Elevated Intracranial Pressure (ICP)

Signs & Symptoms

	ACUTE	CHRONIC
INFANT	Vomiting, brady/tachycardia, irritability, altered LOC, bulging ant. fontanelle, *Cushing's triad	Bulging anterior fontanelle, irritability, lethargy, poor feeding, vomiting
CHILD (verbal)	Headache, vomiting, altered LOC, papilledema, hypertension, brady/tachycardia, *Cushing's triad	Headache and vomiting (worse in the morning), visual disturbance, abnormal gait, poor coordination, papilledema, Perinaud's syndrome

*Cushing's Triad (late finding): hypertension, bradycardia, irregular respirations

Management of Elevated ICP in Hospital

Symptomatic increased ICP or signs of impending herniation

1. **Baseline Stabilization**
   - → Airway, Breathing, Circulation
   - → Elevate head to 30° and keep midline
   - → Maintain normoxemia and normocarbia (35-40mmHg)
   - → Avoid hypotension with PRN fluids, vasopressors
   - → Avoid hyperthermia with Acetaminophen or mechanical cooling
   - → Sedation for agitation
   - → Osmolar therapy (mannitol or hypertonic saline)
   - → Intubate if refractory hypoxia, hypoventilation, GCS ≤ 8 or loss of airway protection
2. **Emergent CT**

TBI with GCS ≤ 8, signs of impending herniation or abnormal CT?

Yes / No

Surgical ICP monitor placement

ICP ≥ 20 mmHg?

On imaging…

Obstruction?

EVD and CSF drainage

Ensure adequate sedation, osmolar therapy, consider transient hyperventilation

Surgically amenable lesion?

Lesion removal

ICP ≥ 20 mmHg?

Aggressive management:
- → Barbiturate induced coma
- → Decompressive craniectomy

Baseline monitoring/management + Treat underlying cause

Differential Diagnosis

Reduced intracranial space due to:
1. CSF: hydrocephalus, increased production
2. Blood: hematoma, hemorrhage, vasodilation
3. Brain/skull: mass (causing bleeding), cerebral edema, depressed skull fracture
4. Idiopathic intracranial hypertension

Physical Exam

- → Airway, Breathing, Circulation
- → Vitals
- → Neurologic Exam and GCS

Investigations

- → Labs: Electrolytes (avoid hyponatremia), Ca^{2+}, Mg^{+}, urea nitrogen, Cr, ABG, CBCd, pan-culture (if febrile)
- → Imaging: CT or MRI
- → Procedures: *LP

*LP is **contraindicated** in patients with a known/ suspected intracranial mass or suspicion of highly elevated ICP

Elevated ICP

ICP ≥ 20mmHg for >5min

Suspect Non-Accidental Injury if:

→ **Acute elevated ICP + retinal hemorrhage**, cutaneous bruising, fractures or visceral injury

Management Memory Aid

ICP HEAD
- → **I** Intubate
- → **C** Calm (sedate)/Coma
- → **P** Place drain/Paralysis
- → **H** Hyperventilate
- → **E** Elevate head
- → **A** Adequate BP
- → **D** Diuretic (i.e. mannitol)

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