INTRODUCTION
Reliable classification of neonatal seizures remains controversial but is a key tool for research and clinical purposes. Currently used classification systems include the following:

• Volpe (1989, 2001) with an emphasis on clinical criteria
• Mizrahi and Kellaway (1987, 1998) with emphasis on origin and including electrographic seizures
• New ILAE organisation of seizures (Berg et al, 2010) which in contrast to previous ILAE classification includes neonatal seizures but without consideration of their specificities

In this study we evaluate these classification systems on the basis of a retrospective analysis.

METHOD
Infants were identified from the EEG data base at Great Ormond Street Hospital, London, UK, who had seizures captured on video-EEG between from 2005-2014 and were either < 28 days of chronological age (term infants) or <44 weeks post-conceptional age (PCA - preterm infants).

Recordings were assessed for seizure frequency, duration and grouped into the following:
(I) electroclinical, (II) electrographic and (III) clinical-only.

The three current classification systems were used to characterize seizures and their accuracy was assessed. Where available demographic data were collected regarding comorbidities, current medications and seizure aetiology.

RESULTS

• Patient characteristics: 85 patients
  • 53 term: mean chronological age 15 days (range 1-28 days)
  • 21 preterm: mean PCA 38 weeks (range 30-43 weeks)
  • 11 no data on gestational age
  • Total of 280 events
  • 151 (54 %) electrographic seizures
  • 80 (29 %) electroclinical seizures
  • 49 (17 %) clinical-only seizures
• Of the 56 new-borns with electrographic seizures 46 (82%) had only electrographic events
• Mean duration was:
  • 114 sec for electroclinical seizures
  • 129 sec for electrographic seizures
  • 13 sec for clinical-only seizures

In the Volpe classification 27% of the events were fully classifiable and 17% were partly classifiable, in the Mizrahi and Kellaway classification 21% of the events were fully classifiable and 73% were partly classifiable and in the ILAE classification 16% were fully classifiable and 17% were partly classifiable.

Electroclinical seizures were predominantly subtle (30/80), generalized tonic (19/80) or focal clonic (18/80) and in the ILAE classification 16% were fully classifiable and 17% were partly classifiable.

Electrographic seizures were predominantly multifocal myoclonic (39/49) or subclinical (6/49).

CONCLUSION
Neonatal seizures were often electrographic and showed a considerable duration, which supports the importance of video-EEG monitoring in neonatal intensive care. A large number of neonates presented without associated clinical seizures and would otherwise be missed.

Clinical only seizures represented a small proportion in our study with predominantly myoclonic movements and a short seizure duration. These movements might in part represent physiologic myoclonic movements.

All three classifications systems could fully classify only up to one third of the seizures. Overall the high proportion of electrographic seizures, the complex seizure semiology and the subtle seizure manifestations in neonates contributed to this result.

Therefore we feel the necessity of a distinct classification system in the neonatal period, which should be based on electro-clinical phenotypes and ideally, reflect pathophysiologic origin.

Table 1: Classifyability of different seizure categories

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Figure 2. Event frequency

Figure 3. Event duration

Figure 4. Classifiability of electroclinical seizures

References


Declaration of Interest:
I hereby declare, that since the 1st of september 2013 i had no commercial, personal or material relationships to industrial companies