

## Appendix 2: Fictional case

*A 13-year-old boy is admitted to the pediatric intensive care unit (ICU) via the emergency department after sustaining a major traumatic brain injury by falling through a skylight while on the roof of a disused warehouse. The patient had been truant from school at the time of injury. His score on the Glasgow coma scale at the scene was 3. On admission to the ICU, he underwent mechanical ventilation and is ventilating satisfactorily. Computed tomography shows a complex right frontoparietal skull fracture, associated subdural and massive intracerebral haemorrhage with edema, and midline shift. His pupils are dilated and nonreactive.*

There are clear clinical and radiologic indices of increased intracranial pressure, which is an immediate threat to the patient's survival. Although not supported by level I evidence, there is strong clinical consensus that focal space-occupying pathology (particularly extra-axial and parenchymal hemorrhage) should be evacuated surgically, with outcome strongly dependent on time from injury to surgery. If (as is possible in our patient's case) there is widespread cerebral edema of a nonhemorrhagic brain, then consideration should be given to a decompressive craniectomy (wide excision of bone to allow expansion of intracranial contents without increasing intracranial pressure), although the evidence for this is conflicting.<sup>1,2</sup>

*Upon his return from surgery, the patient's pupil reactivity is restored. On the first day postsurgery, some flexion of the right arm on suctioning is noted.*

In the short term, flexion in relation to stimulation probably suggests inadequate sedation, which should be avoided because of undesirable increases in intracranial pressure. However, the preservation of a flexor motor response at this stage is an encouraging sign for motor recovery in the medium term. In a situation of lateralized injury with asymmetric motor responses, the better response is most relevant to prognosis.

Assuming no further complications, the immediate threat to survival is probably past. Although a prolonged period of rehabilitation may be required, expectations for motor recovery are positive. However, the circumstances of the injury imply likely adverse premorbid psychosocial factors such as inadequate parental and educational support. Lack of such structure will greatly complicate the remediation of any emerging problems of reduced learning efficiency (injury to medial temporal lobe structures), and attention, impulse control and executive function (injury to the frontal lobe).

*Mechanical ventilation is removed on day 5, and the patient is transferred from the pediatric ICU to the acute neurorehabilitation service on day 10. After 10 weeks of rehabilitation, he is sent home with mild hemiparesis affecting the function in his left arm and hand. However, he is fully ambulant and able to perform activities of daily living independently. After a transitional period, he returns to school with an individual educational plan. Increasing problems with school attendance emerge over the next 12–18 months; two years after his injury, he is arrested for car theft.*

Apparently impressive early motor recovery marred by emergent psychiatric and cognitive morbidity is not uncommon after diffuse traumatic injuries in young people. A misleadingly good physical recovery can lead to inadequate monitoring for difficulties emerging later on, primarily in education. Impulsivity, impaired executive function, and deficits in social and language skills can lead to educational disengagement and increased risk of criminality if family and other social supports are not in place.

## References

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2. Taylor A, Butt W, Rosenfeld J, Shann F, Ditchfield M, Lewis E, et al. A randomized trial of very early decompressive craniectomy in children with traumatic brain injury and sustained intracranial hypertension. *Child's Nervous System*. 2001;17:154–62.