On evolution of intracranial changes after severe traumatic brain injury and its impact on clinical outcome

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Akademisk avhandling

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Avhandlingen kommer att förvaras på svenska.

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Abstract
Severe traumatic brain injury (sTBI) is a cause of death and disability worldwide and requires treatment at specialized neuro-intensive care units (NICU) with a multimodal monitoring approach. The CT scan imaging supports the monitoring and diagnostics. The level of S100B and neuron specific enolase (NSE) reflects the severity of the injury. The therapy resistant intracranial hypertension requires decompressive craniectomy (DC). After DC, the cranium must be reconstructed to recreate the normal intracranial physiology as well as to address cosmetic issues.

The evolution of the pathological intracranial changes was analyzed in accordance with the three CT classifications: Marshall, Rotterdam and Morris-Marshall. The Rotterdam scale was best in describing the dynamics of the pathological evolution. Both the Rotterdam score and Morris-Marshall classification showed strong correlation with the clinical outcome, a finding that suggests that they could be used for prognostication. We demonstrated a clear correlation between the CT classifications and concentrations of S100B and NSE. The results revealed a concomitant correlation between NSE and S100B and clinical outcome. We found that the interaction between the ICP, Rotterdam CT classification, and concentrations of biochemical biomarkers are all associated with DC. We found a high percentage of complications following cranioplasty. Our results call into question whether custom-made allograft should be considered the best material for cranioplasty.

It is concluded that both the Rotterdam and Morris-Marshall classification contribute to clinical evaluation of intracranial dynamics after sTBI, and might be used in combination with biochemical biomarkers for better assessment. The decision to perform DC should include a re-assessment of ICP evolution, CT scan images and concentration of the biochemical biomarkers. Furthermore, when determining whether DC treatment should be used, surgeon should also consider the risks of the following cranioplasty.

Keywords
Severe traumatic brain injury, ICP targeted therapy, ICP, decompressive craniectomy, S100B, NSE, cranioplasty