Reviewer's report

Title: Multi-parametric effect in predicting tumor histological grade by using Susceptibility Weighted Magnetic Resonance Imaging in tongue squamous cell carcinoma

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Reviewer: Michiel W.M. van den Brekel

Summary: The article describes a new method, susceptibility weighted MRI (SWI), which can be applied to predict the histological grade in oral tongue squamous cell carcinomas (OTSCCs). A prospective study cohort of 30 patients are included for analysis, and six parameters are extracted from the SWI by two independent experienced radiologists. Univariate analysis showed three predictive parameters, namely ITSSs, ITSS-score and ITSS ratio. ITSSs seems the best and is combined with the other parameters in the multiparametric analysis. This showed an improvement of the ROC analysis when the parameters ITSSs and Tumor thickness are combined.

Feedback:

For this article the novel technique SWI is used. However, since this sequence is not applied in routine imaging. Not everyone is familiar with SWI, so a few parameters to give the reader more sense of this sequence might help understand some considerations. For example, the scan time. What is the additional scan time for the patient compared with the routine MRI by using this sequence.

SWI images are obtained by multiplying the magnitude image with the phase mask. However, some studies only used the magnitude or phase image. Define which image you are using in your research.

Tumor thickness is measured by multiplying the number of axial T2WI slices where the lesion was visible by the slice thickness. The method is a commonly used method, however, this method results in a underestimation of the tumor thickness since the slice thickness are 4 mm. This is a limitation of your research.

Also when predict a histological grade using MRI, you have to consider the difference in scale between these modalities. The MRI scale is 4 mm, while histological grading is assessed on a scale which is much smaller. Are you do a correction for this scale? If not, mention in the discussion section as a limitation or a challenge.

ITSSs are low signal intensity and a fine linear or dot-like structures. Which underlying histopathological principles are the result of the low signal intensity? Tumor necrosis can also show a log signal intensity, is this included or excluded in the ITSSs?
The quantitative measurement is performed three times and the mean value is recorded and used for analysis. As reader, the mean value can be still a random value, if there is a high range in the three quantitative measurements of the radiologists. To give the reader more feeling of this mean value and strengthen your research, I propose to do a statistical analysis to prove the variability between the three measurements. This can be done by an intraclass correlation coefficient. Furthermore, knowledge about the time interval between those three measurements might also give more information to the reader. If the time interval is too short between the measurements, the results can be biased by knowledge bias. If so, this must be described in the discussion section. In addition, this method of manually delineating and measuring the parameters is a time-invasive principle.

Points of attention

Figure 1B: There is a discrepancy between the number of arrowheads in the normal (n=3) and enlarged image (n=4).

Figure 2B: In the enlarged box, the second highest two arrowheads are pointing to the same low signal intensity spot. Is this spot counted twice since there are two arrows? Of are this two spots?

Figure 3: In my opinion, this image has no added value to the article.

Figure 5: In figure 4 the AUC values are shown in the figure. In figure 5 the different AUC values for the univariate and multivariate analysis are shown. However, this is only visual. The notation of the AUC values (similar as in figure 4) can strengthen this image.

Table 1: The unit of the ITSSs (\#) is missing and an explanation of the ITSS score is missing in the caption of the table.

Typo's

Background section: "Intratumoral various characteristics such as ..... in brain tumors such as gliomas [20,21]" Start with capital letter

Image processing and analysis section: "Intratumoral calcifications or macrohemorrhages .......... into account. ITSS score was ..... more than 10 ITSSs [29]." Dot to separate the sentence in two sentences

"Tumor thickness was measured by counting numbers of axial T2w1 slice where .... Slice thickness." Turn around: 'number' instead of 'numbers' and 'slices' instead of 'slice'.

SWI results section: "Of the 30 tumors, ITSSs were seen in 25 (83.3\%) cases." This number has to be 23 with a percentage of 76\%
Pre- and post-contrast SWI section: "Representative images showed in …. delineated on CE-SWI (fig 7)." The sentence is not fluent. It is hard to understand the meaning of the sentence, even after reading multiple times. Furthermore, I think in the sentence "tumor lesion was with obvious enhancement", the word "was" is redundant.

Discussion section: " ITSSs only yielded an area …. (rCBV) performed best." 2 small typo's. Firstly it has to be 'glioblastomas' instead of 'globlastomas'. Secondly, the abbreviation (rCBV) is used before the explanation of this abbreviation. So maybe you can slide this definition forward.

Figure 4: In the text and table we can read an AUC value range of (0.613-0.916), while the figure shows an AUC range of (0.603-0.916).

Figures: The abbreviation ITSSs brings some confusion. In the text, we can read always ITSSs. While in the figures ITSS is always used.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Unable to assess

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

Not relevant to this manuscript

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