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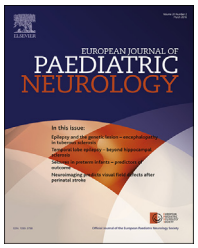

Original article

High prevalence of abnormal motor repertoire at 3 months corrected age in extremely preterm infants

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ABSTRACT

Aims: To compare early motor repertoire between extremely preterm and term-born infants. An association between the motor repertoire and gestational age and birth weight was explored in extremely preterm infants without severe ultrasound abnormalities.
Methods: In a multicentre study, the early motor repertoire of 82 infants born extremely preterm (ELGAN:<28 weeks) and/or with extremely low birth weight (ELBW:<1000 g) and 87 term-born infants were assessed by the "Assessment of Motor Repertoire – 2 to 5 Months" (AMR) which is part of Prechtl's "General Movement Assessment", at 12 weeks post-term age. Fidgety movements were classified as normal if present and abnormal if absent, sporadic or exaggerated. Concurrent motor repertoire was classified as normal if smooth and fluent and abnormal if monotonous, stiff, jerky and/or predominantly fast or slow.
Results: Eight-teen ELBW/ELGAN infants had abnormal fidgety movements (8 absent, 7 sporadic and 3 exaggerated fidgety movements) compared with 2 control infants (OR:12.0; 95%CI:2.7–53.4) and 46 ELBW/ELGAN infants had abnormal concurrent motor repertoire compared with 17 control infants (OR:5.3; 95%CI:2.6–10.5). Almost all detailed aspects of the AMR differed between the groups. Results were the same when three infants with severe ultrasound abnormalities were excluded. In the remaining ELBW/ELGAN infants, there was no association between motor repertoire and gestational age or birth weight.

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Conclusion: ELBW/ELGAN infants had poorer quality of early motor repertoire than term-born infants.The findings were not explained by severe abnormalities on neonatal ultrasound scans and were not correlated to the degree of prematurity. The consequences of these abnormal movement patterns remain to be seen in future follow-up studies.

1. Introduction

Recent advances in perinatal medicine perinatal care have increased survival rates among the most immature infants, but the risk of impaired cognitive and motor outcome remains significant.[1,2] Early prediction of outcome in these infants remains a challenge, and the assessment of general movements developed by Prechtl et al.[3,4] has been shown to be one of the most promising tools to predict cerebral palsy (CP) or normal development in survivors.[3] Abnormal general movements in young infants is also associated with poor cognitive and motor outcome in children born preterm without CP.[5] In order to start early intervention for those with the highest risk of disability, there is a need to develop and improve diagnostic tools.[6]

The General Movements Assessment (GMA) is based on observations of spontaneous movements in normal fetuses,[7] neonates and infants, and has led to a systematic classification defining a set of normal movements for each respective age group.[8] Part of the GMA is the classification of presence or absence of fidgety movements at 9–18 weeks post-term age, which can predict later CP with a high degree of accuracy.[4,9] The "Assessment of Motor Repertoire – 2 to 5 Months" (AMR) is a standardised assessment of general movements,[8,10] also describing the quality and the quantity of the concurrent motor repertoire.[10,11] The concurrent motor repertoire refers to movements which co-occur with fidgety movements and include, among other things: kicking, hand–face contact, hand–hand manipulation, leg lift and fingers fiddling with clothing. The inter-observer reliability of the AMR instrument has been shown to be good.[12]

We have previously shown that an abnormal concurrent motor repertoire, despite present fidgety movements, is associated with an impaired cognitive and motor outcome at 10 years of age in very low birth weight (VLBW) children who did not develop CP.[5] This is in accordance with other studies showing that specific aspects of the concurrent motor repertoire during the fidgety movements period in extremely preterm infants is associated with later adverse motor and cognitive development.[11,13] In addition, as many as half of VLBW children showing the presence of fidgety movements also presented an abnormal concurrent motor repertoire in infancy.[5] However, the distribution of the different items of the AMR in term infants has not been established. In order to improve the diagnostic properties of the AMR for high-risk infants, it is necessary to establish normative data in healthy, term-born infants, and describe possible differences with preterm infants.

The aim of this study was to compare detailed aspects of the early motor repertoire during the fidgety movements' period between extremely preterm infants and healthy, term-born infants. Additionally, we wanted to explore associations between the motor repertoire, gestational age and birth weight in extremely preterm infants without severe abnormalities on neonatal imaging.

2. Material and methods

2.1. Design

The present study was a prospective multicentre cohort study including infants born between Jan. 1st, 2009 and Dec. 31st 2013 at Trondheim University Hospital (hospital 1), and between Jan. 1st, 2009 and Dec. 31st, 2012 at Oslo University Hospital (hospital 2) and at University Hospital of North Norway (hospital 3) in Norway. Inclusion criteria were extremely premature born infants with gestational age <28 weeks (ELGAN) and/or a birth weight <1000 g (ELBW) who had their follow-up at one of the participating university hospitals or a collaborating local hospital. The infants were invited to participate before discharge from their respective Neonatal Intensive Care Units (NICU). All parents that were asked for participation gave their written consent. Infants with syndromes, malformations, major surgery or with other problems which could affect spontaneous movements were excluded from the study. Infants participating in early intervention studies aimed to influence motor and/or cognitive development could not be included in this study.

Table 1 – Clinical characteristics of the study population.

	ELBW/ ELGAN (n = 82)		Control (n = 87)	
	Mean	**(SD)**	**Mean**	**(SD)**
Gestational age (weeks)	26.6	(1.8)	39.6	(1.0)
Birth weight (g)	884	(217)	3689	(400.8)
	n	**(%)**	**n**	**(%)**
Boys	47	(58)	45	(52)
Birthweight ≤10th percentile	22	(33)	4	(5)
Intraventricular hemorrhage grade 1	17	(21)	0	(0)
Intraventricular hemorrhage grade 2	4	(5)	0	(0)
Intraventricular hemorrhage grade ≥ 3[a]	3	(4)	0	(0)
Periventricular leukomalacia grade 1	1	(1)	0	(0)
Bronchopulmonal dysplasia	14	(17)	0	(0)
Treated retinopathy of prematurity	4	(5)	0	(0)

SD = Standard deviation.
ELBW = Extremely low birth weight; <1000 g.
ELGAN = Extremely low gestational age newborn; <28 week.
[a] One infant had intraventricular hemorrhage grade 3 and a cystic periventricular leukomalacia.