ROLE OF DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING IN DIFFERENTIATION BETWEEN BENIGN AND MALIGNANT CERVICAL LYMPHADENOPATHIES

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Introduction

Lympadenopathy (LAP) is a disease of LNs in which they are abnormal in size, number or consistency. LN enlargement is of concern to both patients and clinicians, particularly if underlying pathology is due to malignancy. The most accurate method for differentiation between benign and malignant LNs is histological evaluation. However, Ultrasound (US) and US guided fine needle aspiration cytology (FNAC) is invasive and operator dependent. Recently Positron emission tomography (PET) is used for lymph node evaluation with high accuracy, however it carries the risk of exposure to radioactive material. On the other hand, diffusion weighted magnetic resonance imaging (DWI) allows tissue characterization without the need of exposure to ionizing radiation, radioactive material, or even contrast material.

Aim of the work

The aim of this work was to characterize the nature and differentiate benign from malignant cervical lymphadenopathy using diffusion-weighted MR imaging.

Methods

This study was carried out on thirty patients presenting with enlarged cervical lymph nodes.

All patients underwent:

Full history taking.

Ultrasound or CT as screening tool.

MRI neck study including :

-T2 axial and coronal for localization.

-Diffusion weighted imaging with a b factor of 0 and 1000 s/mm2.

-Apparent diffusion coefficient (ADC) map will be reconstructed.

Compare result to histopathology results in all patients.

Results

Table (1):Comparison between the two studied groups according to demographic data(n=30).

Demographic data	Total (n = 30)		Malignant (n = 20)		Benign (n = 10)		Test of Sig.	p
	No.	%	No.	%	No.	%		
Sex								
Male	17	56.7	12	60.0	5	50.0	χ^2= 0.271	FEp= 0.705
Female	13	43.3	8	40.0	5	50.0		
Age (years)								
Min. – Max.	10.0 – 82.0		10.0 – 82.0		40.0 – 67.0		U= 99.500	0.983
Mean ± SD.	49.67 ± 15.46		48.85 ± 17.80		51.30 ± 9.86			
Median (IQR)	53.50 (42.0 – 60.0)		53.50 (42.0 – 60.0)		51.50 (42.0 – 60.0)			

SD: Standard deviation IQR: Inter Quartile Range

χ^2: Chi square test FE: Fisher Exact U: Mann Whitney test

p: p value for comparing between the studied groups

*: Statistically significant at $p \leq 0.05$

Table (2):Comparison between the two studied groups according to ADC value

ADC value	Total (n = 30)	Malignant (n = 20)	Benign (n = 10)	U	p
Min. – Max.	0.30 – 2.40	0.30 – 0.90	0.90 – 2.40	0.500*	<0.001*
Mean ± SD.	0.88 ± 0.46	0.62 ± 0.16	1.42 ± 0.39		
Median (IQR)	0.70 (0.6 – 1.3)	0.60 (0.5 – 0.7)	1.35 (1.3 – 1.5)		

SD: Standard deviation IQR: Inter Quartile Range

U: Mann Whitney test

p: p value for comparing between the studied groups

*: Statistically significant at $p \leq 0.05$

Table (3):Agreement (sensitivity, specificity) for ADC value to predict malignancy form benign

	AUC	p	95% C.I	Cut off#	Sensitivity	Specificity	PPV	NPV
ADC value	0.998	<0.001*	0.987 – 1.008	≤0.8	95.00	100.00	100.0	90.9

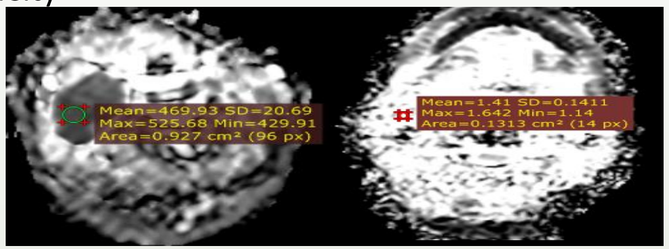

Figure (1): Axial T2 MRI (A) Malignant node with Low ADC value (B) Benign node with and high ADC value.

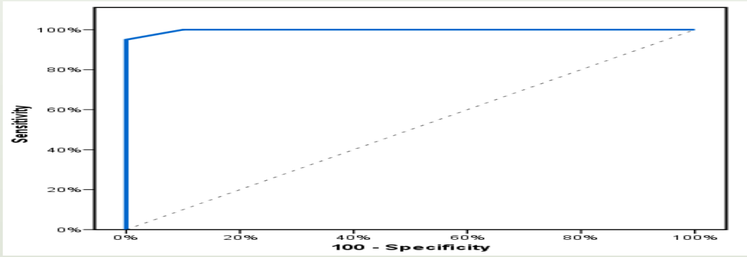

Figure (2):ROC curve for ADC value to predict malignancy form benign

AUC: Area Under a Curve p value: Probability value

CI: Confidence Intervals

NPV: Negative predictive value PPV: Positive predictive value

*: Statistically significant at $p \leq 0.05$

#Cut off was done by using Youden index

Conclusion

DWI helps in tissue characterization in cervical lymphadenopathy when added to anatomical data obtained by conventional MRI sequences to reach final confident diagnosis in order to reduce the rate of biopsy.

The calculation of ADC value is a quantitative test and demonstrates the water content more precisely than DW imaging. The proposed cut off value was 0.8 $x10^{-3}$ mm^2 /s, less than that is considered malignant lesion and more than that is considered benign lesion.