Pediatr Neurosurg 2011;47:87
DOI: [10.1159/000330885](https://doi.org/10.1159/000330885)

Commentary on ‘Decompressive Hemicraniectomy for Pediatric Traumatic Brain Injury: Long-Term Outcome Based on Quality of Life’ by Arun T. Jacob et al., *Pediatr Neurosurg* DOI: [10.1159/000329624](https://doi.org/10.1159/000329624)

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Jacob et al. [1] have produced a thoughtful and timely review of their own experience and of the literature regarding decompressive hemicraniectomy (DHC) for traumatic brain injury (TBI) in children. A very helpful feature of their study is its focus on relatively long-term quality of life outcomes, which is quite appropriate in this context.

Critical care after severe TBI seeks to maintain cerebral perfusion and avoid brain herniation in the face of traumatic cerebral edema. Some of the interventions undertaken in an attempt to achieve this goal, notably prolonged hyperventilation, now appear to be more harmful than helpful regarding outcome. The heuristic attraction of DHC is that it may allow the avoidance of cerebral hypoperfusion and herniation without severely perturbing systemic homeostasis.

The guidelines for the acute medical management of severe traumatic brain injury in infants, children and adolescents identify DHC as a treatment option for patients with refractory intracranial hypertension after standard medical and critical care measures such as mechanical ventilation, sedation, pharmacological paralysis, diuresis and ventricular drainage [2].

In their series, Jacob et al. [1] included a number of patients who did not present with severe TBI, i.e. who had initial Glasgow Coma Scale scores above 8. In addition, many of their patients did not undergo intracranial pressure monitoring prior to early decompression. While these individual treatment decisions by an expert group were undoubtedly rational and carefully chosen, they do point out the heterogeneity of the population of injured children studied in this clinical setting, and the resulting difficulty in interpreting the related literature.

There are many important sources of heterogeneity in this patient population that are likely critical to assessing the efficacy of DHC. First, the physiological response of the brain to trauma and to our therapeutic interventions likely varies greatly between infants, children and adolescents. Second, particular mechanisms of injury, for example abusive brain trauma, may predispose to a different injury pattern and pathophysiology. Third, the presence or absence of mass lesions in addition to brain edema, such as hematoma or contusion, may also variably affect both prognosis and response to therapy.

The choice of DHC as a therapy for severe TBI in children is not a trivial one, given the significant complications that may ensue, as accurately identified by these authors in both their own series and in the literature. DHC has been associated with cerebrospinal fluid leak, increased incidence of posttraumatic hydrocephalus, bone flap reabsorption and surgical site infection. The goal of patient selection for DHC is to avoid operation on those patients who will make a good recovery with nonsurgical management as well as on those who may be more likely to survive in a vegetative state after decompression. The resulting ‘window’ of injury severity and type of injury for which DHC may have a meaningful positive effect on long-term outcome is likely narrow, but has not been clearly defined.

Indeed, a recently published, large prospective study claimed that worse outcomes result after DHC than with nonsurgical management for severe TBI [3]. This study has been criticized, however, for enrolling patients whose injuries were not severe enough to justify DHC as an intervention, or in other words, for missing the therapeutic ‘window’.

Thus, it is critically important that expert clinicians and major centers remain committed to carefully studying systematically defined patient populations in order to verify the efficacy of DHC in children suffering from severe brain trauma. It is equally important that investigators reliably identify the therapeutic window in which we should apply this dramatic and sometimes morbid intervention. In other words, we must be able to reliably identify those children doomed to a poor outcome without DHC, but who still have the potential for meaningful recovery.

References

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