

ANSWER TO PHOTO QUIZ

Brain activity in cardiac arrest

Keywords - continuous EEG monitoring, cardiac arrest, resuscitation, hypoxic-ischemic brain injury

Diagnosis

Initially, the EEG showed a continuous EEG pattern and on the co-registered ECG a normal sinus rhythm was seen. The ECG pattern suddenly changed to ventricular fibrillation, after which the EEG pattern changed gradually. This slowed down and became isoelectric after 26 seconds. When chest compressions were started this led to considerable disturbance of the EEG signal. Cardiopulmonary resuscitation was successful and the patient made a good recovery. He was discharged to the cardiology ward with short-term memory impairment that recovered over time.

This EEG registration clearly shows that brain cells are extremely susceptible to hypoxic-ischaemic injury. The main reason for this phenomenon is the lack of energy resources within the brain cells. Already after several seconds a gradual slowing of the EEG pattern occurs, progressing to an isoelectric EEG within 30 seconds. Patients admitted to the ICU after cardiac arrest often recover heart function. Other organs, such as kidneys and liver, also endure the period of anoxaemia with relatively little damage. The brain is often severely injured leading to persisting coma. Especially a delay in starting basic or advanced life support is one of the main factors associated with poor outcome.^[1]

In many ICUs patients admitted after cardiac arrest are currently monitored with continuous electroencephalography. This technique allows monitoring of the evolution of EEG patterns over time.^[2] In the first few hours after admission an isoelectric or low voltage EEG can often be found which slowly improves when brain function recovers. When a continuous pattern is found 12 hours after cardiac arrest the brain damage is not severe and a good outcome can be expected.^[3] On the other hand, if after 24 hours the EEG pattern has not recovered to a continuous pattern this is indicative of severe brain injury and a poor outcome is highly likely.

References

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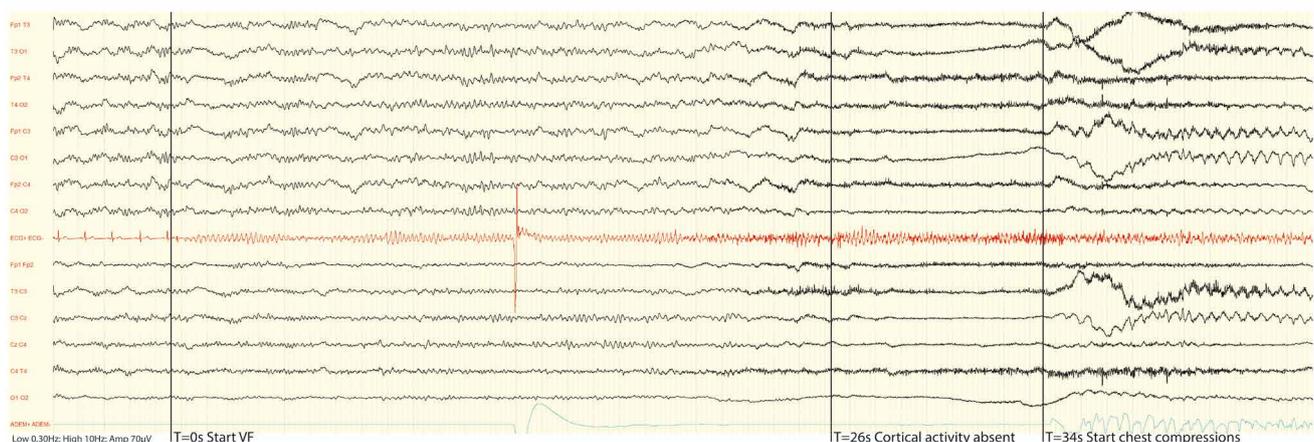


Figure 2. Suddenly changing EEG trace of a patient after successful resuscitation.