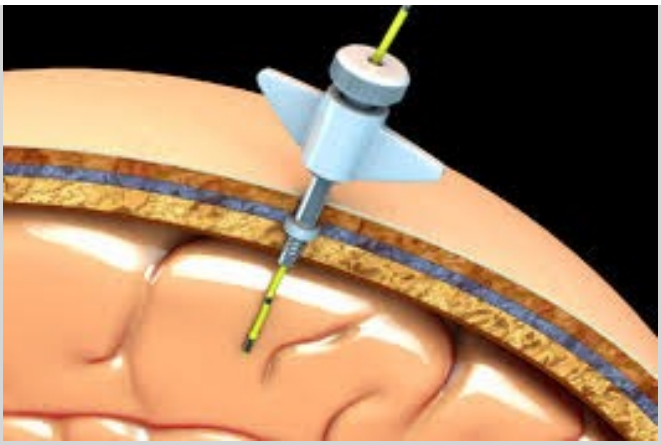
ACCU KIT OF THE WEEK

THE ROYAL LONDON HOSPITAL

# The ICP bolt

JM February 2021



## What's this?

This is a Codman parenchymal pressure-reading catheter, also known as a bolt.

## Why use a bolt?

Intracranial pressure (ICP) monitoring is most commonly used for traumatic brain injury (TBI) patients where non invasive monitoring is not possible.

## How does it work?

Neurosurgeons usually insert these in ED resus/ theatres. A drill is used to make a small hole in the skull. The tip of the catheter is then inserted into the brain parenchymal tissue. Changes in pressure are detected by the piezoelectric strain gauge and connected to the monitor which gives a mean pressure and a waveform.

## How else is ICP measured?

A good answer here would move from clinical examination including fundoscopy, through serial neuroimaging, to invasive pressure monitoring devices. Lumbar puncture with manometer will also give ICP when the patient is in the lateral position. LP is contraindicated where there is suspected intracranial mass effect (e.g. TBI). The other invasive intracranial pressure monitor you will encounter on the ACCU is the externalised ventricular drain (EVD).

## Who needs one?

Cerebral Perfusion Pressure= mean arterial pressure- ICP. A brain injured patient should usually have a CPP of 50-70mmHg. Previous Brain Trauma Foundation guidance has recommended ICP monitoring for TBI with GCS <9 with abnormal CT, or GCS 9-13 and age>40 or motor posturing or SBP <90.

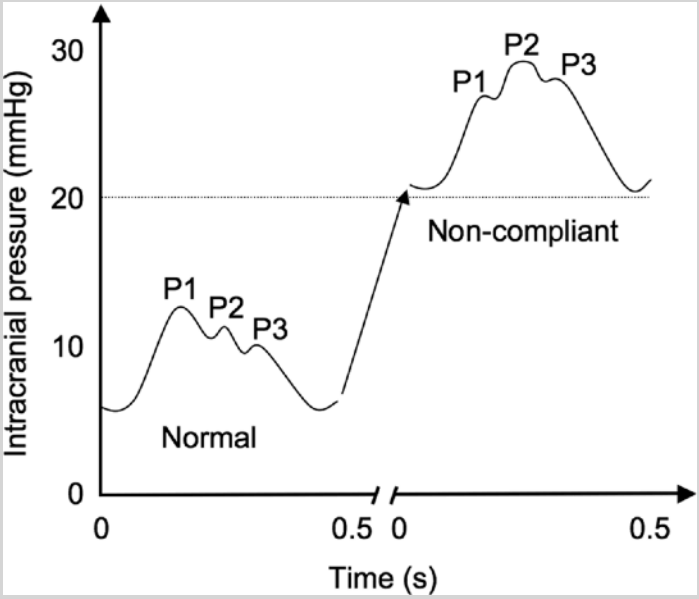
## Name some problems with the bolt

It's invasive and can cause bleeding (although infection is rare). CSF cannot be drained or sampled. It cannot be re-zeroed. Relatively expensive. Unlike the EVD, the bolt might read pressure in one part of the brain that does not reflect global ICP. If the tip is abutting injured tissue, the ICP may read higher than the global pressure (which is what you actually want to know).

## What's a normal ICP?

In health, ICP is 5-15mmHg. An ICP above 20 may indicate a need for medical management, repeat imaging and/or intervention.

## What does an ICP waveform look like?




The waveform represents how arterial pressures are transmitted through brain tissue. p1 relates to systolic arterial pressure wave, p2 is a tidal wave or rebound through the brain p3 aortic valve closure. When P2 is larger and wider than P1, this corresponds to poorly compliant brain tissue. Lundberg waves refer to a time compressed trace. Lundberg A waves are sustained rises in ICP over 5-10 minutes. They imply reduced compliance and are said to herald brain herniation.