

Cranioplasty complications

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Complications include:

- a) [infection](#): ≈8% risk
- b) [hematoma](#): under the cranioplasty flap (epidural or subdural). Epidural more likely than subdural
- c) [seizures](#)
- d) [brain injury](#)
- e) [Autologous bone flap cranioplasty complications](#)
- f) [hydrocephalus](#)
- g) [CSF leak](#)
- h) [Temporal hollowing](#)

The risk of complication is increased with bifrontal bone defects.

The [incidence](#) of [complications](#) after [cranioplasty](#) is high, ranging from 12% to 50%.

The [complication rate](#) of [cranioplasty](#) is higher than for other elective neurosurgical procedures. Older age, poorer functional situation (worse [Barthel index](#) score) and early surgery (≤ 85 days) are independent risk factors for complications ¹⁾.

Cranioplasty after [decompressive craniectomy](#) (DC) is associated with increased morbidity, but the reported mortality rate is low.

[Intracranial pressure](#) (ICP) is a crucial factor that we need to take into account in all major

pathophysiological changes of the brain after [decompressive craniectomy](#) (DC) and [cranioplasty](#) (CP). The purpose of a study was to check [ICP](#) values before and after cranioplasty and its relation to various parameters (imaging, demographics, time of cranioplasty, and type of graft) as well as its possible relation to postsurgical [cranioplasty complications](#). The authors performed a [prospective](#) study in which they selected as participants adults who had undergone unilateral frontotemporoparietal DC and were planned to have cranioplasty. Intracranial pressure was measured with [fiber-optic sensor](#) in the [epidural space](#) and did not affect cranioplasty in any way. Twenty-five patients met the criteria. The mean vclCP (value change of ICP) was 1.2 mm Hg, the mean Δ ICP (absolute value change of the ICP) was 2.24 mm Hg and in the majority of cases there was an increase in ICP. The authors found 3 statistically significant correlations: between gender and Δ ICP, Δ time (time between DC and CP) and vclCP, and pre-ICP and $\pm$ ICP (quantitative change of the ICP). Male patients tend to develop larger changes of ICP values during CP. As the time between the 2 procedures (DC and CP) gets longer, the vclCP is decreased. However, after certain time it shows a tendency to remain around zero. Lower pre-ICP values (close to or below zero) are more possible to increase after bone flap placement. It seems that the brain tends to restore its pre-DC conditions after CP by taking near-to-normal ICP values ²⁾.

Epidural Fluid Collection

[Epidural Fluid Collection](#).

Brain herniation

The Death from [brain herniation](#) after cranioplasty ³⁾

Massive cerebral edema

[Brain edema after cranioplasty](#).

Intracerebral Hemorrhagic Infarction

Cranioplasty-related [reperfusion injury](#) ⁴⁾

Infection

see [Cranioplasty infection](#).

Epilepsy after cranioplasty

see [Epilepsy after cranioplasty](#).

Autologous bone flap cranioplasty complications

see [Autologous bone flap cranioplasty complications](#).

Subdural empyema

Male, 47 years old, with a history of [malignant middle cerebral artery infarction](#) with [decompressive craniectomy](#) exactly one year ago and underwent [cranioplasty](#)

Reports experiencing an unusual headache and swelling with increased temperature in the cranioplasty area, along with the discharge of serosanguinous fluid that was not present before.

Physical Examination (EF): Swelling in the cranioplasty area with increased temperature.

An urgent non-contrast and contrast-enhanced cranial CT scan is performed.



REPORT: Compared to the last study there is a presence of an extra-axial collection on the right convexity underlying the cranioplasty. It has a subdural morphology, approximately 2.7 cm in the coronal plane, with a heterogeneous content predominantly hyperdense, likely related to hematic residues, as well as some minimal air bubbles. There is a striking enhancement of the dura mater, and radiological signs suggestive of [subdural empyema](#). This collection causes a mass effect on the underlying cerebral sulci but does not cause midline deviation or clear signs of [herniation](#).

A discrete increase in extracranial soft tissues of about 2 cm thickness in the coronal plane adjacent to the cranioplasty is also identified. It shows heterogeneous contrast enhancement and ill-defined hypodense foci inside, suggesting soft tissue infection with associated myositis and subgaleal collections.

There are no signs of bone resorption of the cranioplasty suggesting associated osteomyelitis.

Extensive corticosubcortical hypodensity in the territory of the right middle cerebral artery is identified, indicating an old ischemic infarction. This results in slight retraction of the right occipital and temporal horns, as well as slight hypodensity of the right mesencephalic peduncle related to Wallerian degeneration.

Case series

[Cranioplasty complications case series.](#)

1)

Paredes I, Castaño-León AM, Munarriz PM, Martínez-Perez R, Cepeda S, Sanz R, Alén JF, Lagares A. Cranioplasty after decompressive craniectomy. A prospective series analyzing complications and clinical improvement. Neurocirugia (Astur). 2014 Dec 9. pii: S1130-1473(14)00145-6. doi: 10.1016/j.neucir.2014.10.001. [Epub ahead of print] PubMed PMID: 25497290.

2)

Tsianaka E, Singh A, Drosos E, Fountas K. Direct Consequences of Cranioplasty to the Brain: Intracranial Pressure Study. J Craniofac Surg. 2021 Nov-Dec 01;32(8):2779-2783. doi: 10.1097/SCS.00000000000007945. PMID: 34727479.

3)

Li J, Lin H, Long X. The Death from cerebral hernia after cranioplasty: A case report. Asian J Surg. 2024 Mar 25;S1015-9584(24)00545-1. doi: 10.1016/j.asjsur.2024.03.115. Epub ahead of print. PMID: 38531742.

4)

Oh HJ, Shim JJ, Ahn JM, Oh JS, Yoon SM. Multiple Cerebral Hemorrhages Caused by Paradoxical Reperfusion Injury After Cranioplasty. Korean J Neurotrauma. 2022 May 31;18(2):335-340. doi: 10.13004/kjnt.2022.18.e28. PMID: 36381453; PMCID: PMC9634289.

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