

ICP monitoring – a quick guide

Kirsty Matthews – Senior ICM trainee, July 2016

There are two ICP monitoring systems currently in use on the ACCU.

The Camino Integra system consists of a bolt which plugs into a monitoring box, usually found mounted on a stand behind the patients head. This is a digital pressure monitoring system that senses changes in the amount of light reflected from a pressure sensitive diaphragm located at the tip of a fibreoptic catheter. The bolts can be inserted so that the tip lies either subarachnoid or intraparenchymal. The monitoring box displays the ICP waveform, numeric mean ICP values and alarm limits.

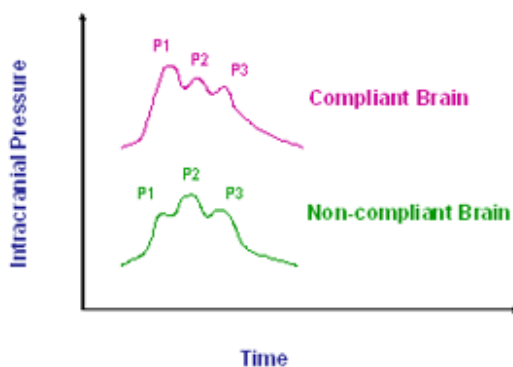
The Camino system is being phased out in preference of the Codman with Directlink modules. This system consists of a microsensor with a miniature strain gauge in the tip, a transducer box (where the system is zero'ed) and a cable that plugs directly into the patient monitoring units so that the ICP trace is displayed on the main monitoring screens (and can be integrated with the invasive pressure data to display a CPP). These bolts can be intraparenchymal or subdural, are less bulky than the Camino bolts, but do need zero'ing regularly.

ICP targets should be patient-specific and set by the neurosurgeons or the ACCU consultant and transcribed onto the daily charts. Usually the aim is to keep the ICP <20 cm mm/Hg and the cerebral perfusion pressure (CPP) (MAP-ICP) >60 mm/Hg

ICP wave forms

See: <http://www.slideshare.net/joemdas/intracranial-pressure-wave-forms-and-monitoring> for a good tutorial on pathological changes to the waveform morphology (slides 16-22).

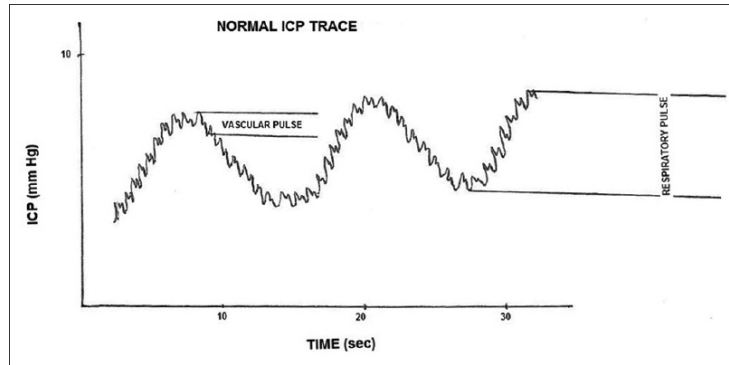
Each cardiac cycle generates an ICP waveform, which looks like this:



P1 = percussion wave (arterial pulsation)
P2 = tidal wave (intracranial compliance)
P3 = dicrotic wave (venous pulsation)

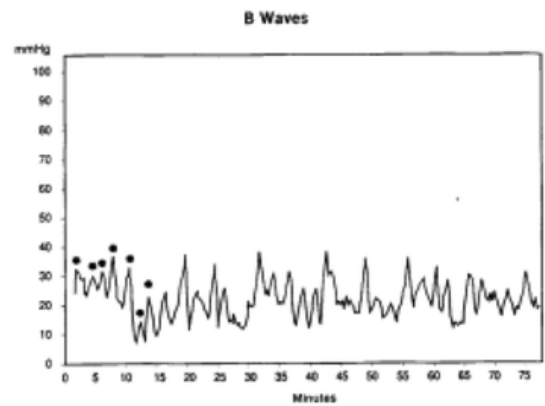
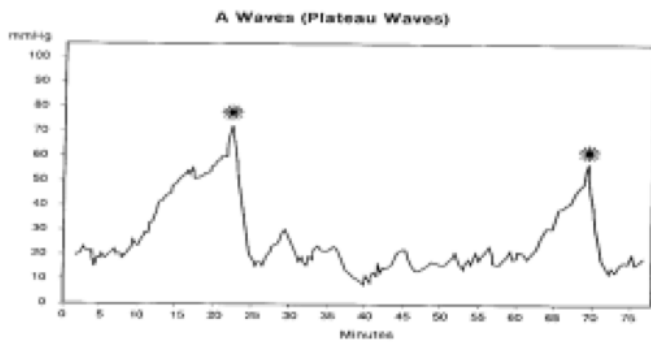
$P2 > P1$ suggests intracranial hypertension

In general, a rounded waveform is bad!



Displayed continuously against time, the waveform starts to look like this:
 Some characteristic pathological patterns can also be seen at this 'macroscopic' level and these are called Lundberg waves.

Broadly, Lundberg A waves indicate impending brain herniation and Lundberg B indicate unstable ICP - therefore consider both as pathological until proven otherwise. Lundberg C waves are usually physiological.



See slides 24-33 of the above link for more detailed explanation.

Note that a flat ICP trace indicates either kinking/compression of the transducer or death of the patient!