THE ROLE OF ARTERIAL SPIN LABELING MAGNETIC RESONANCE PERFUSION IN PEDIATRIC EPILEPSY

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Introduction

Epilepsy is one of the most common diagnoses seen by pediatric neurologists. Magnetic resonance imaging (MRI) is the preferred imaging modality to detect structural abnormalities in patients with seizure because of its superior sensitivity for lesion detection. If the magnetic resonance (MR) result does not reveal structural abnormalities, identifying the epileptogenic zone is more challenging in these patients. Arterial spin labeling (ASL) is a magnetic resonance imaging (MRI) technique for assessing cerebral blood flow by magnetically labeling protons from the inflowing blood as an endogenous diffusible tracer. ASL is a safe and easily accessible modality, that can be used to assist with the localization of seizure focus.

Aim of the Work

To assess the role of arterial spin labeling MRI perfusion in children with focal epilepsy particularly those with negative structural MRI studies.

Subjects and Methods

Subjects: This study was conducted on 20 children presenting with interactable focal epilepsy referred to radiology department for further MRI assessment.
Methods: A cross sectional prospective study was conducted.
Each patient was subjected to:
•history taking
•thorough clinical and neurological examination
•electroencephalogram (EEG)
•imaging evaluation of the brain including
routine magnetic resonance imaging :
•3D T1-weighted sequences
•T2-weighted axial, sagittal and coronal sequences
•Fluid -attenuated inversion-recovery (FLAIR) axial sequence
•Diffusion weighted imaging
•Arterial spin labeling MR perfusion weighted imaging (ASL-PWI)
Clinico-imaging correlation was done by assessing the degree of concordance by comparing the area of ASL changes to that of the presumed clinical seizure focus.

Results

Table 1: Distribution of the studied cases according to ASL findings (n=20)

ASL	No.	%
Hypoperfusion versus Hyperperfusion		
Hypoperfusion	15	75.0
Hyperperfusion	5	25.0
Left versus Right		
Left	16	80.0
Right	4	20.0
Lobar, multilobar and focal		
Lobar	14	70.0
Multilobar	5	25.0
Focal	1	5.0
Site of the lobar changes		
Temporal	7	35.0
Frontal	6	30.0
Parietal	1	5.0
Site of multilobar changes		
FTP	2	10.0
FT	2	10.0
FP	1	5.0
Site of focal changes		
Hippocampus	1	5.0

Table 2: Distribution of the studied cases according to seizure semiology (n=20)

Clinical seizure focus	No.	%
Lateralization:		
• Left side	16	80
• Right side	4	20
Localization:		
• Temporal lobe	10	50
• Frontal lobe	9	45
• Parietal lobe	1	5

Table 3: Distribution of the studied cases according to concordance (n=20)

Concordance	No.	%
A-Lateralization		
-Concordance	20	100.0
-Discordance	0	0.0
B-Localization		
-Concordance	12	60.0
• **Complete**	8	40.0
• **Partial**	4	20.0
-Discordance	8	40.0

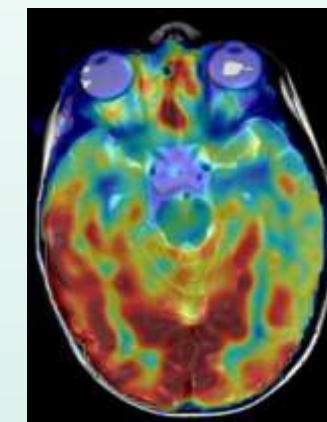**Figure1:** ASL showing hypoperfusion of the left temporal lobe relative to the right side.
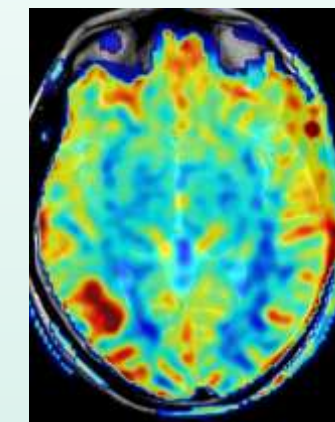

Figure2: ASL showing hyperperfusion of the right parietal lobe relative to the left side.
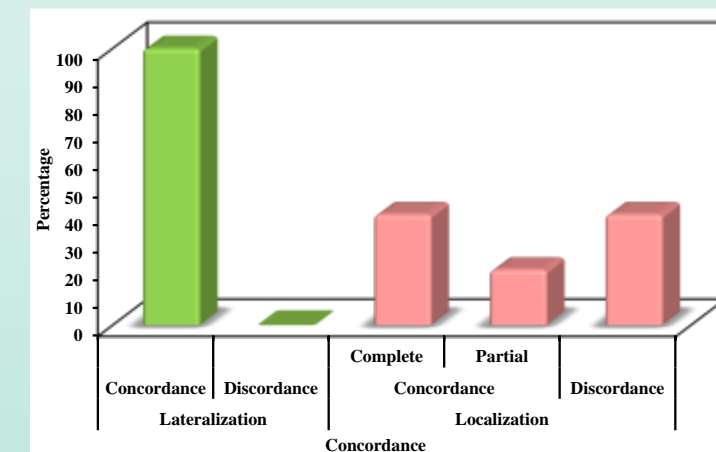

Figure 3: Distribution of the studied cases according to concordance between ASL perfusion and seizure semiology

Conclusion

ASL is a safe and easily accessible imaging modality, that can be used to assist with the localization of seizure focus in pediatric epilepsy particularly those without structural brain lesions in the clinical practice