 0.80) and lower quality of life (d = 0.64).

The study found a 25% prevalence of GHD in veterans with mild TBI as shown by glucagon stimulation. The neuropsychological findings raise the possibility that GHD has adverse effects on executive abilities and mood. Further studies are needed to determine whether GH replacement is an effective treatment in these patients [3)].

1)
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