Abstract:

Objective: To evaluate the utility of the Pharmacokinetic modeling derived from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) in differentiating benign from malignant adnexal masses.

Methods: 43 patients with 49 complex adnexal masses (27 benign, 3 borderline, and 19 malignant) underwent preoperative DCE-MRI examinations, on a 3 Tesla MRI. Using extended Tofts' model, quantitative analysis was done in the solid parts of all tumors. Three PK parameters were defined as Volume transfer coefficient (Ktrans), the rate constant (Kep) ,and the plasma volume (Vp). Semiquantitative analysis was also performed and the values of relative signal intensity (SI_{rel}) , wash-in-rate (WIR) , the initial area under the curve ($iAUC_{60}$), time-to-peak (TTP) and wash-out-rate (WOR) were calculated. Using logistic regression and receiver operating characteristic (ROC) curve, we compared the mean values of individual parameters between benign and malignant lesions.

Results: The mean value of Ktrans and the plasma volume (Vp) were significantly higher in malignant adnexal masses (P-value<0.0001 and P-value = 0.001 respectively). Semiquantitative analysis showed that SI_{rel} (P-value <0.0001), WIR (P-value <0.0001) and $iAUC_{60}$ (P- value = 0.001) had higher values in malignant adnexal tumors compared to the benign ones. The pairwise comparison among the ROC curves showed that the area under the curve (AUC) of Ktrans was significantly larger than the AUCs of all other quantitative and semiquantitative parameters.

Conclusions: Quantitative DCE-MRI is a relevant tool for differentiating benign from malignant adnexal masses. Among all pharmacokinetic and semiquantitative parameters, Ktrans is the most accurate discriminator.