Post Concussional Syndrome

Dr. Wai-kei Wong  MB.ChB(CUHK), MRCSEd(Surgery), FRCSEd (SN), FCSHK, FHKAM
Department of Neurosurgery, Princess Margaret Hospital

Introduction

Post Concussional Syndrome is a common disease entity encountered in head injury patients. Sometimes the injury impact can be very trivial, and patient is thought of being malingering. It has a wide spectrum of presentations. A correct diagnosis is important as it has significant impact in medico-legal aspect especially in work compensation.

History

The understanding of Post Concussional Syndrome evolved from a pure "neurosis", or "malingering" to an organic disorder. The first one to describe the syndrome was by Boyer in 1822.

John Erichsen, Professor of Surgery at London University, described "Railway spine" for the railway injured worker in 1866. He stated that this minor injury could result in severe disabilities with "Molecular disarrangement or anaemia of the spinal cord"

Miller in 1961 studied 200 patients (involved in compensation). At least 47 of them showed features of "compensation neurosis", which have features of arriving late, accompanied by relative who take the active role; unshakable conviction of unfitness for work and absolute refusal to admit any degree of symptomatic improvement.

But Guthkelch (1980) studied 398 patients involved in compensation. Only 6.8% got "accident neurosis", with "Bizarre and inconsistent complaints, exaggeration of length of initial unconsciousness, and attention seeking behaviours".

Fee and Rutherford (1988) found 39% of their patients were symptomatic at the time of settlement and 34% were still symptomatic one year after.

Definition

The word concussion is derived from the Latin concussus, which means "to shake violently."

Previously "loss of consciousness" was thought to be necessary.

The Congress of Neurological Surgeons in 1966 gave what still stands as our best succinct definition of concussion: "an immediate and transient impairment of neural function such as an alteration of consciousness, disturbance of vision, equilibrium, and other similar symptoms"

Concussion has been categorised into three types or grades for clinical purposes. Several classification schemes have been proposed, with three currently in widespread use.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Cantu</th>
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<th>Colorado</th>
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<tbody>
<tr>
<td>Grade 1</td>
<td>LOC &lt; 5 min or PTA of 30 min-24 hr</td>
<td>LOC &lt; 5 min or PTA of 30 min-24 hr</td>
<td>LOC &lt; 1 hour</td>
</tr>
<tr>
<td>Grade 2</td>
<td>LOC &gt; 5 min or PTA &gt; 24 hr</td>
<td>LOC or retrograde amnesia</td>
<td>LOC (coma), confusion with amnesia</td>
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<tr>
<td>Grade 3</td>
<td>LOC or retrograde amnesia</td>
<td>LOC</td>
<td>LOC</td>
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</table>

<table>
<thead>
<tr>
<th>ICD 9 classification</th>
<th>Mental confusion or disorientation</th>
<th>LOC &lt; 1 hour</th>
<th>LOC 1-24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>850.0</td>
<td>No LOC</td>
<td>LOC &gt; 24 hrs with complete recovery</td>
<td></td>
</tr>
<tr>
<td>850.1</td>
<td>Brief LOC</td>
<td>Incomplete recovery</td>
<td></td>
</tr>
<tr>
<td>850.2</td>
<td>Moderate LOC</td>
<td>LOC &gt; 24 hrs with complete recovery</td>
<td></td>
</tr>
<tr>
<td>850.3</td>
<td>Prolonged LOC with recovery</td>
<td>Incomplete recovery</td>
<td></td>
</tr>
<tr>
<td>850.4</td>
<td>Prolonged LOC</td>
<td>LOC &gt; 24 hrs with complete recovery</td>
<td></td>
</tr>
<tr>
<td>850.5</td>
<td>LOC of unknown duration</td>
<td>LOC &gt; 24 hrs with complete recovery</td>
<td></td>
</tr>
<tr>
<td>850.9</td>
<td>Unspecified</td>
<td>LOC &gt; 24 hrs with complete recovery</td>
<td></td>
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Post Concussional Syndrome is a collection of symptoms and signs including headache, dizziness, vertigo, tinnitus, hearing loss, blurred vision, diplopia, convergence insufficiency, light and noise sensitivity, diminished taste and smell, irritability, anxiety, depression, personality change, fatigue, sleep disturbances, decreased libido, decreased appetite, memory dysfunction, impaired concentration and attention, slowing of reaction time and information processing. 70-85% head injury admissions belong to
minor ones. 15 to 30% of them will have post-traumatic symptoms.

Headache (46%), dizziness (14%), amnesia (13%) and weakness (10%) are the most common presentations, which usually will improve with time.

