

NON-INVASIVE ABSOLUTE CEREBRAL OXIMETRY (FORE-SIGHT) : A NEW GUIDE DURING CAROTID ENDARTERECTOMY?

C. DE DEYNE*^o, R. MESTRUM*, W. LANSINK[,] K. LATTHOUWERS*, F. JANS*^o, G. LAUWERS**[,] H. SCHROE**[,] R. HEYLEN***

Dept of Anesthesia, Ziekenhuis Oost-Limburg, Genk (Belgium)

Dept of Thoracovascular Surgery, Ziekenhuis Oost-Limburg, Genk (Belgium)

Faculty of Medicine, University Hasselt (Belgium)

During carotid endarterectomy (CEA), the incidence of intra-operative stroke due to clamping-induced cerebral ischemia or embolization remains significant (3-5%). Temporary occlusion of the carotid artery always carries the risk of severe brain damage, as poor collateral circulation will result in cerebral ischemia. Detection of cerebral ischemia before it becomes irreversible would be of great benefit. Cerebral oximetry, based on NIRS, measures regional cerebral tissue oxygen saturation (SctO₂) non-invasively. The FORE-SIGHT cerebral oximeter, a recently introduced monitoring device, uses 4 precise wavelengths to determine absolute SctO₂. In this study, we evaluated the changes in absolute SctO₂ values during carotid clamping for CEA.

Over a 16months period, 115 pts scheduled for CEA were included with IRB approval. In all pts, CEA was performed under general anesthesia. FORE SIGHT monitoring was used to measure bilateral SctO₂, together with routine EEG monitoring to detect intra-operative cerebral ischemia. EEG changes indicative of ongoing cerebral ischemia, occurring after carotid clamping, guided the decision for shunt insertion. In this report, only patients revealing no EEG changes indicative of ongoing cerebral ischemia (and without shunting procedure) were included (n:89 pts).

Mean ipsilateral SctO₂ immediately before clamping was 71.2% (62%-80%) and decreased significantly (p:0.0042) by a mean of 6.56% (2%-20%) after cross-clamping. Validation studies proved a stable correlation between SctO₂ and jugular bulb saturation (SjO₂) with SctO₂ 10% higher than SjO₂. As it is accepted that SjO₂ has a normal safe limit of 45%, the absolute Fore-Sight SctO₂ threshold is estimated to be approximately 55%. In 11 pts, we observed ipsilateral SctO₂ values between 55%-60%, while in 3 pts, ipsilateral SctO₂ decreased below 55%. Mean contralateral SctO₂ before clamping was 71.8% (65%-78%) and no significant changes were observed after carotid clamping. During clamping, ipsilateral SctO₂ remained stable without any further significant decreases. Mean ipsilateral SctO₂ before clamp release was 67.1% (58%-78%) and increased significantly (p:0.0181) by a mean of 5.52% (2%-15%). Mean ipsilateral SctO₂ after clamp release was 72.5% (63%-87%). We observed no significant changes in contralateral SctO₂ values after clamp release. Rigorous blood pressure management assured stable hemodynamic conditions (without any hypotensive episodes) in all pts. Finally, all 89 pts experienced an uneventfull neurological recovery.

Non-invasive absolute cerebral oximetry revealed significant ipsilateral decreases in cerebral saturation after carotid cross clamping. The use of SctO₂ threshold levels, indicative of ongoing cerebral ischemia, seems however difficult, as we found that almost 1 on 5 pt developed SctO₂ values below 60% after cross clamping, without any EEG changes and with an uneventfull neurological outcome.