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Diagnostic value of dynamic contrast-enhanced MR imaging and diffusion weighted MR imaging for differentiation of benign and malignant parotid tumors

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Background & Objective: Preoperative prediction of parotid tumor malignancy strongly influences surgery planning. This study aimed to evaluate dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) and diffusion weighted imaging (DWI) for differentiating benign from malignant parotid tumors.

Materials & Methods: Prospectively, DCE-MRI and DWI were performed in 112 patients, with 148 confirmed parotid masses. Apparent diffusion coefficient (ADC) values were measured on DWI. DCE-MRI semi-quantitative analysis was based on time-intensity curve (TIC), and quantitative assessment on Ktrans, Kep and Ve. The optimal thresholds for differentiating malignant from benign tumors were determined.

Results: Considering tumors with TIC type C as malignant, sensitivity, specificity, accuracy, positive and negative predictive values were 95%, 76%, 79%, 38% and 99%, respectively. Considering ADC threshold values 0.709×10^{-3} mm^2/s < ADC < 0.948×10^{-3} mm^2/s as reflecting malignancy, sensitivity, specificity, accuracy, positive and negative predictive values were 75%, 78%, 78%, 35%, and 95%, respectively. Considering TIC type C and ADC values 0.709×103 mm^2/s < ADC < 0.948×10^{-3} mm^2/s as reflecting malignancy, sensitivity, specificity, accuracy, positive and negative predictive values were 75%, 91%, 89%, 58%, and 96% respectively. With threshold Kep=1.118 min^{-1} and Ve=0.315 between Warthin and malignant tumors, sensitivity, specificity, accuracy, positive and negative predictive values for malignancy were 70%, 96%, 92%, 82%, and 93%, respectively. With threshold Kep>0.555 min^{-1} and Ve<0.605 between pleomorphic adenomas and malignant tumors, sensitivity, specificity, accuracy, positive and negative predictive values for malignancy were 90%, 74%, 80%, 69%, and 92%, respectively.

Conclusion: DCE-MRI and DWI provide more information in differentiating benign from malignant parotid tumors.

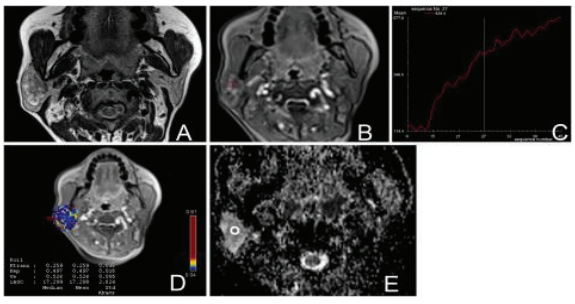


Figure 1: Pleomorphic adenoma; (A) Axial T2WI showing a mixed hyper-dense and isodense nodules in the right parotid. (B) CE-T1WI showing non-homogeneous enhanced nodules. (C) TIC of pattern A. (D) Ktrans map showing Ktrans value of 0.259 min^{-1}, Kep value of 0.497 min^{-1} and Ve of 0.524; (E) ADC value is 1.124×10^{-3} mm^2/s.

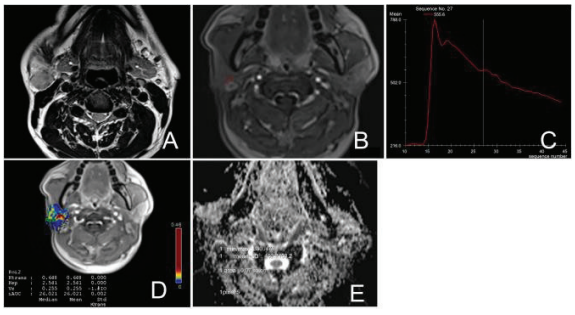


Figure 2: Warthin tumor; (A) Axial T2WI showing hypodense nodules in the right parotid. (B) CE-T1WI showing a homogeneous enhanced nodule. (C) TIC of pattern B. (D) Ktrans graph showing Ktrans value of 0.648 min^{-1}, Kep value of 2.541 min^{-1}, and Ve of 0.255; (E) ADC value is 0.402×10^{-3} mm^2/s.

Recent Publications

1. Viallon M, Cuvinciuc V, Delattre B, et al. (2015) State-of-the- art MRI techniques in neuroradiology: principles, pitfalls, and clinical applications. Neuroradiology 57:441-67.
2. Yeo D M, Oh S N, Jung C K, et al. (2015) Correlation of dynamic contrast-enhanced MRI perfusion parameters with angiogenesis and biologic aggressiveness of rectal cancer: preliminary results. J Magn Reson Imaging 41:474-80.
3. Chung W J, Kim H S, Kim N, et al. (2013) Recurrent glioblastoma: optimum area under the curve method derived from dynamic contrast-enhanced T1-weighted perfusion MR imaging. Radiology 269:561-8.
4. Thomas A A, Arevalo Perez J, Kaley T, et al. (2015) Dynamic contrast enhanced T1 MRI perfusion differentiates pseudoprogression from recurrent glioblastoma. J Neuroonco. 125:183-90.

Biography

Zheng S Y has his expertise in evaluation and passion in improving the health and wellbeing. His open and contextual evaluation model based on responsive constructivists creates new pathways for improving healthcare. He has built this model after years of experience in research, evaluation, teaching and administration both in hospital and in education institutions. The foundation is based on fourth generation evaluation which is a methodology that utilizes the previous generations of evaluation: measurement, description and judgment. It allows for value-pluralism and this approach is responsive to all stakeholders and has a different way of focusing.

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