

Abstract details

Assessment equivalence between pupillometry indices NP_i and QP_i in acute brain injury patients

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Introduction

Pupillary examination, in particular pupillary reactivity to light, is fundamental for the monitoring and daily follow-up in acute brain injury patients in intensive care units (ICU). As a matter of fact, intracranial pressure monitoring and pupillometry measurement are part of daily care of brain-injured patients in some ICUs.

Pupillometric indices combining different parameters of the pupillary light reflex has been described that has predictive value for intracranial hypertension and neurologic outcome, depending on the device, these two indices are known as NP_i, proposed by Neuroptics, and QP_i, proposed by IdMed, based on a statistical classification of the amplitude of the photomotor reflex.

Objectives

The objective of this pilot study is to explore whether the QP_i is equivalent to the NP_i in patients with acute brain injury (TBI, SAH and ICH and post-cardiac arrest hypoxic-ischaemic encephalopathy).

To assess whether the parameters exploring the pupillary reactivity to light of both devices are equivalent.

Methods

A prospective, observational, pilot study was conducted in patients with acute brain injury (TBI, SAH and ICH and post-cardiac arrest hypoxic-ischaemic encephalopathy), consecutively admitted to our Intensive Care Department. All patients were in coma, with deep sedation. Isolated pupillometry measurements were performed sequentially by two investigators, blinded to the comparative examination, with two different pupillometers (NP_i-200 and Neurolight). Demographic, clinical, and therapeutic variables were collected for all patients during ICU admission. A third researcher analyzed the results, using IBM SPSS Statistics, version 27.0. The percentage of observed agreement was calculated for all the categorical and dichotomous variables. The reproducibility of all measurements was evaluated by calculating the unweighted Cohen's kappa coefficient (κ) for measurements with dichotomous results and the weighted Cohen's kappa coefficient for measurements with multiple, ordinal answer options. All κ coefficients and ICC values were interpreted according to Landis and Koch; values between 0.01 and 0.20 were considered to indicate slight agreement, values between 0.21 and 0.40 to indicate fair agreement, values between 0.41 and 0.60 to indicate moderate agreement, values between 0.61 and 0.80 to indicate substantial agreement, and values between 0.81 and 1.00 to indicate almost perfect agreement.

Results

From December 2022 to March 2023, in our study, we included 53 patients (ICH 43%; SAH 32%; Post-cardiac arrest 15%; TBI 10%) and performed 86 measurements. Among them, 60% were male, with mean age 61 (+/- 13), the mean GCS at admission was 7. We recorded 21 ICP measurements, with mean ICP of 10 mmHg.

Among pupillometry indices, we found a strong correlation between QP_i and NP_i (k 0.83; p = <.001), as well with pupillary light reflex variables (Var Neurolight and CH NP_i-200, respectively) with substantial agreement (k 0.81; p = <.001).

Conclusions

In our pilot study, we found a strong (substantial) correlation between NP_i and QP_i, as well with pupillary light reflex variables (Var and CH), which nowadays are considered the most robust variables to assess neurologic outcome, based on NP_i-200 studies.

Forward studies are needed to determine the equivalence among the two pupillometers to assess the neurologic outcome among acute brain injury patients with different etiologies.