THE ADDED VALUE OF DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING IN THE DIFFERENTIATION BETWEEN BLAND AND MALIGNANT PORTAL VEIN THROMBUS

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Introduction

HCC represents > 90% of primary hepatic tumors. It ranks as the 5th most common cancer worldwide and the 2nd leading cause of death among male patients after lung cancer. The diagnosis of HCC is made nowadays by non-invasive criteria where imaging studies play main role. HCC has tendency for microvascular invasion with invasion of portal vein being reported in 35%-50% of HCC cases. Concomitant bland and malignant PVT coexist as well. The differentiation between bland and malignant PVT is crucial as it's hugely implicated in the diagnosis, staging, prognosis of the disease, and the treatment plans. DW MRI is an emerging non invasive imaging technique, that doesn't need contrast administration. It's very sensitive in tissue characterization and can be used to differentiate between bland and malignant PVT.

Aim of the work

To evaluate the role of DW MRI in combination with mean ADC values in differentiating between bland and malignant portal vein thrombus.

Patients and Methods

Our study was carried on 25 patients referred to the Department of Radiodiagnosis and Intervention, Alexandria Main University Hospital. They underwent dynamic contrast enhanced MRI liver and proved to have PVT whether bland or tumoral. We have detected 26 PVT in our 25 patients, that is due to the presence of concomitant bland and malignant PVT within the same patient. The 26 PVT were divided into 2 groups: 10 bland and 16 malignant PVT. The enhancement pattern was used as our reference for sure sign of malignancy. By using ROIs, mean ADC values of bland and malignant PVT were calculated to reach a cut off value.

Results

The mean ADC value of bland PVT was (1.48 x 10^{-3} mm^2/sec ± 0.35 SD), it was higher than the mean ADC value of the malignant PVT, which was (0.93 x10^{-3} mm^2/sec ± 0.13 SD). These results were statistically significant with P value (= 0.001). The mean ratio ADC bland PVT/ ADC HCC tumor was (1.78 ± 0.32 SD), it was higher than that of ADC malignant PVT/ ADC HCC tumor which was (1.13 ± 0.25 SD). These results were statistically significant with P value (< 0.001).

A cut off value of (≤ 1.1 × 10^{-3} mm^2/sec) for mean ADC of PVT was reached and proved to be highly diagnostic of malignancy. A cut off value of (≤1.385) for the mean ratio ADC PVT/ ADC HCC tumor was reached and proved to be highly diagnostic of malignancy.

Table (1):Comparison between the two studied groups according to mean ADC values of 26 thrombi

	Total	Bland	Malignant	t	p
PV thrombus ADC (mm^2/sec) (x10^{-3})	(n = 26)	(n = 10)	(n = 16)		
Min. - Max.	0.70 - 1.90	0.80 - 1.90	0.70 - 1.20	4.812*	0.001*
Mean ± SD.	1.14 ± 0.36	1.48 ± 0.35	0.93 ± 0.13		
Median (IQR)	1.0 (0.90 - 1.50)	1.60 (1.30 - 1.70)	0.90 (0.80 - 1.0)		
Ratio ADC thrombus/ADC tumor	(n = 20)	(n = 4)	(n = 16)		
Min. - Max.	0.78 - 2.13	1.36 - 2.13	0.78 - 1.80	4.452*	<0.001*
Mean ± SD.	1.26 ± 0.37	1.78 ± 0.32	1.13 ± 0.25		
Median (IQR)	1.11 (1.0 - 1.37)	1.82 (1.57 - 1.99)	1.10 (1.0 - 1.31)		

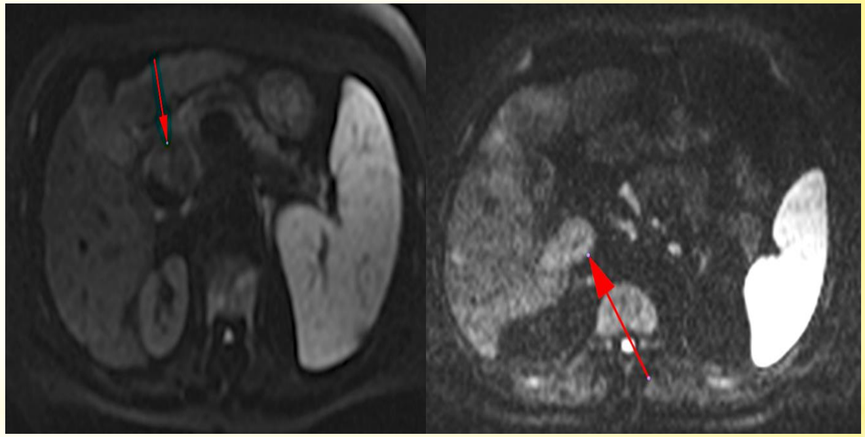

Figure (A) :
Bland PVT is noted in the main portal vein (red arrow), seen hypointense on DWI with no diffusion restriction, mean ADC was 1.8 x10-3 mm^2/sec (not shown).

Figure (B) :
Malignant PVT is noted in the right branch and extending into the main portal vein (red arrow), seen hyperintense on DWI with diffusion restriction, mean ADC value was 1.1 x10-3 mm^2/sec.

Conclusion

DW MRI is a useful noninvasive imaging technique with great ability in tissue characterization, in combination with mean (ADC) values can be used to differentiate between bland and malignant PVT through qualitative and quantitative methods (through the reached cut off values) respectively.

It can be confidently used as an alternative in case of patients contraindicated to contrast material, or patients with excessively altered hemodynamics resulting in unconclusive diagnosis.