

Title	Cranioplasty complications in severe traumatic brain injury: implications of timing of surgery, implant material and incidence of ventriculomegaly versus Post-Traumatic hydrocephalus
Journal	Neurosurgical Review
Authors	S. Chibbaro, I. Zaed, G. Dannhoff, J. Todeschi, C.H. Mallereau, L. Prisco, A. Alfieri, K. Bernhardt, E. Sartoretti, M.E Halatsch, G. Spatola, A. Cardia, C. Bruno, N. Syrmos, B.R. Carangelo, A. Zalaffi, F. Moruzzi, L. Lippa, G. Tiezi, F. Servadei, A. Reisner, S. Khilar, C. Iaccarino, A. Rubiano, G.M.V. Barbagallo, F. Tarantino, R. Tinturini, C. Bartolozzi, A. Cerase, G. Gualtieri, M. Ganau
Product	Autologous bone, titanium, polyetheretherketone (PEEK), polymethyl methacrylate (PMMA), porous hydroxyapatite (PHA = CustomBone Service)
Objective(s)	Correlation between CP timing, implant material, and the <u>incidence of postoperative complications</u> in patients undergoing CP after DC for severe head injuries.
Method of Analysis	Retrospective multicenter study
POINTS	
1) Method	A retrospective multicenter study was conducted from January 2010 to December 2021 across 9 European neurosurgical centers. A cohort of 4007 patients who underwent CP following DC for severe head injury was analyzed. Timing was categorized as: <i>ultra-early</i> (< 30 days), <i>early</i> (31–90 days), <i>late</i> (> 90 days). Complications were defined according to Clavien-Dindo classification.
2) Results	Among the 4007 patients, 352 (8.8%) had ultra-early CP, 1627 (40.5%), and 2028 (51.7%) had early and late CP respectively. Cerebrospinal fluid (CSF) derangement was more frequently associated with large defects and the incidence of Sinking Skin Flap Syndrome (SSFS). SSFS was more frequently diagnosed in patients undergoing late surgery whereas hydrocephalus and epilepsy were less frequently encountered in the ultra-early and early groups ($p < 0,05$). The overall complication rate was 24.6% (985 patients) including internal hydrocephalus (20%), infection (18%), external hydrocephalus (15%), epilepsy (15%), acute extradural (14%) or subdural hematomas (10%), and subdural hygroma (8%). Simultaneous CP and VPS led to infections in all cases, regardless of implant material.
3) Conclusions	Surgery timing has a greater impact on CP complications than implant material. CSF derangement represents the single most relevant factor influencing the clinical course of patients undergoing CP.
ADDITIONAL COMMENTS / POINTS TO STRESS / POINTS OF STRENGTHNESS	
<ul style="list-style-type: none"> • PHA (CustomBone) in 761 patients = 19%. Largest population ever published in clinical study; • The overall infection rate did not significantly differ among the materials used, except for PHA (CustomBone) implants, which demonstrated a lower infection rate (1.2%, $P = 0.05$). 	