

Neurotrauma Clinical Practice Guideline

TITLE: Surgical Management of Traumatic Brain Injury

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PURPOSE: This is a clinical practice guideline for surgical intervention in patients with acute traumatic epidural, subdural and intraparenchymal mass lesions

DISCLAIMER: This is a guideline only. This does not constitute a standard of care or hospital policy. Clinicians can deviate from this guideline when clinically appropriate but must document a reason for doing so.

SCOPE: This guideline applies only to acute traumatic brain injury (injury within 24 hours of admission).

This guideline applies only to patients deemed to have a reasonable chance of some neurologic improvement or recovery with intervention (i.e. 'salvageable') by the attending/consulting neurosurgeon.

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I. Procedures

A. Indication for Craniotomy at Presentation

Acute traumatic intracranial hematoma (epidural, subdural, or occasionally intraparenchymal with extension to the cortical surface) presenting with GCS greater than 3 and localizing signs correlative with mass lesion (e.g. anisocoria, posturing, Cushing's triad), should undergo emergent evacuation.

B. Indication for Craniotomy after Initial Presentation

All 'salvageable' patients with any traumatic intracranial hematomas who were initially admitted for non-operative management should undergo urgent surgical evacuation if the GCS score decreases by 2 or more points (not ascribable to iatrogenic cause or pharmacologic agents) and does not respond to appropriate medical ICP management.

C. Coagulation Goals Prior to Surgery/Bedside Procedures

Emergent neurosurgical intervention (operative or bedside) is appropriate in patients with INR \leq 1.3, Platelet Count \geq 100,000K and normal platelet function and no known bleeding diathesis. Exceptions to this are to be made only by the attending/consulting neurosurgeon, documented in the chart, and conveyed to the patient/next-of-kin/POA as part of informed consent for increased risk surgery.

D. Acute Traumatic Epidural Hematomas:

1. Acute traumatic epidural hematoma greater than or equal to 30 cm³ or associated with greater than 5mm midline shift on CT scan should be evacuated as soon as possible regardless of the patient's GCS score.
2. In a patient with GCS $>$ 8, acute traumatic epidural hematoma less than 30 cm³, less than 15mm thick on a single axial slice, less than 5mm midline shift on CT scan may be closely observed in the ICU with serial neurological exams and serial CT scan.

E. Acute Traumatic Subdural Hematoma:

1. Acute subdural hematoma greater than 10mm thick and associated with a greater than 5mm midline shift should be surgically evacuated as soon as possible regardless of the patient's GCS score.
2. Acute subdural hematoma of any size associated with a witnessed decline in GCS of 2 or more points (excepting for intubation, induction of anesthesia or other iatrogenic interventions), or refractory elevation

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of ICP > 20 mmHg should be surgically evacuated as soon as possible.

3. Acute subdural hematoma of any size associated with GCS 3-8 (coma) should prompt consideration for intracranial pressure monitoring (see below)

F. Intraparenchymal Hematoma:

1. Intraparenchymal hematoma of greater than 50 cm³ should be treated surgically.
2. Intraparenchymal hematoma of greater than 20 cm³ and GCS ≤ 8 with midline shift or active decline in neurologic function should be treated surgically.
3. Intraparenchymal hematoma of any size in a patient GCS > 3, associated with refractory ICP > 20 mmHg or witnessed non-epileptic neurologic decline correlative with the lesion should be treated surgically in cases where the benefit of evacuation outweighs the surgical risk(s).
4. Patients with intraparenchymal lesions of any size who show no evidence of neurologic compromise, no signs of mass effect (i.e. midline shift, hydrocephalus, herniation) may be managed non-operatively given that ICP is controllable to less than 20 mmHg.

G. Depressed Skull Fracture:

1. Open depressed (compound) skull fractures depressed greater than 1cm (or the thickness of the cranium) should have the fracture surgically debrided and/or elevated and primarily closed as soon as possible. Any fracture with gross contamination (Wound Class III or IV) should be debrided surgically.

H. Decompressive Craniectomy for Management of ICP:

1. Early decompressive craniectomy should be considered for 'salvageable' patients with initial GCS greater than 3 (including witnessed GCS > 3 in 60 minutes prior to admission) and medically refractory ICP > 20 mmHg.

I. Intracranial Pressure Monitoring:

1. ICP should be monitored in all 'salvageable' patients with GCS equal to or less than 8 with abnormal head CT.
2. External ventricular drain is considered the gold standard for monitoring of ICP.
3. ICP may be monitored by a "bolt" and strain gauge device.

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4. Additional invasive monitoring (Temp, Pb_tO_2 and others as available) may be associated with improved outcomes, and should be considered.
5. ICP should be monitored in all patients who undergo operative decompression / evacuation of epidural, subdural or intraparenchymal hematoma *and* have (or are expected to have) a post-operative GCS of 8 or less (i.e. no neuro exam to follow) after emergence from anesthesia.

References:

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Date