

Depressed skull fracture treatment

[Depressed skull fractures](#) may require surgery to lift the bones off the brain if they are pressing on it by making burr holes on the adjacent normal skull.

Depressed skull fractures are usually comminuted, with broken portions of bone displaced inward—and may require surgical intervention to repair underlying tissue damage.

Surgery for depressed skull fractures has developed over centuries to attain the consensus approaches currently employed. A review of Stein from the Department of Neurosurgery, Perelman School of Medicine at the University of [Pennsylvania](#) outlines the last 200 years of development of surgical approaches to closed and open [depressed skull fractures](#), fractures involving [dural venous sinuses](#) and ping-pong fractures involving infants. Early reports often dealt with only closed and open depressed skull fractures. However, experience has shown that each fracture category merits its own management strategies. Accepted approaches are based on observation only; there is little-to-no scientific evidence to support treatment for any fracture type ¹⁾.

ICP monitoring

Indications

Indications for surgery Level III ²⁾ : 1. open (compound) fractures

a) surgery for fractures depressed > thickness of calvaria and those not meeting criteria for nonsurgical management listed below

b) nonsurgical management may be considered if ● there is no evidence (clinical or CT) of dural penetration (Cerebrospinal fluid fistula, intradural pneumocephalus on CT...) ● and no significant intracranial hematoma ● and depression is < 1cm ● and no frontal sinus involvement ● and no wound infection or gross contamination ● and no gross cosmetic deformity

2. closed (simple) depressed fractures: may be managed surgically or nonsurgically

Timing of surgery

Level III ³⁾: early surgery to reduce risk of infection

Surgical methods

Level III ⁴⁾:

1. elevation and debridement are recommended

2. option: if there is no evidence of wound infection, primary bone replacement
 3. antibiotics should be used for all compound depressed fractures
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There is no evidence that elevating a depressed skull fracture will reduce the subsequent development of posttraumatic seizures,⁵⁾ which are probably more related to the initial brain injury.

Surgical treatment

1. position: (depends on location of the fracture)
2. post-op: ICU
3. blood: type & screen (for severe fractures: type and cross 2 U PRBC)
4. consent (in lay terms for the patient—not all-inclusive):
 - a) procedure: surgery in the area of the skull fracture to bone fragments that may have been displaced, to repair the covering of the brain, to remove any foreign material that can be identified and any permanently damaged brain tissue (i.e., dead brain tissue), remove any blood clot and stop any bleeding identified, possible placement of intracranial pressure monitor. If a large opening has to be left in the skull, it may require surgery to correct in a number of months (3 or more)
 - b) alternatives: nonsurgical management
 - c) complications—usual craniotomy complications —plus any permanent brain injury that has already occurred is not likely to recover, seizures may occur (with or without the surgery), hydrocephalus, infection (including delayed infection/abscess)

Technical considerations of surgery

Surgical goals (modified)

1. debridement of skin edges
2. elevation of bone fragments
3. repair of dural laceration
4. debridement of devitalized brain
5. reconstruction of the skull
6. skin closure

Techniques

1. with open (compound) contaminated fractures, it may be necessary to excise depressed bone. In these cases or when air sinuses are involved, to minimize the risk of infecting the flap, some surgeons follow the patient for 6–12 months to rule out infection before performing a cosmetic cranioplasty. There has been no documented increase in infection with replacement of bone fragments; soaking the fragments in povidone-iodine has been recommended

2. elevating the bone may be facilitated by drilling burr holes around the periphery and either using rongeurs or craniotome to excise the depressed portion

3. in cases where laceration of a major dural sinus is suspected and surgery is mandated, adequate preparation must be made for dural sinus repair; NB: the SSS is often to the right of the sagittal suture

a) prepare for massive blood loss

b) have small Fogarty catheter ready to temporarily occlude sinus

c) have dural shunt ready (Kapp-Gielchinsky shunt, if available, has an inflatable balloon at both ends)ç

d) prep out saphenous vein area for vein graft

e) bone fragments that may have lacerated sinus should be removed last

¹⁾

Stein SC. The Evolution of Modern Treatment for Depressed Skull Fractures. World Neurosurg. 2018 Oct 13. pii: S1878-8750(18)32341-6. doi: 10.1016/j.wneu.2018.10.045. [Epub ahead of print] Review. PubMed PMID: 30326316.

²⁾ ³⁾ ⁴⁾

Bullock MR, Chesnut RM, Ghajar J, et al. Surgical management of depressed cranial fractures. Neurosurgery. 2006; 58:S56–S60

⁵⁾

Jennett B. Epilepsy after Non-Missile Head Injuries. 2nd ed. London: William Heinemann; 1975

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