

**Introduction:** Cranioplasty remains an essential procedure following craniectomy, however is still associated with high levels of morbidity. We aimed to investigate factors associated with cranioplasty outcomes.

**Methods:** Single-centre, retrospective cohort study of patients undergoing first cranioplasty (01/03/2010- 30/09/2020). Patient demographics, craniectomy and cranioplasty factors were extracted. Primary outcome was all cause explantation. Secondary outcomes were post-operative explantation secondary to infection, overall surgical morbidity, and mortality. Post-operative morbidity was classified according to the Landriel-Ibanez and Clavien-Dindo systems.

**Results:** Included were 279 patients with a mean age of 43.9 years [SD=15.3] at time of cranioplasty. The most common craniectomy indications ultimately requiring cranioplasty were traumatic brain injury (33.3%, n=93) and tumour (24%, n=67). Cranioplasty materials were titanium (43.7%, n=122), porous polyethylene (27.6%, n=77), hydroxyapatite (17.6%, n=49), polyetheretherketone/polyetherketoneketone (6.1%, n=17), polymethylmethacrylate (4.3%, n=12) and autologous (0.7%, n=2). Median follow-up time after cranioplasty was 29 months [IQR 8.3-73.8]. All cause explantation and explantation due to infection were experienced by 12.5% (n=35) and 9.7% (n=27), respectively. 29.7% (n=83) showed surgical morbidity. Of these, 21.5% (n=60) had at least Grade 2b Landriel-Ibanez and Grade 3b Clavien-Dindo complication, requiring surgical management under general anaesthetic. Three patients (1.1%) died in the peri-operative period and 40 patients in total (14.3%) during follow-up. Multivariate analysis of time to event outcomes using the Cox proportional hazards model demonstrated that porous polyethylene is highly protective against all cause explantation (HR 0.24 [95% CI 0.08-0.72], P=0.01) and explantation due to infection (HR 0.31 [95% CI 0.10-0.94], P=0.04). Left hemispheric craniectomy (HR 4.05 [95% CI 1.6-10.24], P=0.003) and bifrontal craniectomy (HR 3.64 [95% CI 1.27-10.5], P=0.02) increased risk of mortality. No factors were associated with overall surgical morbidity.

**Conclusion:** The risk of post-operative morbidity remains high following cranioplasty but is reduced with the use of porous polyethylene.

#### BRAIN AND SPINE 1 (2021) 100307 100633 THE GERMAN NATIONAL TBI-REGISTRY: CONCEPTION, IMPLEMENTATION AND FIRST RESULTS

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**Objective:** Nationwide data on the epidemiology, treatment characteristics, and long-term outcome of severe traumatic brain injury (TBI) in Germany is not yet existing. Neurosurgeons from the German Neurosurgery Society (DGNC) and traumatologists from the German Trauma Society (DGU), therefore, joined forces in 2016 to conceptualize a TBI module for the well-established Trauma Register of the DGU (TR-DGU). Here, we report how this “German National TBI registry (GNTR)” has been developed, implemented, and tested in a recently completed pilot period.

**Methods:** The conception and implementation process of the GNTR from August 2016 to February 2019 is described, and results of its 23-months long pilot period from February 2019 to December 2020 are presented. For the pilot period, TBI patients were prospectively enrolled at nine neurosurgical and traumatological hospitals across Germany. Inclusion criteria were treatment on the ICU  $\geq$  24h, or an ISS score  $\geq$  16. A variety of clinical, imaging, and laboratory parameters were collected, and the GOSE score was used to assess the outcome at discharge and 6- and 12 months follow-up.

**Results:** Details on the structure and dataset of the GNTR as well as milestones and pitfalls during its conception and implementation, are outlined. During the pilot period, a total of 264 TBI patients were enrolled. Their demographic

characteristics, clinical, imaging, and radiological findings, and their early mortality and functional outcome are described. Furthermore, factors associated with an unfavorable outcome (GOSE 1-4) are assessed using uni- and multivariate regression analyses. Finally, problems and future directions of the GNTR are discussed.

**Conclusion:** The pilot period of the GNTR offers a first glance at the current epidemiology and treatment characteristics of TBI patients in Germany. More importantly, they show how a national TBI registry yielding high-quality prospective data can be developed, implemented, and tested within four years.

#### BRAIN AND SPINE 1 (2021) 100307 100634 INTRACRANIAL PRESSURE MONITORING IN TBI PATIENTS: EXTENSION OF THE RECOMMENDATIONS AND THE EFFECT ON OUTCOME BY PROPENSITY-SCORE MATCHING

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**Background:** ICP monitoring has been recommended for TBI patients with GCS <9 after cardiopulmonary resuscitation and revealing space-occupying lesions or swelling on initial CT scan. However, previous studies that have evaluated the effect of ICP monitoring on outcome have showed conflicting results. In addition, the potential benefit of ICP monitoring in patients with higher scores that early deteriorate after admission or those in the absence of CT findings suggestive of high ICP have not been assessed before.

**Methods:** Our prospectively maintained registry was searched for all adult TBI patients admitted between 1996-2020 with GCS <9 following a nonsurgical resuscitation or deterioration from higher scores to GCS <9 within 24h after TBI and any abnormality on the initial CT scan. Patients recruited were divided into groups if they fulfilled strict (brain trauma foundation guidelines) or extended criteria (patients that worsened after admission or without space-occupying lesions) for ICP monitoring. The effect of ICP monitoring on in-hospital mortality and 1-year GOS was investigated after propensity-score matching.

**Results:** We reviewed 1689 patients that met our inclusion criteria, but 186 patients were excluded because of risk of 48h-mortality >80% (unsalvageable patients). 1094 patients fulfilled strict criteria, 375 extended criteria and 34 no criteria for ICP monitoring. The beneficial effect of ICP monitoring following strict criteria on in-hospital mortality (29.5% vs 48%, p<0.001) was confirmed after matching. The beneficial effect remained significant for extended criteria and when we evaluated deaths directly related to brain injury. However, in those patients that survived after hospital discharged, ICP monitoring was associated with worse 1-year GOSE.

**Conclusions:** ICP monitoring in patients with severe TBI within 24h after injury and abnormal initial CT scan was associated with a decreased in in-hospital mortality but worse long-term recovery after balancing differences in patients baseline characteristics.

#### BRAIN AND SPINE 1 (2021) 100307 100635 QUANTITATIVE ASSESSMENT AND LOCALIZATION OF THE HOLLOWING OF THE TEMPLE AFTER CRANIECTOMY AND CRANIOPLASTY

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**Background:** Computer-aided design (CAD) cranioplasty implants are shaped with respect to bony defects not taking into account temporal muscle atrophy after craniectomy. This often results in a typical contour defect at the temple which can present an esthetic discomfort. The aim of this work was to assess localization and volume of this defect, to improve future surgical strategies.

**Methods:** We analyzed CTs of patients with craniectomy and CAD cranioplasty in our institution from 2012-2018. 3D reconstructions of the skin surface prior to craniectomy and > 6 weeks after cranioplasty were subtracted resulting in a 3D volume of the hollowing defect. All cases were fused to localize the center of the defect in relation to a reference skull.

**Results:** Out of 91 patients, 21 had suitable datasets. 5 had good cosmetic results,