Recognition of anaplastic foci within low-grade gliomas using MR spectroscopy.


Abstract

Background. The recognition of anaplastic foci within low-grade gliomas is of extreme importance in patients under follow-up for Grade II gliomas. We present the algorithm of MR spectroscopy (MRS)-guided brain biopsy and its correlation with tumour histology. Methods. Twenty-seven patients harbouring suspected Grade II/III glioma were examined on our 3T MR. 2D PRESS-CSI metabolite images of Choline/Creatine, Creatine/N-acetylaspartate and Choline/N-acetylaspartate were calculated and exported to the DICOM format. According to these maps, a stereobiopsy was performed at the point of maximum Choline/Creatine ratio prior to tumour resection. In the case of enhancing tumour, a subsequent biopsy was performed from the point of enhancement. Comparisons were made between the histology of the biopsied specimens and the resected tumours. Results. Eleven tumours were diagnosed as high-grade and sixteen as low-grade lesions. The correlation between main spectroscopic ratios (Cho/Cr and Cho/NAA) was strongly positive at the points of maximum Cho/Cr. Similar results were obtained at the points of contrast enhancement. Comparison of histological parameters of biopsy samples at the points of maximum Cho/Cr and histological examination of the completely resected tumours gives a strong correlation of tumour grade, number of mitoses and Ki-67 expression. The diagnostic accuracy of MRS-guided biopsy was 84%. The absolute value of Cho/NAA was higher in high-grade compared to that of low-grade lesions. The value of Cho/NAA ratio of 0.9 using MRS produced a sensitivity and specificity of 78% in the differentiation between low-grade and high-grade lesions. Combining MRS with structural MR, the sensitivity increased to 86% and the specificity to 80%. Conclusions. Strong correlation was demonstrated between Cho/Cr and Ch/NAA ratios. Strong correlation was demonstrated between histological parameters of biopsy samples taken using Cho/Cr ratio and those from total tumour examination. Diagnostic accuracy of MRS-guided biopsy was 84%. Sensitivity and specificity of MRS combined with structural MR reaches 86% and 80%.

PMID: 24377726 [PubMed - as supplied by publisher]