Anterior Pituitary Hormonal Disturbances in Patients Suffering with Traumatic Brain Injury

Sir,

We read with interest the article titled "Evaluation of pituitary function in cases with the diagnosis of pediatric mild traumatic brain injury: Cross-sectional study." As every practicing neurosurgeon and treating physician is very well aware about criticality of management of traumatic brain injury and associated endocrinal dysfunction observed not only during stay in hospital for treatment but even during the follow-up period. Aylanç *et al*. analyzed pituitary dysfunction in 24 children, who suffered head trauma.[1] The serial monitoring of serum cortisol, thyroid-stimulating hormone, free T3, free T4, prolactin, insulin-like growth factor-1, serum sodium, luteinizing hormone (LH), follicle-stimulating hormone, and testosterone levels in male were carried out. However, none of cases demonstrated abnormality of the pituitary hormonal axis, except one child who had relatively lower serum cortisol level, and none of rest of the children suffered with pituitary hormonal deficiency. Further, authors also concluded that pituitary hormonal dysfunction can develop early, while some may present later during follow-up period and advocated need for longer follow-up of all head injury cases.[1]

However, study of anterior pituitary hormonal disturbances following traumatic brain injury by Aylanç

et al. is not the first study in the literature.[1] In 1979, Steinbok and Thompson analyzed serum cortisol levels in a total of 49 patients, who suffered with head injury, and approximately, 42% cases had elevations of serum cortisol associated with alterations in diurnal rhythm and correlated with the severity of the head injury and fracture of the middle cranial fossa.[2]

Tandon *et al*. analyzed the pattern and frequency of endocrine alteration in a total of 99 cases with severe traumatic brain injury; out of which, forty patients succumbed during hospital stay and the rest 59 cases were available for followed up till 6 months.[3] The anterior pituitary hormone assessment was carried out first within 24 hours of head injury incident and subsequently repeated up to 6 months of follow-up in survivors. Further, authors noted serum cortisol rise followed by prolactin were the most common hormonal derangements observed at admission, while mass effect in the form of midline shifts, which were revealed on computed tomography (CT) scans, inversely correlated to serum cortisol but directly related to growth hormone (GH) elevation, and the presence of brain infarct on cranial CT scans was also inversely related to serum cortisol and LH surge. A significant alteration of diminishing trend of serum mean T4 level values and normalization or a decreasing trend from initially elevated mean serum cortisol as well as GH levels during follow-up was observed. Tandon *et al*. concluded abnormalities in anterior pituitary hormone levels appear to be relatively common in severe traumatic brain injury and show significant fluctuation in the first 6 months following sustaining severe head injury.[3]

De Marinis *et al*. analyzed the impact of severe head injury in 21 comatose male patients on basal pituitary hormone secretion, noticed alteration of GH and prolactin secretion during very acute phase while an imbalance of releasing factors in later on subacute and chronic phase.[4]

Krahulik *et al*. observed the incidence of neuroendocrine dysfunction following traumatic brain injury in 23%–60% of adults and 15%–21% of children in a respective analysis.[5] Krahulik *et al*. analyzed growth, pubertal development, and skeletal maturity evaluation in 58 patients following traumatic brain injury within the age range of 0.5–18.7 years. The cases with severe head injury group had more incidence of diabetes insipidus and syndrome of inappropriate antidiuretic hormone secretion in the early posttraumatic period, i.e., 40%, compared to moderate head injury, i.e., 11.5%. The incidence of endocrine dysfunction at initial evaluation significantly correlated with the injury severity; however, it was not related to subsequent development of a late hormonal dysfunction.[5] In the 1st year following head injury, the hormonal disorder was observed in 17.6% of the cases; however, it was less frequent in children and adolescents than compared to adults, and risk factors include severity of the craniocerebral injury, finding on neuroimaging, and the presence of traumatic intracranial mass effect.[5]

Ulutabanca *et al*. prospectively analyzed 41 children with a mean age of 7 years; out of which, 21 patients had mild, 10 cases each had moderate and severe head injury, respectively, to evaluate the pituitary function during the acute phase (first 24 h) and chronic phase (at 12 months).[6] In the acute phase adrenocorticotropic hormone (ACTH) deficiency was observed in 24.4%, and overall, 44.3% cases demonstrated pituitary hormone dysfunction of at least one hormone. All the patients developing the pituitary hormone deficiencies during acute phase showed complete recovery after 12 months of follow-up. However, further, another two new patients developed new onset deficiency of GH during chronic phase evaluation; in addition, one of them also had associated deficiency of ACTH.[6]

However, there are many concerns regarding the incidence of pituitary hormone dysfunction in children suffering with head injury in the study by Aylanç *et al*.[1] First, the sample size comprising of 24 children is comparatively much smaller, and small cohort size may be a factor for incongruency of result compared to other published literature.[4-6] Second, large number of cases, i.e., 58.3% children, represented to suffer mild head injury and more so these cases might be having Glasgow coma scale of 15/15 after sustaining head injury, a may be a factor for comparatively very low incidence of hormonal dysfunction observed in the study by Aylanç *et al*.[1] and further only a miniscule of cases, i.e., 4.2% sustained were representative of sustaining severe head injury.

However, nevertheless, treating physician and health-care provider should always keep the possibility of developing hormonal disturbances in cases suffering with traumatic brain injury, which can develop either in the acute phase as well as chronic phase or even many years after the incidence of traumatic brain injury. Aylanç *et al*.[1] highlighted the need of importance of hormonal evaluation and appropriate hormonal supplementation to promote proper growth and development of not only in children but also in adults. Ulutabanca *et al*. further concluded the hormonal changes in the early acute posttraumatic phase were transient, while in the chronic phase, the GH deficiency was observed and concluded the incidence of posttraumatic hypopituitarism was relatively lesser than the adult patients but nevertheless

can occur even many years after the traumatic event, so regular follow-up is regularly and religiously advocated.[6]

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Quick Response Code:

Website: www.ruralneuropractice.com

DOI: 10.4103/jnrp.jnrp_438_16

How to cite this article: Satyarthee GD, Garg K. Anterior pituitary hormonal disturbances in patients suffering with traumatic brain injury. J Neurosci Rural Pract 2017;8:481-3.