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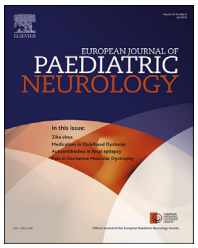

Original article

A change in temporal organization of fidgety movements during the fidgety movement period is common among high risk infants

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ABSTRACT

Aim: General movement assessment (GMA) at 9–20 weeks post-term, can effectively predict cerebral palsy. Our aim was to evaluate intra-individual variability of the temporal organization of fidgety movements (FMs) in high risk infants.

Material and methods: 104 High risk infants (66 males) with at least two video recordings from the FMs period participated. 45 of the infants had GA <28 weeks and/or BW ≤800 g. Mean post-term age at first and second assessments was 11.0 (8–16) and 14.0 (11–17) weeks, respectively, and median time-difference between the assessments was 2.0 (range: three days to six weeks) weeks. Video recordings were analyzed according to Prechtl's GMA.

Results: 33 (32%) Infants were classified differently at first and second assessments. Six infants (6%) changed from normal to abnormal, and 10 (10%) changed from abnormal to normal FMs. Seven of the ten who changed classification from abnormal to normal were born before GA 26 weeks. A change between intermittent and continual, which are both considered normal, was observed in 17 (16%) infants.

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Conclusion: A change in temporal organization of FMs is common in high risk infants. Especially in extremely preterm infants with abnormal FMs, more than one assessment should be performed before long-term prognosis is considered.

1. Introduction

The assessment of general movements (GMs) is a non-invasive, reliable and valid method to predict severe neurological impairments.[1–3] In particular the absence or sporadic occurrence of fidgety movements (FMs), during the fidgety movement's period (9–20 weeks post term age), is highly predictive of cerebral palsy (CP).[4–6] Knowledge of the intra-individual variability of FMs in high risk infants during this period is sparse.[7] However, such knowledge is essential for appropriate prediction of neurological outcome.

Intra-individual variability may be defined as differences in motor development or performance within individuals and between repeated measurements.[8] The intra-individual variability of GMs varies through their natural developmental course, as GMs occur in age specific patterns and change as a result of developmental transformations of the nervous system.[7] The majority of changes in GM quality occur in the transitional period, 6–9 weeks post term age, when the FMs emerge.[7] However, FMs which are characterized by movements with small amplitude and moderate speed of the neck, trunk, and limbs in all directions, does also vary with age, as does the temporal organization of FMs (FMs across time). Initially the FMs occur as isolated events before they gradually increase in frequency until they subside and are replaced by voluntary movements.[7]

Fidgety movements can be classified as either normal or abnormal. Normal FMs are present either intermittently (F+) or in a continual pattern (F++), whereas abnormal FMs are present sporadically (interspersed with long pauses, F+/−), exaggerated with respect to speed and amplitude (Fa), or as absent (F−).[6,7] As absent or only sporadically present FMs are found to be a good predictor of neurological impairment,[6] and accurate classification of the temporal organization of FMs is essential.

The reliability of GM assessment is found to be very good[1,7] however, variability of infants temporal organization of FMs during the time period when normal FMs are considered essential for a normal neurodevelopment, have not been well described in large groups of high risk infants.[9]

The aim of our study was to evaluate intra-individual variability of the temporal organization of FMs in infants with high risk for neurodevelopmental sequelae.

2. Methods

2.1. Participants

Term and preterm born high risk infants, with two video recordings in the fidgety movement's period, were included from a prospective observational study. All infants discharged from two university hospital NICUs between February 2009 and June 2013, were enrolled in a routine follow-up clinic for children with specific risk factors for adverse neurodevelopment. They were classified as high risk infants if they had one or more well-known perinatal risk factors for neurological impairment (Table 1). Infants with congenital malformations that could interfere with their GMs were excluded. The age at assessment was corrected for GA for infants born prematurely.

2.2. General movement assessment

General movement assessment (GMA) is a non-invasive method that estimates the integrity of the infant nervous system by observing the quality of spontaneous movement patterns involving the limbs, neck, and trunk, which emerge over the first few months of life.[5] There is good evidence that lack of normal FMs, normally present at 9–20 weeks post-term,[5] can accurately predict the development of CP in high risk populations.[2,3]

GMA were performed 9–20 weeks post term age, during the fidgety movement's period. The infant's GMs were video recorded using a standardized video set-up consisting of a mattress and a stationary digital video camera (Sanyo VPC HD-200). Recordings were performed according to Prechtl's GMA methodology,[7,9] at least 30 min after feeding and lasted for 5 min during periods of active wakefulness. The infant was lying in supine, wearing a nappy and a white onesie. The temperature in the room was comfortable (24–28 °C) and the infant had enough space to move spontaneously on the mattress. The assessments of FMs were carried out independently by two certified and experienced GM observers (LA and TF). In case of disagreement, a consensus was reached between the observers, based on additional evaluations the same day. The observers did not have knowledge of the

Table 1 – Criteria for neonatal high risk classification.

Birthweight ≤1000 g and/or GA <28 weeks	45
Perinatal arterial stroke	6
Perinatal asphyxia with hypothermia treatment	23
Perinatal asphyxia without hypothermia treatment	7
Others[a]	23
Total	104

[a] Intracranial imaging abnormalities, severe sepsis and/or CNS infection, protracted hypoglycemia, neonatal seizures, syndromes, severe growth restriction, severe pulmonary hypertension and hypoxia.