

## Treating Head Injury in the intensive care setting

In this setting that means youre treating secondary injury: i.e rising ICP due to the brain becoming engorged with blood in response to trauma. Thus, a swelling brain bruise.

=== !! ITS ALL ABOUT THE SWELLING !! ===

If the Intracranial Pressure rises above 20-25, the cerebral perfusion pressure will drop. **THUS:**

**Keep the ICP in MID-TEENS**

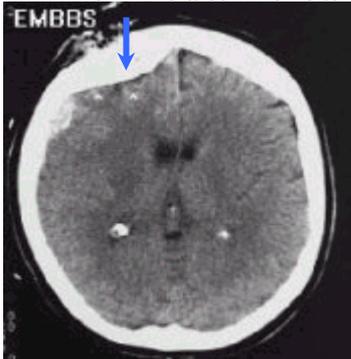
Normally ICP is 0 to 15 mm Hg; over 30 requires treatment:

Cerebral perfusion pressure :  
CPP = MAP - ICP  
!! CPP should be around 65!!  
So keep the MAP at or above 80

1. **FIRST, SECURE AIRWAY.** Intubate if the patient is GCS 8 or below
2. **Sit the patient up at 30 degrees**
3. **Keep their head straight.**
4. **SEDATE THEM HEAVILY** (even a slight cough could raise their ICP dangerously)
5. **CONTROL THE CARBON DIOXIDE** → **AT 37 to 38** because CO2 determines the cerebral blood flow, and you want to keep the blood flow constant so that the vessels don't dilate too much (thereby adding to the already high ICP)
6. **GET A SKULL CT SCAN.** Need to know what is raising that pressure:

### EPIDURAL HEMATOMA

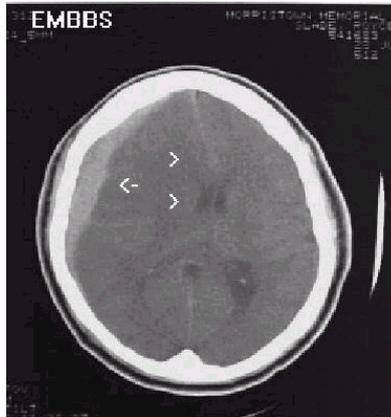
Fast growing: being filled by an artery which got cut open by skull fracture edges moving past one another. The MIDDLE MENINGEAL is a common site



= This does not mean brain damage, but it does **NEED AN URGENT OPERATION** to dig out the clot

### SUBDURAL HEMATOMA

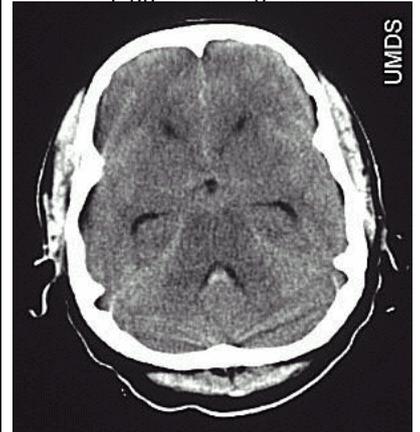
Slow-growing venous filled hematoma.



= This means brain damage is happening, but it **DOES NOT NEED AN URGENT OPERATION**

### SUBARCHNOID BLEEDING

slow Or fast bleeding into the CSF and subarachnoid space. From deceleration trauma, when the brain rides forward along the anterior cranial cavity floor, shredding its supplying vessels with the jagged crista galli .



!! **SUBTLE CT SCAN CHANGES** !! since patient lies supine for the CT, the blood collects in the posterior parts of the ventricles. Plus the sulci are also filled with blood, but its hard to see.

### CEREBRAL CONTUSION: bleeding into the parenchyma



PLUS, you sometimes get these scattered throughout the brain; this is **MULTIPLE PETECHIAL HAEMORRHAGES** which are associated with diffuse axonal injury.

## **CONTROLLING THE ICP:**

### **7. Make sure you have a good idea of what the blood pressure and the ICP are**

This means an **Arterial line** and an **ExtraVentricular Drain** ( Neurosurgeons just cram it through the brain into the ventricle; the theory is that the brain damage already incurred makes the thin needle wound seem acceptable)

### **8. Suck the fluid out with HYPERTONIC SALINE**

**3 times the concentration of normal; better than mannitol.**

## **BLOOD PRESSURE RISING NOW?**

### **9. Consider giving frusemide**

(as the blood becomes hyper-osmolar it will suck in some interstitial water and thus expand in volume; so you want to urinate it out before the blood pressure goes out of control)

### **10. Blood pressure falling? Give Noradrenaline (vasoconstrictor)**

## **INTRACRANIAL PRESSURE STILL RISING?? Time for “Second Tier Therapies”**

### **11. Barbiturates: reduce the metabolic rate of the brain, thus decreasing oxygen**

**demand and reducing blood flow** (which is dependant on metabolic rate, vasodilation being triggered by metabolites)

### **12. Hypothermia: for the same reason**

### **13. Muscle Relaxants to stop coughing: heavily sedated patients might still manage to gag on their endotracheal tube and cough, though not showing any outwardly signs of doing so. However, the ICP WILL JUMP each time they do so. WATCH THE ICP GAUGE! (With paralysing anaesthesia the patient will still gag, but not be able to cough.)**

### **14. STEROIDS: if the ICP increase is not the result of trauma, but a tumour**

## **STILL RISING??**

### **15. Its time for **DECOMPRESSIVE CRANIECTOMY****

**Take off the front of the skull, and the brain has somewhere to expand into.**