

Near-infrared spectroscopy (NIRS) for patients with minor or moderate head trauma in the ED

Azzouz Neji (1); Yordanov Youri, MD (1)(2); Kalpokdjian Aurélie, MD (1); Sobotka Jennifer (1); Pourriat Jean-Louis, MD, PhD (1)(2)

- 1. Emergency Department, EMS, and Forensic Emergency Medicine - Hôtel-Dieu – Assistance Publique des Hôpitaux de Paris – PARIS**
- 2. Université René Descartes – Faculté de Médecine de Paris 5**

Introduction

Cerebral oximetry (rSO₂) is used in cardio-paediatric and neurosurgery, as part of a multimodal monitoring system. It can be measured by non-invasive equipment based on near-infrared spectroscopy technology (NIRS). It has been used to predict intracranial subdural and epidural hematomas in severe head trauma patients. Our main aim was to evaluate the use of an rSO₂ measurement device in minor to moderate head trauma patients in the emergency department.

Methods

We conducted a one-month prospective, monocentric, single-blind study in an urban emergency department in France. Every patient, presenting to the ED with a head trauma, was included. For all patients the triage process was conducted according to the department protocols, and the rSO₂ was measured using the NONIN 7600 device. 2 probes were applied on the forehead of the patients, these probes giving us 2 rSO₂ values. Those values were concealed and unknown by the EM physician in charge of the patient.

Results

We included 70 patients in one month. Mean age was 49,8 years, and the sex ratio was 2/1 (47 males, 23 females). 3% were transferred to a neurosurgery department, 12% were admitted for more than 24h, 46% had a 6 hours surveillance then were discharged and 39% were immediately discharged. 31% of the patient had a CT scan, based on the physicians' evaluation. The mean right rSO₂ was 68,1% (+/- 12,5%), the left was 70,6% (+/- 10,6%). Mean right-left rSO₂ difference was 9,2% (+/- 12,2%). We didn't find any significant correlation between the NIRS values and patients' 24 hours outcome, nor radiological findings (all CT scan, except one, were normal). But the right-left rSO₂ difference was significantly correlated with the CT scan decision (p=0,005).

Conclusion

The NONIN 7600 is a quick and easy to use device that we used to measure the rSO₂ for minor and mild head trauma patients. We found a significant correlation between the right-left rSO₂ and the CT scan decision, but none with patients' clinical or radiological outcome. We strongly believe that a much more powerful study could unveil a link between rSO₂ and brain injury in the ED. That study could eventually define rSO₂ limit values associated with brain injury and intracranial hematomas.