



## Focus on traumatic brain injury

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Almost every paper on brain trauma starts with the statement that traumatic brain injury (TBI) is the main cause of death in those under 45 years; at least this fact is still true in developed countries.

On the other hand, the prognosis of TBI is improving. The mortality after severe head injuries has been cut in half compared to the 1980s. The advances in the outcome of TBI are the result of improving interactions between the rescue system, traumatologists, neurosurgeons and anesthesiologists, intensive care units, and rehabilitation medicine.

However, beside all improvements in the management of head injuries, there are still unsolved problems, in particular in the interaction of TBI with polytrauma. Overall, 78% of all patients with TBI suffer additional injuries [1, 2]. Focusing on emergency room patients show that 37% of all polytrauma patients suffer a TBI [3]. TBI and thoracic injuries are the most common lesions in polytrauma.

Traumatic brain injury in the multiply injured patient: does it mean mainly a severe head injury with some additional peripheral injuries or is it a polytraumatized patient with a head injury among the other injuries? Or is polytrauma with brain injuries a specific and separate pathology?

The reciprocal interaction of the injuries is supporting this point of view. For example, the quite common rupture of the infundibulum of the hypophysis caused by a fracture of the base of the skull will affect the whole body, e.g., by hypothyreosis or diabetes insipidus with uncontrolled volume loss.

Paresis caused by brain damage influences the postoperative results of fracture treatment. On the other hand, reduced mobility due to multiple fractures of the limbs influences the ability to relearn walking.

Injuries of the body have a great influence on the brain injury, e.g., acute respiratory distress syndrome will cause reduced brain oxygenation, and increased intra-abdominal and thoracic pressure might result in a sustained increase in intracranial pressure due to the reduced venous drainage out of the brain.

Two other facts may underline the opinion that polytrauma with TBI is a specific syndrome: there is a strict correlation between the severity grading in TBI and the severity of the polytrauma [4]; and the main cause of death in the multiply injured patient is still the brain trauma.

The literature favors a small volume resuscitation in multiply injured patients without TBI [5, 6]. But in patients with an additional TBI, normotension is the aim. Is this a contradiction?

To underline the importance of TBI in emergency surgery, this issue of the *European Journal of Trauma and Emergency Surgery* is dedicated to brain trauma and focuses on recent topics.

Haltmeier et al. [7] contribute a new study to the long-lasting controversy about prehospital intubation strategies in the US vs. Europe in severe head injuries, demonstrating a worse outcome and a higher mortality in the intubated patients. This result is opposed to central European guidelines and the guidelines of the European Brain Injury Consortium. In these guidelines, the prehospital intubation of comatose patients (GCS < 9) is mandatory.

The underlying question is still unsolved: the group with intubation has a lower Glasgow coma scale score in the emergency room; does this mean that only the really critically severe TBI patients are intubated in the prehospital setting? In this case, the worse outcome of these patients more closely reflects the poor incoming condition than the difficulties of prehospital intubation.

Recent discussions about TBI not only deal with severe head injury, but nowadays there is a focus shift to the vast majority of TBI—the so-called mild TBI and concussion. By definition the neurological symptoms of a mild TBI will vanish within days, and a full recovery is expected.

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But we also learned in the last decade that a large percentage of mild TBI patients have symptoms for quite a long time, having difficulties in the ability to work or to learn in addition to headache. This problem is more obvious in younger patients. And these symptoms are amplified by an additional impact to the brain before the symptoms of the first trauma disappeared.

Exemplary for this ongoing discussion are three articles in this issue:

Corresponding with the increasing number of elderly patients with mild head injuries in western societies, we will be increasingly confronted with trauma patients under various antithrombotic therapies. The article “The role of delayed head CT in evaluation of elderly blunt head trauma victims taking antithrombotic therapy” by Scantling et al. is a contribution to the question at what time point a CT scan is optimal to detect intracranial bleeding and—just as important—to detect blossoming up bleedings [8].

The paper by Chakroun-Walha et al. on “Post-concussive syndrome after mild head trauma—epidemiological features in Tunisia” demonstrates the ability but also the difficulties in the management of minor head injuries in situations with reduced resources [9].

The article by Nakhajavan-Shahraki et al. “Pediatric Emergency Care Applied Research Network (PECARN) prediction rules in identifying high risk children with mild traumatic brain injury” also deals with mild TBI [10]. The article is validating a scoring system to identify children being graded at the first view as mild head trauma but having a clinically important trauma. The aim is discrimination between children needing a CT scan and those who do not.

### Compliance with ethical standards

The author complies with the ethical guidelines for authorship and publishing in the *European Journal of Trauma and Emergency Surgery*.

This article does not contain any studies with human or animal subjects performed by the authors.

**Conflict of interest** Eckhard Rickels declares no conflict of interest in relation to this work

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