Introduction

Congenital brain malformations occur as a result of embryogenesis impairment and present as an anatomic defect or destructive brain lesion. It is very difficult to make a diagnosis of congenital brain malformation, based on clinical findings, use of MRI is essential in these cases ***(Ozerova, 2009)***.

A child may have numerous brain malformations, frequently accompanied by congenital abnormalities of other organs and systems due to chromosomal balance impairment or noxious exposures during embryogenesis ***(Ozerova, 2009)***.

Exogenous factors as well as hypoxia cause developmental defects of neural tissue, and focal and diffuse brain damage. MRI allows distinguishing of changes that have occurred due to chromosomal abnormalities and due to noxious exogenous factors ***(Ozerova, 2009).***

Infants born at a gestational age (GA) below 32 weeks are prone to diffuse white matter (WM) injury. This may eventually result in damage, underdevelopment and atrophy of the internal capsule and the corpus callosum, Conventional MRI techniques detect white matter (WM) injury and depict features of brain maturation (***De Bruïne et al.,2011).***

Diffusion imaging is a magnetic resonance imaging modality that measures the microscopic molecular motion of water to yield information about brain structure. The technique has been used increasingly in recent years to investigate congenital brain malformations. The technique has been successfully applied to conditions ranging from rare hindbrain malformations, such as horizontal gaze palsy with progressive scoliosis, to conditions that are undetectable using conventional neuroimaging, such as grapheme-color synesthesia***(Wahl and Mukherjee, 2009).***

Though diffusion imaging has already yielded considerable insight into the pathogenesis and clinical features of congenital malformations, recent advances in imaging techniques promise to provide much more extensive knowledge of these conditions in the future ***(Wahl and Mukherjee, 2009).***

Diffusion magnetic resonance (MR) imaging is evolving into a potent tool in the examination of the central nervous system. Although it is often used for the detection of acute ischemia, evaluation of directionality in a diffusion measurement can be useful in white matter, which demonstrates strong diffusion anisotropy. Techniques such as diffusion-tensor imaging offer a glimpse into brain microstructure at a scale that is not easily accessible with other modalities, in some cases improving the detection and characterization of white matter abnormalities. Diffusion.

MR Tractography offers an overall view of brain anatomy, including the degree of connectivity between different regions of the brain ***(Nucifora et al., 2007).***

Diffusion Tensor Imaging (DTI) has been proposed as an additional tool in the assessment of WM injury and may provide more adequate diagnostic and prognostic information in relation to neurological outcome than conventional MR imaging ***(De Bruïne et al., 2011).***

Diffusion tensor imaging (DTI) with fiber tractography (FT) is a recently introduced imaging technique that is unique in providing detailed imaging of white matter (WM) tracts and connectivity between different regions of the brain not easily appreciated with other imaging methods, DTI has been used in recent years to investigate several disease conditions involving WM, including brain malformations ***(Spalice et al., 2010).***