

# EEG Monitoring: Abnormalities in COVID-19 Patients on Ventilators

A high percentage of intensive-care COVID-19 patients on ventilators experience neurological symptoms.

Literature reports indicate that specific requirements apply to the sedation of patients with severe COVID-19. As a bedside monitoring procedure, EEG monitoring (EEG: electroencephalogram) is particularly significant in patients with COVID-19, especially given that procedures such as routine EEG, CT and MRI are due to the contagiousness of the virus only available to a limited extent, and possibly not at all. Important applications for EEG monitoring in intensive-care patients include controlling the depth of sedation and also monitoring of therapy for seizures.

## Epileptiform EEG Activity

An unusually high proportion of patients with COVID-19 displays epileptiform activity in the EEG during the course of treatment. Continuous EEG assists with dosing antiepileptic drugs and can also help make decisions regarding the combination of different antiepileptic drugs. If the inha-

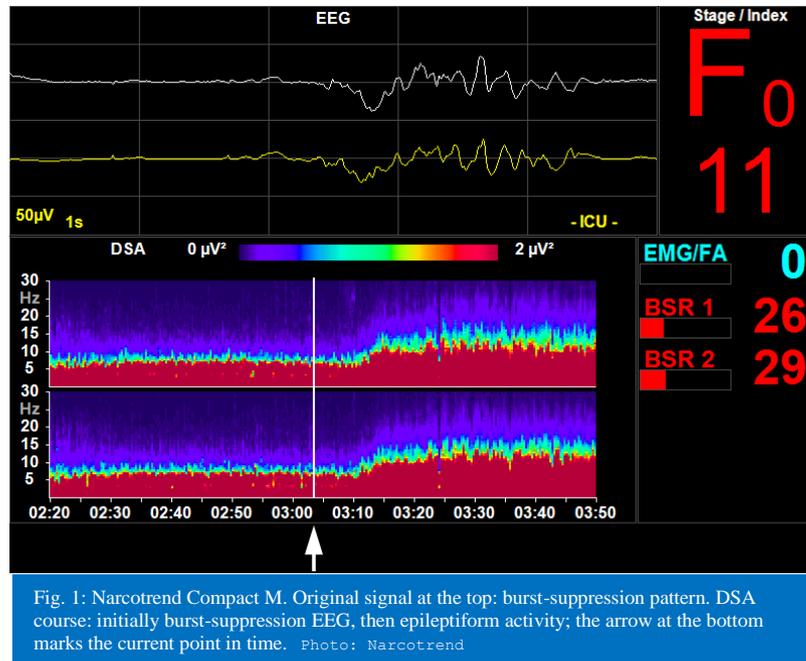


Fig. 1: Narcotrend Compact M. Original signal at the top: burst-suppression pattern. DSA course: initially burst-suppression EEG, then epileptiform activity; the arrow at the bottom marks the current point in time. Photo: Narcotrend

lation anesthetic sevoflurane is used for sedation, then it must be considered that sevoflurane may induce epileptiform EEG activity in children and also adults.

Especially given that increased seizure propensity and incidence have been observed in COVID-19 patients, special care is required when using sevoflurane. As per the S1 recommendations for intensive-care therapy for patients with COVID-19, it should be preferentially aimed for intubation

and invasive ventilation in patients experiencing severe hypoxemia

PEEP ventilation, prone position, relaxation and the use of ECMO are listed as potential measures.

Deep sedation may be required to allow adequate ventilation. Both IV hypnotics and inhalation anesthetics are used for sedation. Sensory perceptions must be sufficiently blocked in the patients, at the same time avoiding too deep sedation.

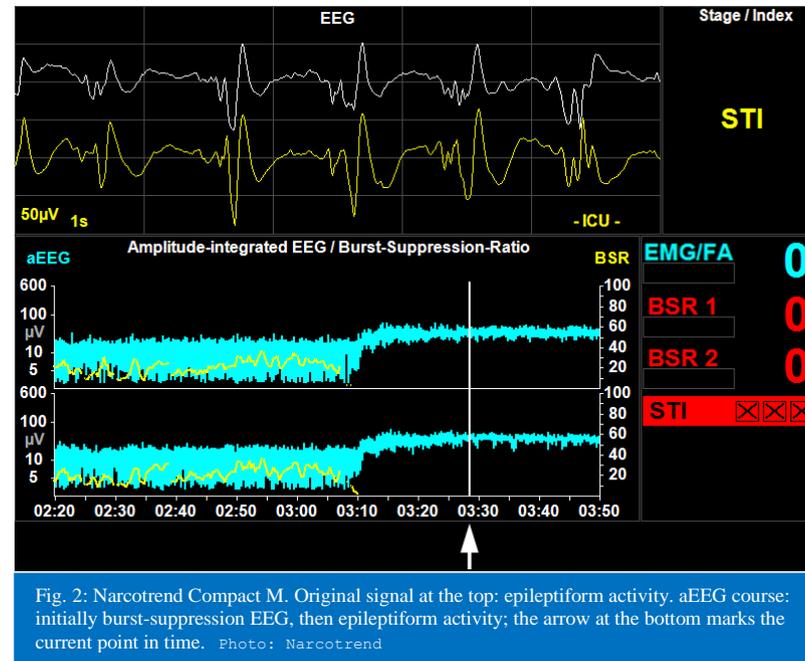


Fig. 2: Narcotrend Compact M. Original signal at the top: epileptiform activity. aEEG course: initially burst-suppression EEG, then epileptiform activity; the arrow at the bottom marks the current point in time. Photo: Narcotrend

If combinations of various substances are administered, the EEG helps assess the effects resulting from them and avoid too deep and too flat sedation stages.

Some COVID-19 patients must be sedated for periods of multiple weeks. Individual overdoses of sedatives should be avoided. This helps by not unnecessarily prolonging the stay in the intensive-care unit as well as by minimizing the probability of secondary complications.

## Use of EEG Monitoring

Figures 1 and 2 show the EEG of a patient who initially during the course of sedation displayed a burst-suppression EEG (Fig. 1), which later developed into epileptiform activity (Fig. 2). From approx. 3:10am on the time axis, both the DSA representation (Fig. 1) and the amplitude-integrated EEG (aEEG) clearly show the transition to an EEG with epileptiform activity (Fig. 2).

The EEG signal has been automatically assessed, initially as sedation stage F<sub>0</sub> (scale from A = awake to F = very deep sedation); later on, sharp epileptiform activity was recognized, triggering the assessment as STI (Sharp Transient Intensity).

## Narcotrend Compact M as Special ICU Version

For EEG monitoring of intensive-care patients, the EEG monitor Narcotrend-Compact M is available in a special ICU Version. Either 1 or 2 EEG channels can be recorded, and the electrodes can be flexibly positioned. The EEG signal is automatically interpreted with view to depth of sedation on the one hand, and on the other hand the recognition of epileptiform EEG activity is supported by use of the parameter STI (Sharp Transient Intensity). The intensive-care EEG monitoring can be coded and accounted for via OPS 8-920 (2-channel recordings, > 24 hours). For intraoperative EEG monitoring, the OR version of the Narcotrend-Compact M can be used. What sets both versions of the Narcotrend-Compact M apart is that they perform EEG assessments adjusted for age, from newborns to old age.

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