Role of conventional MRI , and Diffusion tensor imaging tractography in evaluation of congenital brain malformation

Essay

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Abbreviations	
AC	Anterior commissure
ACC	Agenesis of corpus callosum
ACR	Anterior region of corona radiate
ADC	Apparent diffusion coefficient
ALIC	Anterior limb of internal capsule
CBT	Corticobulbar tract
CG	Cingulum
CSF	Cerebrospinal fluid
CP	Cerebral peduncle

CST	Corticospinal tract
DCN	Deep cerebellar nuclei
DCSP	Decussation of superior cerebellar peduncle
DTI	Diffusion tensor imaging
EPI	Echo-planar imaging
FA	Fraction anisotropy
FACT	Fiber assignment by continuous tracking
FMRI	Functional magnetic resonance imaging .
FSE	Fast spin-echo
FT	Fiber tracking
FX	Fornix
ICP	Inferior cerebellar peduncle
IFO	Inferior fronto-occipital fasciculus
ILF	Inferior longitudinal fasciculus
MCP	Middle cerebellar peduncle
ML	Medial lemniscus

NF-1	Neurofibromatosis type I
NF-2	Neurofibromatosis type 2
OT	Optic tract
PCR	Posterior region of corona radiate
PLIC	Posterior limb of internal capsul
PMG	Polymicrogyri
PYT	Pyramidal tract
SCR	Superior region of corona radiate
SOD	Septo-optic dysplasia
SFO	Superior fronto-occipital fasciculus
SLF	Superior longitudinal fasciculus
SN	Substantia nigra
SNR	Signal to noise ratio
ST	Stria terminalis
SWS	Sturge-Weber Syndrome

TS	Tuberous sclerosis
UBO	Unidentified bright objects

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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. 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. 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).***

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