Tissue oxygenation

In order to monitor tissue oxygenation in patients with acute neurological disorders, probes for measurement of brain tissue oxygen tension (ptO2) are often placed non-specifically in a right frontal lobe location. To improve the value of pbtO2 monitoring, placement of the probe into a specific area of interest is desirable. Häni et al presented a technique using CT-guidance to place the ptO2 probe in a particular area of interest based on the individual patient's pathology.

In this retrospective cohort study, they analyzed imaging and clinical data from all patients who underwent CT-guided ptO2 probe placement between October 2017 and April 2019. Primary endpoint was successful placement of the probe in a particular area of interest rated by two independent reviewers. Secondary outcomes were complications from probe insertion, clinical consequences from ptO2 measurements, clinical outcome according to the modified Rankin Scale (mRS) as well as development of ischemia on follow-up imaging. A historical control group was selected from patients who underwent conventional ptO2 probe placement between January 2010 and October 2017.

Eleven patients had 16 CT-guided probes inserted. In 15 (93.75%) probes, both raters agreed on the correct placement in the area of interest. Each probe triggered on average 0.48 diagnostic or therapeutic adjustments per day. Only one infarction within the vascular territory of a probe was found on follow-up imaging. Eight out of eleven patients (72.73%) reached a good outcome (mRS ≤ 3). In comparison, conventionally placed probes triggered less diagnostic and therapeutic adjustment per day ($p = 0.007$). Outcome was worse in the control group ($p = 0.024$).

CT-guided probe insertion is a reliable and easy technique to place a ptO2 probe in a particular area of interest in patients with potentially reduced cerebral oxygen supply. By adjusting treatment aggressively according to this individualized monitoring data, clinical outcome may improve [1)].

Yagi et al. monitored CBO in 20 patients with cardiac arrest by NIRS. On the arrival of patients at the emergency department, the attending physician immediately assessed whether the patient was eligible for this study after conventional advanced life support and, if eligible, measured CBO in the frontal lobe by NIRS. They found that in all patients, the cerebral blood flow waveform was in synchrony with the chest compressions. Moreover, the tissue oxygenation index increased following cardiopulmonary bypass (CPB) in patients undergoing CPB, including one patient in whom CBO was monitored using the NIRO-CCR1. In addition, although the NIRO-CCR1 could display the pulse rate (Tempo) in real-time, Tempo was not always detected, despite the detection of the cerebral blood flow waveform. This suggested that chest compressions may not have been effective, indicating that the NIRO-CCR1 also seems useful to assess the quality of CPR. This study suggests that the NIRO-CCR1 can measure CBO during CPR in patients with cardiac arrest as effectively as the NIRO-200NX; in addition, the new NIRO-CCR1 maybe even more useful, especially in prehospital fields (e.g. in an ambulance), since it is easy to carry [2)].

1)
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2)
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