Detection of skull expansion with increased intracranial pressure.

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Abstract
A technique is described which uses standard strain-gauge technology to detect skull expansion associated with increased intracranial pressure.

The neurosurgery literature has also provided some evidence of cranial bone mobility. Heifetz and Weiss (1981) applied skull tongs containing strain gauges to two comatose patients. In the first patient, intracranial pressure (ICP) was increased by applying intermittent jugular compression, while in the second patient, ICP was increased by injecting 7-12 cc of fluid into the ventricles of the brain. The results demonstrated that each time the ICP was increased between 15-20 mm Hg, there was a voltage change indicating movement of the skull tongs and therefore, an expansion of the cranial vault. Pitlyk et al. (1985), similarly placed Gardner-Wells tongs with strain gauges first on a dried cadaver skull, then on a fresh cadaver and six live dogs. ICP pressure was increased by manipulating a Swan-Ganz catheter or by saline infusion into the intraspinal subarachnoid space. The authors were not able to consistently increase the ICP in the cadaver skulls but were successful with the dog model. Changes in skull expansion were recorded with increases in ICP as small as 2 mm Hg. Magnitudes of skull expansion, however, were not documented.

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