

# Subdural empyema following cranioplasty

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see also [Epidural abscess following cranioplasty](#).

## Epidemiology

[Epidural empyema](#) was seen in 10 (3%) of 300 cases. One of the most important factors related to infection was the time interval after the primary surgery; all infected cases were operated on within 3 months <sup>1)</sup>.

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Singh et al. in a prospective cohort study of patients from August 2015 to December 2017, who had undergone decompressive craniectomy followed by cranioplasty after 6 weeks were followed up to 6 months after cranioplasty and complications were recorded both by imaging and clinically. The complications were classified as minor (subgaleal collection, seizures) did not require the second surgery, and major (hydrocephalus, bone flap infection) which required the second surgery. To find out neurological outcomes, the Glasgow coma score (GCS) and Glasgow outcome scale extended (GOSE) were recorded at 1 month, 3 months, and 6 months.

The overall complication rate in this study was 22.4% (16/72). Subgaleal collection was the most common complication (5.6%), followed by hydrocephalus (4.2%), seizure (4.2%), bone flap infection (2.8%), intracerebral hematoma (2.8%), empyema (1.4%), and subdural hematoma (SDH) (1.4%). Of these, 8.4% (n = 6/72) were major complications (hydrocephalus n = 3, bone flap infection n = 2, and SDH n = 1) which required the second surgery. GCS and GOSE were assessed preoperatively and in the postoperative period at 1 month, 3 months, and 6 months. Both mean values of GCS and GOSE showed a significant improvement at 3 and 6 months after cranioplasty.

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Cranioplasty after decompressive craniectomy is associated with a higher complication rate, but good neurological outcomes after surgery always outweigh the complications. However, the complication rate can be brought down by meticulous timing of cranioplasty in a patient with well-controlled comorbidities and precise surgical techniques. However, storing bone in the bone bank is not an additional factor for any post-cranioplasty complications which was considered previously <sup>2)</sup>

## Case reports

A 34-year-old man presented with a case of subdural empyema and cerebral abscess that developed 12 years after initial neurosurgical intervention for a traffic accident in 1998. Under a diagnosis of acute subdural hematoma and cerebral contusion, several neurosurgical procedures were performed at another hospital, including hematoma removal by craniotomy, external decompression, duraplasty, and cranioplasty. The patient experienced an epileptic seizure and was referred to our hospital in March 2010. Magnetic resonance imaging revealed a cerebral abscess extending to the subdural space just under the previous surgical field. Surgical intervention was refused and antimicrobial treatment was initiated, but proved ineffective. Surgical removal of artificial dura and cranium with subdural empyema and resection of a cerebral abscess were performed on May 12, 2010. No organism was recovered from the surgical samples. Meropenem and vancomycin were selected as perioperative antimicrobial agents. No recurrence of infection has been observed. Postneurosurgical subdural empyema and cerebral abscess are recently emerging problems. Infections of neurosurgical sites containing implanted materials occur in 6% of cases, usually within several months of the surgery. Subdural empyema and cerebral abscesses developing 12 years after neurosurgical interventions are extremely rare. The long-term clinical course suggests less pathogenic organisms as a cause of infection, and further investigations to develop appropriate antimicrobial selection and adequate duration of antimicrobial administration for these cases are needed <sup>3)</sup>.

## Case report from the HGUA

A male, 47 years old, with a history of a [malignant middle cerebral artery infarction](#), underwent a [decompressive craniectomy](#) exactly one year ago. He subsequently had a [cranioplasty](#)

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

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



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.

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.

1)

Yamaura A, Sato M, Meguro K, Nakamura T, Uemura K. [Cranioplasty following decompressive craniectomy–analysis of 300 cases (author's transl)]. No Shinkei Geka. 1977 Apr;5(4):345-53. Japanese. PMID: 558536.

2)

Singh S, Singh R, Jain K, Walia B. Cranioplasty following decompressive craniectomy - Analysis of complication rates and neurological outcomes: A single center study. Surg Neurol Int. 2019 Jul 19;10:142. doi: 10.25259/SNI\_29\_2019. PMID: 31528477; PMCID: PMC6744790.

3)

Wakui D, Nagashima G, Takada T, Ueda T, Itoh H, Tanaka Y, Hashimoto T. Cerebral and subdural abscess with spatio-temporal multiplicity 12 years after initial craniotomy for acute subdural hematoma. Case report. Neurol Med Chir (Tokyo). 2012;52(2):109-12. doi: 10.2176/nmc.52.109. PMID: 22362296.

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