Atmospheric pressure

Atmospheric pressure, sometimes also called barometric pressure, is the pressure exerted by the weight of air in the atmosphere of Earth (or that of another planet). In most circumstances atmospheric pressure is closely approximated by the hydrostatic pressure caused by the weight of air above the measurement point. Low-pressure areas have less atmospheric mass above their location, whereas high-pressure areas have more atmospheric mass above their location. Likewise, as elevation increases, there is less overlying atmospheric mass, so that atmospheric pressure decreases with increasing elevation. On average, a column of air one square centimeter in cross-section, measured from sea level to the top of the atmosphere, has a mass of about 1.03 kg and weight of about 10.1 N (2.27 lbf) That force over one square centimeter is a pressure of 10.1 N/cm2 or 101000 N/m2. (A column one square inch in cross-section would have a weight of about 14.7 lb, or about 65.4 N.).

The cranial cavity is a closed compartment and any breach to this confined space secondary to neurosurgery or trauma cause an imbalance between atmospheric pressure and intracranial pressure. As the altitude increases, the atmospheric pressure decreases and hypoxia with hypercarbia is a well-known fact. In children, there is an argument to suggest that hypoxia can contribute to mild increase in intracranial pressure during commercial flights [1)].

Fodstad et al. also commented on the effect of atmospheric pressure acting directly on cerebral tissue during craniectomy. According to them, during an upright position intracranial pressure would equalize with the atmospheric pressure [2)].

1)
Lo Presti A, Weil AG, Ragheb J. Flying with a shunt. J Neurosurg Pediatr. 2015;15(2):223-224.
2)
Fodstad H, Love JA, Ekstedt J, Fridén H, Liliequist B. Effect of cranioplasty on cerebrospinal fluid hydrodynamics in patients with the syndrome of the trephined. Acta Neurochir (Wien). 1984;70(1-2):21-30. PubMed PMID: 6741628.