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Poor neurologic outcomes after cardiac arrest; a spectrum with individual implications☆

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Outcomes assessment

Dear Sir,

We read the case report published by Becker et al. of a cardiac arrest (CA) survivor who had a late neurological recovery despite poor prognostic markers [1]. While we agree that this is a fascinating case which highlights the complexity of neurological recovery and the shortcomings of current neuroprognostication practices in hypoxic–ischemic encephalopathy (HIE), we disagree that this was a "miss in prognostication."

On admission, prior to sedation, the patient was noted to withdraw from pain, suggesting a less severe initial insult [2]. At 48 h, he had absent vestibular–ocular, gag, and corneal reflexes; however, pupillary reactivity re-emerged. Absence of brainstem reflexes at 48 h combined with motor GCS ≤2 after rewarming has been shown to predict Cerebral Performance Category scores (CPC) 3–5 with a positive predictive value of 100%. However, the studies pooled in this meta-analysis were contaminated by withdrawal of life-sustaining therapies (WLST) and subjected to a self-fulfilling prophecy bias [3]. While absent pupillary light reflexes predict poor outcome, this finding within 72 h from CA has lower specificity if therapeutic hypothermia is employed [3]. Recently published international guidelines have updated the recommendations regarding timing of neurological assessments and recommended caution when interpreting early examination findings, underscoring that absence of good neurological function at 48–72 h does *not* rule out subsequent awakening [4–6]. Additionally, the reported patient had post-anoxic status epilepticus, which is associated with a high mortality. However, 3–7% of patients may regain consciousness once this is treated, particularly in the setting of a reactive and continuous encephalographic (EEG) background [8–10]. Nonetheless, the presence of brainstem reflexes, N20 peaks on somatosensory evoked potentials, and preserved reactivity are helpful in identifying survivors with a potential to regain consciousness, but not necessarily regain independence [8]. Based on the above findings, predicting a poor prognosis (CPC 3–5) would be consistent with current national and international guidelines [4,6,11,12]. It would be a "miss in prognostication" if this patient had not only regained consciousness, but also become independent with daily living activities (CPC 1–2). Although a CPC score was not assigned in the reported case, he would likely be classified as CPC 3 given the extent of cognitive deficits, traditionally considered a poor outcome in the CA literature. The natural history of HIE, unexposed to WLST, is unknown. Landmark CA studies suggest a bimodal distribution of outcomes with the highest proportion of patients falling into extremes: CPC 1 and CPC 5. Likely due to perceived poor neurological prognosis and subsequent WLST, there are relatively few cases achieving a CPC 3, a broad category of deficits with varying severity, often reported as less than 10% of survivors [13]. There is no clear consensus among practitioners regarding the clinical significance of CPC 3 other than awakening as demonstrated by a survey of European Society of Intensive Care Medicine members: 58% of survey respondents defined poor outcome as CPC category 3–5, while 39% used CPC category 4–5 [14]. We also must recognize that patients' families may have a similar divergence regarding what degree of clinical recovery is acceptable. It is conceivable that an elderly patient may accept some loss of independence, while a younger patient may find this unacceptable. The CPC score provides only a broad outcome measure, however, a novel extended approach, the CPC-E, explores performance over 10 functional domains and, if used in further prospective CA studies, holds promise in providing more detailed functional outcomes [15].

This case also highlights the potential for late recovery, beyond the 3–11-day range seen in the "late awakeners" group, which occurs more often in survivors of older age, those with renal impairment, and those treated with therapeutic hypothermia [16–18]. Early WLST due to perceived poor neurological outcomes often limits the evaluation of late recovery. Moreover, we do not fully understand the significance of prolonged sedation and anesthetic use in the setting of hypothermia; this certainly had some impact in the clinical course of this case.

In summary, our current prognostication practices differentiate between two groups, those who will regain independence (CPC 1–2) and those who will die or remain severely disabled (CPC 3–5). This case highlights our knowledge gaps and the importance of using a functional outcome assessment (CPC-E) in order to determine those who can make a meaningful recovery. Knowledge of the natural history of CA recovery, untainted by WLST, is crucial to understand each patient's trajectory, and to accurately counsel family members.

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☆ Letter to the Editor regarding: "A major miss in prognostication after cardiac arrest: Burst suppression and brain healing".

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