

Decompressive hinge craniotomy

Decompressive hinge craniotomy (DHC) is an alternative treatment option to decompressive craniectomy (DC) for elevated intracranial pressure (ICP). The aim of this study was to characterize the difference in pressure-volume relationship between DHC and DC.

Methods: We compared the intracranial pressure-volume relationship in a human cadaver model following either DHC, DC, or fixing of the bone plate by titanium clamps. We inserted an intracranial expandable device in two human cadaver specimens, performed either DHC, DC, or bone plate fixation, and gradually increased the intracranial volume while measuring ICP. Following DHC, we also performed CT-scans at pre-defined intervals.

Results: Before ICP exceeded a threshold of 20 mmHg, a fixed bone plate tolerated an increase of 130 ml of intracranial volume, while DHC and DC allowed an increase of 190 ml and 290 ml, respectively. CT-derived calculations following DHC determined that the increase in intracranial volume at ICP 22 mmHg was 65 ml, the maximal increase of intracranial volume was 84 ml, the maximal bone displacement was 21 mm, and the bone plate volume to be 82 ml. Manual stress test of the hinged bone plate did not allow misalignment or intracranial displacement of the bone plate.

Conclusion: DHC increases the intracranial volume by up to 84 ml and allows for approximately 60 ml increase of intracranial volume before ICP exceeds 20 mmHg. This indicates, when comparing with results from previous studies of herniation volumes, that DHC will be sufficient in many patients with head injury or cerebral infarction with treatment refractory intracranial hypertension ¹⁾

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Søndergaard CB, Villa C, Jacobsen C, Lilja-Cyron A, Fugleholm K. The intracranial pressure-volume relationship following decompressive hinge craniotomy compared to decompressive craniectomy-a human cadaver study. *Acta Neurochir (Wien)*. 2022 Nov 11. doi: 10.1007/s00701-022-05409-1. Epub ahead of print. PMID: 36369396.

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