

Diffusion Magnetic Resonance Imaging and Magnetic Resonance Spectroscopy in Detecting Malignancy in Maxillofacial Lesions

Authors : Mohamed Khalifa Zayet, Salma Belal Eiid, Mushira Mohamed Dahaba

Abstract : Introduction: Malignant tumors may not be easily detected by traditional radiographic techniques especially in an anatomically complex area like maxillofacial region. At the same time, the advent of biological functional MRI was a significant footstep in the diagnostic imaging field. Objective: The purpose of this study was to define the malignant metabolic profile of maxillofacial lesions using diffusion MRI and magnetic resonance spectroscopy, as adjunctive aids for diagnosing of such lesions. Subjects and Methods: Twenty-one patients with twenty-two lesions were enrolled in this study. Both morphological and functional MRI scans were performed, where T1, T2 weighted images, diffusion-weighted MRI with four apparent diffusion coefficient (ADC) maps were constructed for analysis, and magnetic resonance spectroscopy with qualitative and semi-quantitative analyses of choline and lactate peaks were applied. Then, all patients underwent incisional or excisional biopsies within two weeks from MR scans. Results: Statistical analysis revealed that not all the parameters had the same diagnostic performance, where lactate had the highest areas under the curve (AUC) of 0.9 and choline was the lowest with insignificant diagnostic value. The best cut-off value suggested for lactate was 0.125, where any lesion above this value is supposed to be malignant with 90 % sensitivity and 83.3 % specificity. Despite that ADC maps had comparable AUCs still, the statistical measure that had the final say was the interpretation of likelihood ratio. As expected, lactate again showed the best combination of positive and negative likelihood ratios, whereas for the maps, ADC map with 500 and 1000 b-values showed the best realistic combination of likelihood ratios, however, with lower sensitivity and specificity than lactate. Conclusion: Diffusion weighted imaging and magnetic resonance spectroscopy are state-of-art in the diagnostic arena and they manifested themselves as key players in the differentiation process of orofacial tumors. The complete biological profile of malignancy can be decoded as low ADC values, high choline and/or high lactate, whereas that of benign entities can be translated as high ADC values, low choline and no lactate.

Keywords : diffusion magnetic resonance imaging, magnetic resonance spectroscopy, malignant tumors, maxillofacial

Conference Title : ICRCMI 2018 : International Conference on Radiology and Computerized Medical Imaging

Conference Location : Amsterdam, Netherlands

Conference Dates : January 22-23, 2018