Visual impairment in infants with brain lesions: from early detection to early intervention


Background/Objectives: Infants with brain lesions often develop visual deficits. Early diagnosis allows the organization of appropriate follow up and plan of intervention inducing mechanisms of brain plasticity, more active at early age. Although we know that associative visual pathways activate 6-8 weeks after birth, often visual assessment is performed later and, in many countries, it includes evaluation of ophthalmological but not functional aspects.

The aim of the study was: 1) to develop an easy protocol to be used by personnel involved in the care of infants at risk for visual impairment but not specialized in visual function; 2) to verify the possibility to detect visual impairment since the neonatal age.

Design: Longitudinal study

Participants and Setting: Thirty infants with brain lesions, but no ocular pathologies, have completed the follow up so far: 21 were born preterm (8 developed periventricular leukomalacia, 6 hydrocephalus, 7 intraventricular haemorrhage), 9 were born at term age (4 presented focal lesions, 3 diffuse white matter, 2 basal ganglia lesions).

Materials/Methods: Ten Italian Centers were involved in the development of a protocol for the assessment of visual function at neonatal age, at 6 and 12 months. Neonatal assessment included the evaluation of ocular motility, fixing, tracking, reaction to a colored target, discrimination of black/white stripes, attention at distance. This assessment, proposed by Ricci et al. in 2008, has already proved to be feasible in difficult settings, such as the Neonatal Intensive Care Unit. The 6 and 12 months assessment included the evaluation of ocular motility, fixing, tracking, saccadic movements, visual acuity (acuity cards technique), visual fields (kinetic perimetry), visual attention, attention at distance, contrast sensitivity (Hiding Heidy test) and stereopsis (Frisby Stereotest). This assessment takes 10-15 minutes. Training sessions have been organized in order to harmonize modality of assessment among the participating groups.

Results: Neonatal visual assessment identified a visual impairment in 6 infants (4 preterm and 2 term born). At 6 months 12 infants presented abnormal development of visual function; at 12 months the same infants still presented visual impairment. All the infants who presented a visual problem have been included in rehabilitation programs.

Conclusions/Significance: The protocol designed proved to be easy to use even by personnel not used to visual assessment. It was well accepted by infants and parents. At neonatal age it allowed to identify a visual problem when infants were still at the hospital and this made easier to support parents and help them to understand their baby’s special needs and abilities. This improved parent-child relationship. The increased number of infants with visual problems at 6 months could indicate the lack of development of the cortical areas responsible for the visual function. A larger cohort would be useful to better define relationship between site of lesion and impairment of specific visual aspects.