

Sitting position: cerebral effects

I spent longer looking this up than the amount of information here would imply, so if you have something else to add or better thoughts, let me know. Obviously the sitting position places the head substantially above the heart resulting in a blood pressure at the brain lower than the heart. The major concern here is this drop in cerebral blood pressure will **lower cerebral perfusion pressure** putting the patient at risk for stroke. Systemic hypotension may develop via **pooling of the blood in the lower extremities**. To counter this, some patients in the sitting position are somewhat reclined (semi recumbent position) to elevate the feet and assist with blood return to the heart. In the awake patient, the cardiovascular system will compensate somewhat with increased vasomotor tone, but this reflex is blunted in an anesthetized patient. Moving from supine to sitting, a patient will experience a **fall in cardiac index, stroke index, right atrial pressure, wedge pressure, and pulmonary and systemic pressures while pulmonary and systemic vascular resistance will increase**. Notably however, there seems to be minimal change in cerebral blood flow. This may partially be the result of **decreased cerebral venous pressure** and improved drainage. Although the sitting position invokes fears of stroke, the precise consequence of the above constellation of changes is not fully understood. **Cerebral saturations do seem to fall in hypotensive sitting patients** although again, the significance of this is undefined. This seems an appropriate time for a reminder that blood pressure changes 0.74 mmHg for every cm in vertical height difference. This must be kept in mind as the difference between the heart, head, and transducer or blood pressure cuff height can be substantial while in the sitting position.

Other considerations include neck position as in the past, sitting position was noted to be a risk factor for **cervical spinal cord injury**. Care should be taken to avoid excessive flexion, extension, or rotation of the neck.

Lastly, any talk about the cerebral effects of the sitting position would be incomplete without mention of the risk of **venous air embolism**. Because the dural venous system is valveless, held open by the cranium, and above the heart, air can be entrained and returned to the heart where it could result in air-lock or cross a PFO to the systemic arterial system resulting in a stroke. A plan to minimize the risk of air embolism and treatment plan should one occur should be created prior to the surgery.

Further Reading: Gracia I, Fabregas N. Craniotomy in sitting position: anesthesiology management. *Curr Opin Anaesthesiol*. 2014 Oct;27(5):474-83. doi: 10.1097/ACO.000000000000104. PMID: 25051265.