TRAUMATIC BRAIN INJURY AND HYPOPITUITARISM

HIPOPITUITARISMO E TRAUMATISMO CRÂNIO-ENCEFÁLICO

ABSTRACT

Traumatic brain injury is a common lesion occurring during trauma, especially in young adults. Among all the complications it can cause there is hypopituitarism, an important syndrome, which can delay growth and development in children, and compromise the quality of life of anyone affected. It is usually underdiagnosed and, therefore, undertreated. Through a quick evaluation of the serum hormones involved in a head injury, it is possible to determine those which will need a more thorough investigation, and leading possibly to hormonal replacement. Treatment should be started in those who show no recovery from a severe or multiple hormonal deficiency after three months of follow-up, and those with no recovery from a light or single hormonal deficiency after one year of follow-up.

Key-words: hypopituitarism, cranioencephal trauma, brain injuries, risk.

INCIDENCE

The incidence of acute hypopituitarism after TBI is estimated to be between 24% and 50% by several studies. Isolated hypopituitarism is the most common (21.4% to 36.9%), followed by multiple (6% to 19.6%) and rarely pan-hypopituitarism (0% to 5.7%). The most prevalent deficiency is Growth Hormone deficiency (5% to 25%), followed by central hypogonadism (17%). Other less common alterations are: hyperprolactinemia (4.2% to 10%), central hypoadrenalism (6% to 9.8%), central hypothyroidism (5-8%) and central diabetes insipidus (1-7%). The severity of trauma, evaluated by the Glasgow Coma Scale, shows no relation to the degree of hypopituitarism in most studies.

DEVELOPMENT

There is a serious controversy surrounding the hypopituitarism development in several studies. As there are only few studies, their number of patients is generally small and their methodologies are not always alike; their results are variable and not at all reliable. However, a recovery generally occurs in a considerable number of patients (20% - 50%) even 12 months after the TBI, and an equally considerable amount (15% - 50%) develops a new deficiency after such time. Thus, hormonal changes can be transitory in the TBI and do not predict deficiencies after one year follow-up. On the other hand, the only type of hypopituitarism of worst prognosis is pan-hypopituitarism, which showed no improvement at all in any study. The follow-up for one year or longer is, therefore, recommended.

A higher incidence was observed in males (76.6%), younger than 10 years old, followed by those of 20 - 29 years old and those of 30 - 39 years old.

HYPOPITUITARISMAFTER TBI

The most accepted theory to explain how even a mild TBI can cause a hypopituitarism is that the movement of the pituitary and its infundibulum during the trauma compromises its blood supply, due to the trauma mechanism itself (acceleration/deceleration, contusion/concussion), diminishing or even abolishing the nurturing of its cells.

As the somatotrophs and gonadotrophs are in its most external layer, their functions are the easiest to be damaged, not only by the bloody supply insufficiency, but also by a possible direct lesion to the cells. Furthermore, haemorrhages and inflammations in response to the trauma in the region may increase the lesion, resulting in an even bigger compromise of the blood supply or direct lesion to the cells by inflammatory agents.5,6

TRAUMATIC BRAIN INJURY (TBI)

TBI is an external aggression to the brain, which can cause several internal lesions, such as contusion, concussion, diffuse axonal lesion, haemorrhaging (extradural, subdural, subarachnoid) and hypopituitarism.

In the USA, the incidence of TBI is higher in men, adolescents and young adults, and it is estimated to affect over 600/100.000 inhabitants per year. Therefore, annually 1.4 million individuals suffer TBI, generating 50.000 deaths and direct and indirect costs of 56.3 billion dollars per year. The estimated general incidence of TBI in children, however, was of 70/100.000 children younger than 17 years old per year in the year 2000, causing a cost of 1 billion dollars, due to hospitalization.

The data in Brazil is scarce, but one study shows that the hospitalization rate due to TBI in São Paulo, in 1997, was of 36/100.000 inhabitants, with an in-hospital mortality of 10% and general mortality of 26.2-39.3/100.000 inhabitants.
CLINICAL IMPLICATIONS

There are several clinical implications in the disturbance of the hypothalamus-pituitary-organs axe (HPOA), especially in children. Despite the normal function of HPOA, which would be extremely worthy not only for children, whose growth and development totally depends on a balanced interaction of all the hormones, but also for public health, as it leads to fatigue, weakness, drowsiness, nausea, vomit and circulatory collapse. Chronically, it causes tiredness, pallor, loss of weight and appetite and hypoglycemia. In children, it also compromises growth and development.

Corticotrophic hormone deficiency, most usually diagnosed through a disturbance in cortisol secretion, acutely leads to fatigue, weakness, drowsiness, nausea, vomit and circulatory collapse. Chronically, it causes tiredness, pallor, loss of weight and appetite and hypoglycemia. In children, it also compromises growth and development.

Other hormones from the HPOA produce well known clinical syndromes: thyreostimulant hormone deficiency causes central hypothyroidism; antidiuretic hormone deficiency causes central diabetes insipidus. Hyperprolactinemia itself does not generate severe changes in the organism, and more than a lesion to the pituitary, it shows a response from the organism to a stressful situation.

DIAGNOSIS AND TREATMENT

For the doctor on call, either a general practitioner, a general surgeon or a pediatrician, being able to identify a case that may need a deeper examination and a referral to the specialist is necessary.

There is no established correlation between the trauma severity and hypopituitarism; however, its incidence is undoubtedly frequent, and a hormonal examination is, therefore, important. The serum dosage of the mainly affected hormones (IGF-1, FSH, LH, testosterone (men) and estrogen/progesterone (women)) is enough for a triage in most of the times. Those, whose exams are altered, may request a more thorough research, through stimuli tests and dosage of other pituitary hormones; it is important to notice that as cortisol reaches its peak in the morning, the evening is for the evening and night for the night. Corticotrophic hormone deficiency, most usually diagnosed through a disturbance in cortisol secretion, acutely leads to fatigue, weakness, drowsiness, nausea, vomit and circulatory collapse. Chronically, it causes tiredness, pallor, loss of weight and appetite and hypoglycemia. In children, it also compromises growth and development.

As all these hormonal changes assuredly compromise the person’s quality of life, apart from his/her growth and development, when in children, a treatment in the adequate cases is mandatory.

Nowadays it is recommended that, after the three months follow-up of the hormonal deficit, if it is multiple or severe, hormonal replacement should be started as soon as possible, and a new testing one year after the trauma will show the need of a continuation in the treatment. The aim of this treatment is to allow the person to regain the normal function of his/her HPOA, which may not always happen.

If it is a single or light deficit, it is suggested an one year follow-up, to evaluate the HPOA recovery; if there is no recovery, treatment is recommended for as long as necessary. Again, this treatment may aim at a regain in the HPOA function, which may not always happen and, therefore, require a continuous treatment for the rest of the patient’s life.

Nevertheless, as there is no consensus about it, the medical conduct is usually according to the experience of the responsible endocrinologist.

CONCLUSION

As we take into account the high incidence of TBI nowadays and consequently the high incidence of post-traumatic hypopituitarism, the early identification of alterations of the HPOA would be extremely worthy not only for children, whose growth and development totally depends on a balanced interaction of all the hormones, but also for public health, as it would lower costs and economic losses due to these deficits, which can compromise the normal functioning and the quality of life of people who were, up until then, productive human beings.

REFERENCES