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Addition of tumor localization to T2/FLAIR mismatch sign on Magnetic Resonance Imaging (MRI) for improving preoperative prediction of 1p19q codeletion in low-grade gliomas.



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OBJECTIVE

The aim of this study was to evaluate the diagnostic value of adding tumor location to T2/FLAIR discordance to help distinguish IDH-mutated astrocytomas from oligodendrogliomas, in a cohort of adult patients with low-grade gliomas presenting IDH mutation..

MATERIALS AND METHODS

Descriptive retrospective study of 127 adult patients with low-grade glioma and IDH mutation, operated at our institution between 2010 and 2019. T2-FLAIR mismatch sign was interpreted as present when complete hyperintensity in the T2 sequence was accompanied by hyperintensity suppression on the FLAIR sequence, with the exception of a peripheral hyperintense halo. Tumor location was defined according to the most affected lobe within the brain on preoperative magnetic resonance images.

RESULTS

- T2-FLAIR mismatch sign was associated with diagnosis of astrocytoma (OR = 42.84 [8.04,796.62], p = 0.0003) with a sensitivity of 0.66, a specificity of 0.95 and a PPV (positive predictive value) and NPV (negative predictive value) of 0.95 and 0.68, respectively.
- Diagnosis of astrocytoma was negatively related to frontal lobe location (OR = 0.44 [0.20,0.92], p = 0.033) and positively related to temporal lobe location (OR = 5.04 [1.77,18.22] p = 0.005).
- The multivariate model with the best performance included sex, age, presence of mismatch and frontal location.

Global significance: p <0.001

Sensitivity = 0.75

Specificity = 0.93

PPV of 0.93

NPV 0.73

Diagnostic summary measures for T2-FLAIR Mismatch sign in Astrocytomas		95% Confidence Interval
Sensibility	66,071 %	37.42% to 69.34%
Especificity	95,652 %	86.19% to 99.93%
Positive Predictive Value	95,27%	75.70% to 99.36%
Negative Predictive Value	68,02%	58.25% to 73.11%

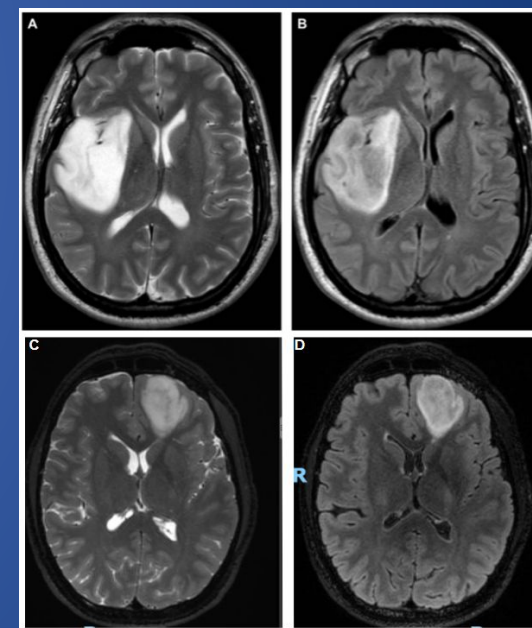


Figure 1: Figure showing positive T2/FLAIR mismatch sign at temporal and frontal location

CONCLUSION

The T2-FLAIR mismatch sign is a useful tool to diagnose astrocytomas with IDH mutation preoperatively with high specificity and low sensitivity. Adding tumor localization to imaging findings increases sensitivity. Using features easy to observe on conventional MRI, 1p19q codeletion status in IDH-mutated tumors can be predicted with considerable precision.