**Pathology**

Concussed neurons can have increase in extracellular K⁺, increase in glucose utilisation, possibly mediated by glutamate, to correct the K⁺ concentration.

There is increase in metabolic rate but decrease in cerebral flow, which is shown to be present within several days after injury

Transient cerebral ischaemia, oedema, widespread neuronal depolarisation from release of acetylcholine, and the shearing of neurons and nerve fibres causing alterations of mental status

Other mediators: Arachidonic acid cascade, catecholamine, cytokines, excitatory amino acid, Ca²⁺, O₂ free radical, PAF, etc

There may be even white matter changes in the brainstem, representing axonal tearing secondary to rapid acceleration or deceleration, or to head impact movements.

The brainstem is thought to be especially involved in patients who have sustained a loss of consciousness. Actually diffuse axonal injury can also occur in patients with mild head injury.

Other studies showed trauma induced Hippocampus necrosis which can occur even in mild head injuries.

**Investigation**

CT and MRI are the main radiological tests. CT brain is usually normal. 9.4% of patients with GCS 15 gets positive findings. 0.3% needs surgery. MRI may show evidence of diffuse axonal injury in 15 to 30% of patients with normal head CT findings after mild head injury. These lesions may represent the pathologic substrate underlying the Post Concussional Syndrome.

Other tests, including Electroencephalography (EEG), Brainstem Auditory Evoked Potential (BAEP) and even Single Photon Emission Computerized Tomography (SPECT) are used in helping to make the diagnosis, but the significance of the tests was controversial.

**Neuropsychology**

Besides imaging tests, cognitive function assessment is important in assessment of Post Concussional Syndrome.


Some of the deficits that can be detected include: reduction in information processing speed, reduction in attention, prolonged reaction time and impaired memory for new information.

Symptoms and cognitive impairment usually show marked improvement within 6 months, up to one year, but residual deficits can still persist.

If there are prolonged deficits, without any improvement, other causes which maintain the syndrome must be considered.

It is important to assess pre-morbid conditions which may prolong the symptoms:
- Psychiatric conditions: depression, personality, anxiety, recent life event
- Lower socioeconomic state, unemployment, younger age, female, lower education
- Alcoholism, drug abuse
- Multiple trauma
- Environment: self-prediction of head injury symptoms

**Management**

Take a careful history and physical examination including the incidence, mechanism of injury, any loss of consciousness, post traumatic amnesia (PTA), using GOAT (table 3), any witness, current symptoms and make detailed records, both in-hospital and outpatient. The longer the PTA, the more significant of the head injury.

<table>
<thead>
<tr>
<th>Description</th>
<th>Error points</th>
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<tbody>
<tr>
<td>1. What is your name? (2)</td>
<td></td>
</tr>
<tr>
<td>2. Where are you now? (5) (City)</td>
<td></td>
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<tr>
<td>3. On what date were you admitted to this hospital? (5)</td>
<td></td>
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<tr>
<td>4. What is the first event you can remember after the injury? (5)</td>
<td></td>
</tr>
<tr>
<td>5. Can you describe in detail (e.g. date, time, companions) the first event you can recall after the injury? (5)</td>
<td></td>
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<tr>
<td>6. What time is it now? (1 for each half hour removed from current time to a maximum of 5 points)</td>
<td></td>
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<tr>
<td>7. What day of the week is it? (1 for each day removed from the correct one)</td>
<td></td>
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<tr>
<td>8. What day of the month is it? (1 for each day removed from the correct one to a maximum of 5 points)</td>
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<tr>
<td>9. What is the month? (5 for each month removed from the correct one to a maximum of 15 points)</td>
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<tr>
<td>10. What is the year? (10 for each year removed from the correct one to a maximum of 30 points)</td>
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Total error points

Total score (100 minus total error points)
Necessary investigations should be done to rule out organic lesions, observe the time course of the symptoms. Social history is an important part of assessment.

We have to refer patients to psychologists early for cognitive function assessment, get a baseline, with serial follow up tests, and to psychiatrists if malingering or psychiatric illness is suspected.

We have to know the validity of all the investigations, and limitations of the psychological assessments.

Treatment is symptomatic (medication to reduce headache and dizziness), psychotherapy, and education.

Conclusion

Post Concussional Syndrome is common especially in minor head injury patients. It is a self limiting disease and usually it will improve gradually. After ruling out organic lesions by imaging, a detailed psychological assessment is necessary to get the baseline and progress, and to find out factors that may prolong the recovery. It is inappropriate to label patient as ‘malingering’ or ‘asking for compensation’ before all these are done.

References