

EEG Monitoring during Surgical Planning of Neurological Disorders

Rose Bentley*

Department of Neurological Disorders, Olabisi Onabanjo University, Ago-Iwoye, Nigeria

ABOUT THE STUDY

The Electroencephalogram (EEG) is a vital neurophysiological tool that allows us to capture and analyze the electrical activity of the brain. This non-invasive procedure has revolutionized the field of neuroscience by providing valuable insights into brain function and helping diagnose various neurological disorders.

Principles of EEG

EEG is based on the principle that the electrical activity of the brain can be detected and recorded through electrodes placed on the scalp. Neurons communicate with each other through electrical impulses, creating intricate patterns of brain waves. These brain waves can be categorized into different frequency bands, including delta, theta, alpha, beta, and gamma waves, each associated with specific brain states and functions.

EEG equipment and procedure

To record EEG signals, electrodes are strategically placed on the scalp using a special conductive gel or paste to ensure good electrical contact. These electrodes are connected to an amplifier that amplifies the weak electrical signals produced by the brain. The amplified signals are then filtered, digitized, and displayed as waveforms on a computer screen.

The procedure itself is non-invasive and painless, making it safe for individuals of all ages. The patient is typically instructed to relax, remain still, and, in some cases, perform specific tasks or stimuli to elicit certain brain responses. EEG recordings can be obtained during wakefulness, sleep, or even under certain sedation states.

Clinical applications of EEG

EEG has a wide range of clinical applications. In the field of neurology, it is extensively used to diagnose and monitor various neurological disorders, such as epilepsy, brain tumors, sleep disorders, and encephalopathies. EEG findings, combined with clinical observations, help healthcare professionals determine the location and severity of brain abnormalities, guide treatment decisions, and assess response to therapy.

In epilepsy, EEG plays a pivotal role in capturing and characterizing seizure activity. It aids in identifying the type of seizure, determining the seizure focus, and guiding the selection of appropriate anti-seizure medications. Long-term EEG monitoring, known as video EEG monitoring, is crucial in capturing elusive seizure events and providing valuable insights for surgical planning in refractory epilepsy cases.

EEG also has applications in the field of sleep medicine. Sleep disorders, such as sleep apnea, narcolepsy, and parasomnias, can be assessed using EEG recordings during sleep. This helps in evaluating sleep architecture, identifying abnormal brain patterns, and guiding treatment strategies.

Research applications of EEG

EEG is not limited to clinical applications; it is also extensively used in research settings to investigate brain function and cognitive processes. It allows researchers to study attention, memory, perception, and other cognitive phenomena by examining the brain's electrical activity during specific tasks or stimuli. EEG recordings provide valuable insights into brain dynamics and connectivity, helping unravel the mysteries of the human mind.

Advancements in EEG technology

Over the years, EEG technology has advanced significantly. The introduction of digital EEG systems and high-density electrode arrays has enhanced the spatial and temporal resolution of recordings. Additionally, sophisticated signal processing techniques and machine learning algorithms have been developed to extract meaningful information from EEG data. These advancements have opened new avenues for personalized medicine, brain-computer interfaces, and neurofeedback applications, paving the way for exciting developments in the field of neuroscience.

CONCLUSION

Electroencephalogram (EEG) is a powerful tool that allows us to delve into the inner workings of the human brain. By capturing and analyzing the electrical activity of the brain, EEG has become instrumental in diagnosing neurological disorders,

Correspondence to: Rose Bentley, Department of Neurological Disorders, Olabisi Onabanjo University, Ago-Iwoye, Nigeria, E-mail: bentrose455@gmail.com

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understanding brain function, and advancing neuroscience research. Its non-invasive nature, combined with its ability to provide real-time information, makes EEG a valuable asset in clinical and research settings. As technology continues to evolve,

EEG holds the promise of further discoveries and innovations, offering a glimpse into the intricate complexities of the human mind and unlocking new possibilities for diagnosis, treatment, and our overall understanding of the brain.