

Scientific Paper:

Acta Neurochir Suppl, 2012, 114, 393 - 397

Visualisation of Cortical pO_2 During an Epidural Mass Lesion in Rodents

Jan Warnat¹, Gregor Liebsch², Eva-Maria Stoerr¹, and Alexander Brawanski¹

¹Department of Neurosurgery, University of Regensburg, Regensburg, Germany

²Biocam GmbH, Regensburg, Germany

Abstract:

Monitoring $p_{bt}O_2$ is a valuable supplemental procedure for neurocritically ill patients. Here, we utilise an opto-chemical method for measuring cortical pO_2 during a reversibly introduced epidural mass lesion in a rat model. The sensor was placed in a cortical window of 17 ventilated Wistar rats. Inflating the balloon device over the contralateral hemisphere increased ICP. Physiological parameters and cortical pO_2 were recorded. The ICP increased from 6.2 ± 4.6 to 44.6 ± 12.6 mmHg ($p < 0.001$). Cortical pO_2 over arterioles changed from 28.9 ± 2.1 to 19.0 ± 2.1 mm Hg ($p < 0.001$), over venules from 14.8 ± 1.2 to 9.9 ± 1.5 mmHg respectively ($p < 0.002$) and over parenchyma from 4.1 ± 0.7 to 2.4 ± 0.8 mmHg respectively ($p < 0.001$), while basic physiological parameters remained constant ($p > 0.05$). During baseline, arterial pO_2 correlated significantly with cortex arteriole and venole pO_2 , but not with cortex parenchyma pO_2 . While ICP was raised, cortical pO_2 did not correlate with arterial pO_2 . In this model, a moderate epidural mass lesion causes a significant decrease in cortical pO_2 . The correlation of cortex vessel pO_2 with arterial pO_2 disappeared during the epidural mass lesion. These findings show the capability of the device to elucidate the behaviour of functionally different cortex areas at pathophysiological conditions.

Key-words: Brain tissue oxygen, $p_{bt}O_2$, partial oxygen pressure, epidural haematoma, time-resolved luminescence imaging, neuromonitoring