FOUR YEARS EXPERIENCE IN USING AMPLITUDE INTEGRATED ELECTROENCEPHALOGRAPHY IN DAILY CLINICAL PRACTICE OF NEONATAL INTENSIVE CARE UNITS

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Introduction

Amplitude-integrated electroencephalography (aEEG) is a bedside, non-invasive, and simplified method of continuous neuromonitoring that allows the assessment of brain activity and function. Newer equipment can associate aEEG with raw EEG traces and video imaging (video aEEG/EEG) leading to a better accuracy. Neuromonitoring with video aEEG/EEG has shown to be useful in neonatal intensive care units (NICUs) since precise evaluation and early diagnosis of brain injury is important for accurate treatment and neurological impairment prevention.

Objective

To describe video aEEG/EEG findings in high-risk newborns.

Methods

Records of all infants monitored with three-channel video aEEG/EEG in a group of 5 hospitals from July/2017 to June/2021 were retrospectively evaluated. Bedside clinicians, guided by institutional protocol, defined the indication of neuromonitoring clinically. Indication of monitored infants, aEEG background activity, sleep-wake cycle (SWC), and seizures were evaluated. All exams were remotely accessed in real time by 4 experienced readers.

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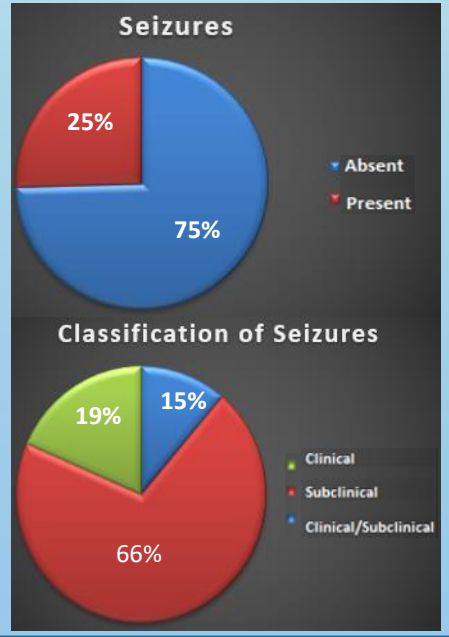
Results

687 infants were included in this study with a total of 34,172 monitoring hours. 385(57%) were male and 481(75%) were born by C-section. Gestational age varied from 22 to 42 weeks and birth weight from 360g to 4880g. Most common diagnosis for monitoring indications were suspected seizures (326;20%) moderate and severe HIE (74;11%), previous seizures (65;9%), mild HIE/neonatal anoxia (64;9%), and congenital heart disease (52;8%). Pathological background activity was found in 210(31%) of monitored infants, and SWC was absent in 417(61%). Seizures were found in 175(25%) infants, being 66% subclinical, 19% clinical, and 15% clinical followed by subclinical (Figures 1). The incidence of alterations in neuromonitoring was greater when evaluating specific groups of diagnosis (Table 1).

TABLE 1: Neuromonitoring alterations according to in diagnosis.

DIAGNOSIS	PATHOLOGICAL BACKGROUND	SEIZURES	SWC ABSENCE
Suspected Seizures (n=326)	21%	18%	47%
Moderate and Severe HIE (n=74)	68%	57%	50%
Previous Seizures (n=65)	40%	38%	62%
Mild HIE/Neonatal Anoxia (n=64)	27%	22%	39%
Congenital Heart Disease (n=52)	21%	19%	71%
Hemodynamic/Ventilatory Instability (n=26)	50%	19%	55%
Extreme Prematurity (n=12)	33%	25%	69%
Severe Sepsis or CNS Infection (n=11)	27%	36%	43%
Severe Intracranial Hemorrhage (n=6)	33%	33%	61%
Others (n=31)	23%	23%	35%

FIGURE 1: Presence and classification of seizures .



Conclusion

Implementation of video aEEG/EEG accessed remotely by experienced users was an especially useful bedside tool to evaluate real time brain function, placing a great role on early diagnosis and treatment, potentially improving outcomes. Pathological background activity and subclinical seizures were frequent in the studied group. Neuromonitoring may be a very suitable strategy for prevention of brain injury in high-risk newborns in many clinical situations.