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### **Title: MONITORING OF BRAIN OXYGENATION DURING COMPLEX CEREBRAL ANEURYSM SURGERY BY ABSOLUTE CEREBRAL OXYGEN SATURATION (FORE-SIGHT TECHNOLOGY)**

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**Background and Goal of Study: (required):** Complex cerebral aneurysm surgery carries a high risk for intra-operative ischemic insults, especially if multiple periods of temporary clipping seem necessary to allow final aneurysm clipping. Optimal intra-operative cerebral protection remains an open and controversial question. The use of non-invasive neuromonitoring, applied during aneurysm surgery, could guide an optimal (and maximal) intra-operative neuroprotective strategy.

**Materials and Methods: (required):** In 12 pts, scheduled for elective complex cerebral aneurysm surgery by supra-orbital incision, non-invasive cerebral oximetry was applied over

the patient's forehead. The Fore-Sight monitor is a newly available, continuous wave, spatially resolved, near-infrared spectrometer that measures absolute cerebral tissue oxygen saturation (SctO<sub>2</sub> %). Validation studies proved a stable correlation between SctO<sub>2</sub> and jugular bulb saturation (SjO<sub>2</sub>) with SctO<sub>2</sub> 10% higher than SjO<sub>2</sub>. As it is accepted that SjO<sub>2</sub> has a normal safe limit of 45%, the absolute Fore-Sight SctO<sub>2</sub> threshold is estimated to be approximately 55%.

**Results and Discussion: (required):** In 3 of 12 pts, excessive ambient light interfered with SctO<sub>2</sub> monitoring and no SctO<sub>2</sub> data could be obtained. In 7 of 9 remaining pts, multiple periods of temporary clipping were applied. Before temporary clipping, barbiturates were administered in order to obtain a Burst Suppression Ratio of 20 to 40%. In all pts, a small, nonsignificant decrease in ipsilateral SctO<sub>2</sub> was observed during temporary clipping, without any SctO<sub>2</sub> value below 55%. After release of the temporary clip, an immediate, shortlasting (3-5min) and significant increase in ipsilateral SctO<sub>2</sub> was observed in 3 pts. In one of these 3 pts, all 4 periods of temporary clipping resulted in the same phenomenon. After release of the temporary clip, ipsilateral SctO<sub>2</sub> increased by a mean of 8.4% (range 7-11%) with return to baseline after a mean of 4min. These observations could point to a local hyperperfusion occurring after the release of the temporary clip and could indicate the presence of a time window not suitable for re-application of a temporary clip.

**Conclusion(s): (required):** This first report reveals the feasibility of intra-operative non-invasive cerebral oxygenation monitoring, using absolute SctO<sub>2</sub> monitoring, during complex cerebral aneurysm surgery. The surgical approach by minimal invasive supra-orbital incision plays a major role in enabling this forehead non-invasive monitoring technique. However, further studies will have to reveal the clinical implications of this new information.