

Abstract ESICM LIVES 2017

Topic: 4.1. Cardiac arrest clinical studies

Title: AUTOMATED PUPILLOMETRY FOR EARLY PROGNOSTICATION IN COMATOSE CARDIAC ARREST PATIENTS: PRELIMINARY RESULTS OF A MULTICENTER STUDY.

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Text: **INTRODUCTION.** Bilateral absence of pupillary reactivity 3 days after cardiac arrest (CA) predicts poor outcome, however prognostic accuracy of standard examination may be lower when performed at an earlier phase and is limited by lack of a quantitative tool.

OBJECTIVES. To examine the accuracy of quantitative pupillometry (NPi-200[®] automated infrared pupillometer, NeurOptics, Irvine, CA, USA) in predicting neurological recovery of post-CA coma and to compare its prognostic value to that of standard qualitative neurological examination.

METHODS. A prospective multicentre study was conducted amongst 10 European academic hospitals (clinicaltrials.gov NCT02607878). Blinded pupillometry tests (Neurological Pupil index [NPI] and % of Pupillary Light Reactivity [PLR]) were performed in parallel with standard neurological examination (motor response [GCS-M] and brainstem reflexes [BSR]) at day 1 and 2 after CA. Outcome was assessed at 3 months using the Cerebral Performance Categories (CPC) score; poor outcome was defined as CPC 4 (vegetative state) and 5 (death). Statistical analyses were performed by an independent statistician.

RESULTS. From March 2015 to October 2016, 371 consecutive patients were included in this ongoing study. On day 1, patients with poor outcome (n=206; 56%) had lower NPi (3.6 ± 1.5 vs. 4.5 ± 0.3 , $p < 0.001$) and lower PLR (13 [8, 19] vs. 20% [17, 26], $p < 0.001$) than patients with good outcome (n=165; 44%). Similar results were found on day 2. Low NPi (< 3) and PLR ($< 13\%$) had higher specificity and positive predictive value for predicting 3-month poor outcome than absent BSR and GCS-M, on both day 1 and day 2 after CA (**Table 1**).

Time after CA	Test	Specificity, %	Sensitivity, %	PP value, %	NP value, %
Day 1	Quantitative PLR, %	92.7 (87.3-96.3)	50.5 (43.2-57.8)	89.7 (82.3-94.8)	59.7 (53.1-66)
	Quantitative NPi, %	97.5 (93.6-99.3)	18.7 (14.4-25.9)	90.7 (77.9-97.4)	49 (43.4-54.7)
	Absent brainstem reflexes	65.4 (56.8-73.4)	55.6 (46.8-64.1)	61.5 (52.2-70.1)	59.7 (51.4-67.7)
	Absent motor response	17 (11.2-24.3)	93.6 (88.6-96.9)	55.7 (49.5-61.8)	70.6 (52.5-84.9)
Day 2	Quantitative PLR, %	93.1 (86.4-97.2)	39.3 (31.5-47.6)	89.4 (79.4-95.6)	51.1 (43.7-58.5)
	Quantitative NPi, %	99.1 (95-100)	23.6 (17.2-31)	97.4 (86.2-99.9)	47.6 (41-54.3)
	Absent brainstem reflexes	86.7 (78.4-92.7)	43.3 (34.3-52.7)	80 (68.2-88.9)	55.6 (47.3-63.6)
	Absent motor response	63.8 (53.9-73)	77.3 (69.5-83.9)	74.1 (66.3-81)	67.7 (57.5-76.7)

[Prognostic accuracy for poor outcome at 3 months.]

CONCLUSIONS. These findings indicate that quantitative pupillometry had higher accuracy than standard qualitative neurological examination in predicting poor outcome in the early ICU phase after CA. Automated infrared pupillometry may be integrated in multimodal algorithms for coma prognostication following CA.

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