THE ASPHYXIATED NEONATAL THALAMUS: A DIFFUSION TENSOR IMAGING STUDY

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Background and aims: Perinatal asphyxia is an important cause of permanent brain injury in term infants. An important neuroimaging indicator of neurodevelopmental prognosis following perinatal asphyxia is the extent of thalamic involvement. However the different patterns of injury seen within thalamus remain unclear. We used diffusion tensor imaging to study these patterns.

Methods: In this retrospective study, we analysed DTI scans of 24 patients diagnosed with perinatal asphyxia, scanned between day 4-7 after birth. Images were acquired using a GE 1.5 Tesla system. Regions of interest were manually placed in four different thalamic regions (ventrolateral, medial, anterior and posterior region) and four localisations in cortex (prefrontal, parietal (post S1), occipital and temporal). ADC values were calculated using 'DTI-studio'. Pearson's correlation coefficient and a multiple regression analysis were used (SPSS 17.0) to study relations between cortical and thalamic values.

Results: We found significant correlations between prefrontal cortical ADC values and (connected) anterior- and medial thalamic regions. Temporal ADC values were correlated to Posterior thalamic regions. Occipital and parietal cortex showed highest correlation with posterior thalamic regions.

Conclusions: Our study reveals significant correlations between the decrease of ADC values of thalamic nuclei and their anatomically corresponding cortical areas in perinatal asphyxia. These findings help explain different injury patterns seen within the asphyxiated thalamus. Unravelling these thalamic injury patterns using DTI could provide insights needed to improve our prognostication following perinatal asphyxia.