PROGNOSTIC VALUE OF SSEPS AND EEG IN THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST

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Purpose of the Study

Post-anoxic coma after cardiac arrest (CA) has become a social and ethical problem in a subset of comatous survivors[1]. We undertook this study to verify the prognostic value of the N20 amplitude in evoked somatosensory potential (SSEPs) and EEG response to painful stimulation (EEG)[2]. Both have been evaluated at 37°C and correlated to neurological outcome, assessed by Cerebral Performance Category Scale (CPC) at 6 months phone - follow up.

Materials and Methods

In this retrospective, non randomized analysis, 51 patients were treated with TH after CA. EEG and SSEPs datahave been collectedpaying attention to the presence of painful response to EEG, to the bilateral presence of N20 wave of SSEPs and to the N20 amplitude.The main object was to understand if there is any relationship between neurological outcome and EEG and SSEPs results in terms of specificity and predictability. Neurological outcome was evaluated after 6 months using CPC by phone interview.
EEG and SSEPs are commonly used in neurological assessment of TH patients. EEG is used to identify any epileptic activity and a cortical response after painful stimulation. SSEPs are performed to test the integrity of nervous pathways[3]. N20 wave defines the cortical response. We have considered the results of the test at 37°C, 48 hours after starting TH. It has been considered as a good neurological outcome at 6 months if CPC was≤2.

Results and Discussion

We considered whether the presence of response after painful stimulation on EEG performed at 37°C could be correlated with a good neurological outcome (CPC ≤2).

	CPC≤2	CPC≥3
	PoS	NEG
PoS	12	4
NEG	15	20

Table 1 shows how the presence of response is strictly correlated with a CPC ≤2 in term of specificity (83%) and predictability (75%).
Moreover, it's been focused on the relationship between N20 average and neurological outcome. Assuming that N20 amplitude is directly related to the activity of nervous pathways, it could be considered as an indirectly marker of cortical healthy neurons activity and neurological integrity. Obtained through the ROC analysis, the average N20 cut off was of |0,82|μVand by comparing the sensibility and specificity of a good outcome, it's highly correlated with a good recovery.

	CPC≤2	CPC≥3
	PoS	NEG
PoS	18	3
NEG	9	21

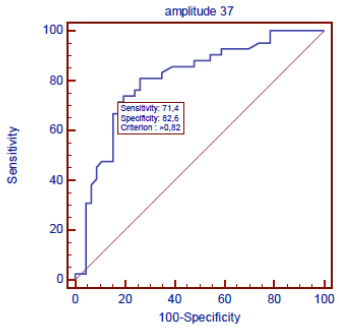

Table 2 shows that the average N20 is the best single marker of a good CPC in terms ofspecificity (87%) and predictability (86%).
Imagine 1 shows the ROC analysis.

Finally it has been analysed the predictability of the association of two different parameters of neurological outcome: the response after painful stimulation on EEG and the amplitude of N20 in normothermia, with a good neurological outcome:

		CPC≤2	CPC≥3
EEG/N20 amplitude		ampiezza / EEG + con outcome +	ampiezza / EEG - con outcome -
	Amplitude / EEG +outcome +	7	2
	Amplitude / EEG - con outcome -	4	19

In Table 3, considering these data, when EEG response and N20 amplitude are concordant, neurological outcome could be assessed with a Specificity of 90% and Predictability of 78%.
TH is considered an effective method to improve neurological outcome, but it doesn't guarantee a complete neurological recovery.

Conclusions

This study, with the limitation of sample size, demonstrates that it's possible to predict a good neurological outcome at 48 hours by using simple tests, such as EEG and SSEPs, usually performed in according to recent guidelines for TH management.
Observation of the AUC of N20 amplitude, said that it is the best independent predictor value of a good neurological outcome when it is ≥ |0,82|μV.
If associated with the presence of an EEG response after a painful stimuli it reaches values of absolute certainty in predicting a good neurological recovery.

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