



Seizures in Mild Neonatal Encephalopathy and Short-term MRI Outcome

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Background

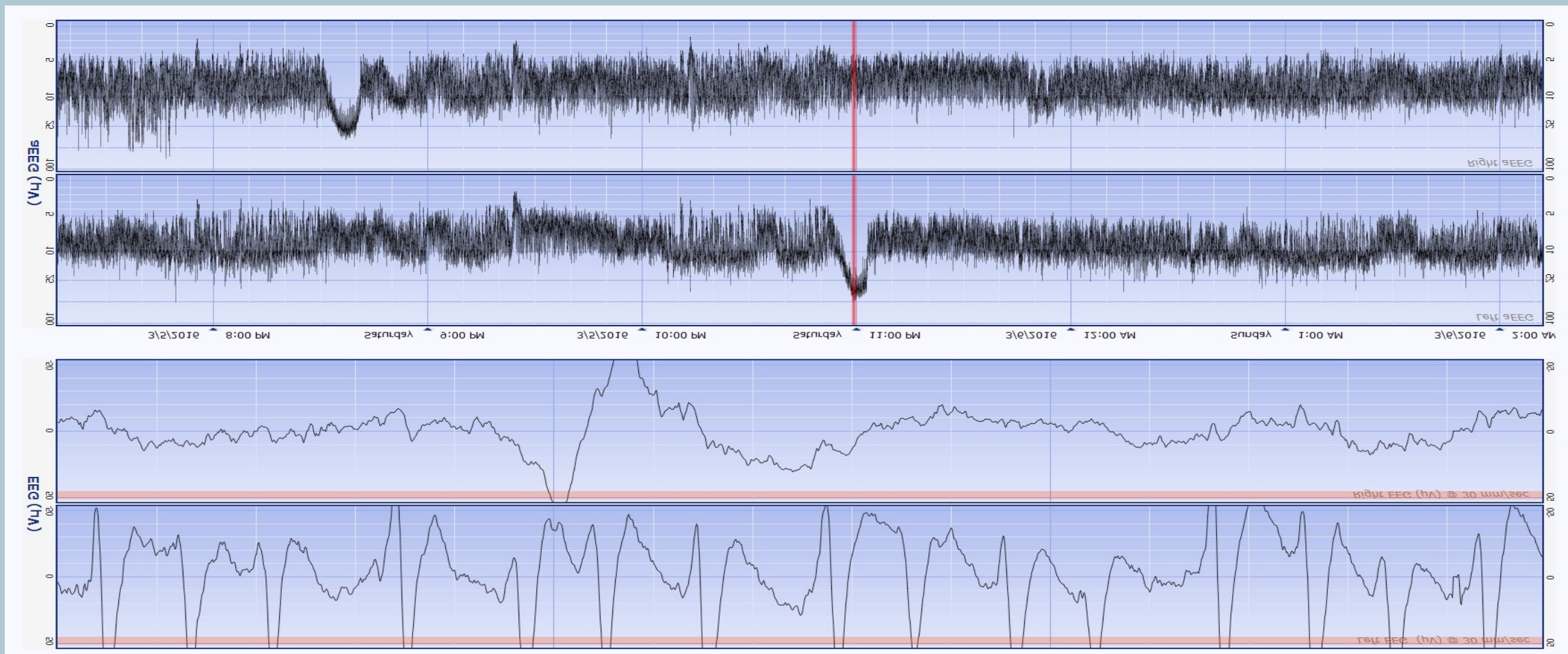
- Many clinical grading systems have been developed to categorize and define Neonatal Encephalopathy (NE)
- Initially designed to serially examine infants over the first week of life, they are now used to inform clinical practice and guide intervention in the first 6 hours after birth
- NE continues to be one of the leading causes of seizures in term neonates and, if present, implies a moderate-severe grade

Aim

This study aims to describe MRI outcomes in infants initially classified as having mild NE who later developed seizures

Methods

- Retrospective cohort study of infants receiving therapeutic hypothermia (TH) for NE at the Brigham and Women’s Hospital, Boston, a tertiary level Neonatal Unit, between 2016-2021
- From this cohort, infants with mild NE with seizures were identified
- EEGs and MRIs were independently graded according to previously published grading systems by 2 Neonatologists with Neurology subspecialisation



Sex	Gestational Age	Birthweight (g)	Perinatal Event	Mode of Delivery	Resus required	Apgar score*	Worst pH/BD/Lactate	Worst Clinical Score	EEG Grade	Seizure Description	Timing of Seizures	Received anti-seizure meds	Discharge Status	Total Weeke score
Male	40.1	2875	No	SVD	IPPV	2/2/6	7.1/11.8/not available	Mild	1	2 central seizures, 5-6 minutes each	Day 1	Yes	Discharged Home	3 (Normal)
Male	40.3	3530	No	EmLSCS	IPPV	3/7/8	7.1/6.7/4.3	Mild	2	29 fronto-temporal seizures, 3-4 minutes each	< 6 hours of age	No	Death	28 (Severe)
Female	38	2710	No	SVD, instrumental	IPPV	3/6/7	7.0/13.4/12.5	Mild	1	1 frontal seizure, 1 minute each	Day 2	No	Discharged Home	0 (Normal)
Female	40.7	2515	No	SVD	Nil	6/7	7.2/11.1/9.6	Mild	1	5 occipital seizures, 5-14 minutes each	Day 1	Yes	Discharged Home	4 (Normal)
Male	38.5	3110	Yes	EmLSCS	Nil	5/8	7.3/7.0/5.2	Mild	2	6 central seizures, 30 minutes each	Day 1	Yes	Discharged Home	15 (Moderate)
Male	38.4	2515	Yes	SVD, instrumental	IPPV	0/3/7	6.8/21.0/17.4	Mild	1	2 frontal seizures, <1 minute each	Day 1	No	Discharged Home	1 (Normal)

Table 1. Clinical description of infants with mild NE who later developed seizures.
SVD, spontaneous vaginal delivery; EmLSCS, emergency lower section caesarean section; IPPV, intermittent positive pressure ventilation. *Apgar scores at 1, 5 and 10 minutes.

Results

- During this time, 291 infants received TH for NE
 - 26 infants (9%) had seizures confirmed electrographically
 - 6 of whom had a clinical diagnosis of mild NE
- 4/6 infants had a normal MRI Brain prior to discharge
- 2 infants had moderate-severe injury on their MRI, both of whom had moderate abnormalities noted on their EEG in the first day
- One of these infants had profound hypoglycaemia and seizures commenced in the first 6 hours after birth. There was concern for an underlying metabolic condition. This infant died on day 11

Conclusions

- In our cohort, 67% (4/6) infants with mild NE who later had seizures had a normal MRI Brain
- Infants with injury noted on their MRI (2/6) had abnormal features on their early EEG
- Presence of seizures does not, by default, imply a poor outcome however further research and long-term follow up is required
- EEG may be helpful in identifying infants at risk