

PERBANDINGAN GAMBARAN ANTARA GLIOBLASTOMA DENGAN METASTASIS OTAK BERDASARKAN MRI KONVENSIONAL DAN *RADIOMICS*

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ABSTRAK

Latar belakang: Membedakan glioblastoma dari metastasis otak pada MRI konvensional sering menantang karena tumpang-tindih tampilan (ring-enhancement, edema vasogenik, dan efek massa). *Radiomics* menawarkan sinyal kuantitatif yang berpotensi melengkapi pembacaan subjektif.

Tujuan: Menilai kemampuan kombinasi fitur MRI konvensional dan *radiomics first-order* dalam membedakan glioblastoma dari metastasis serta menyusun skor prediktif klinis.

Metode: Studi retrospektif pada pasien dengan lesi intraaksial yang menjalani MRI, meliputi penilaian fitur konvensional (jumlah lesi, bentuk, pola enhancement, crossing midline, karakter edema) dan ekstraksi fitur *first-order* dari ROI T1-weighted pascakont ras. Dilakukan pemilihan prediktor berbasis likelihood ratio dan regresi logistik untuk mendapatkan bobot, kemudian dibuat sistem skoring. Kinerja dievaluasi menggunakan kurva ROC dan indeks Youden untuk titik potong optimal.

Hasil: Fitur konvensional yang paling informatif adalah lesi soliter, ring-enhancement ireguler, crossing midline, serta edema proporsional. Pada domain *radiomics*, ambang $mean \geq 87,5$, $median \geq 90$, $minimum \geq 10,5$, dan $variance \geq 529,5$ secara konsisten berasosiasi dengan glioblastoma. Model skoring gabungan menunjukkan performa diagnostik sangat tinggi (AUC 0,997; IK95% 0,993-1,000) dengan titik potong $\geq -31,5$ yang menghasilkan sensitivitas 96,8% dan spesifisitas 100%.

Kesimpulan: Kombinasi fitur MRI konvensional dan *radiomics first-order* mampu membedakan glioblastoma dari metastasis dengan akurasi sangat baik, dan skor yang diusulkan berpotensi menjadi alat bantu keputusan klinis dalam praktik neuroradiologi.

COMPARISON OF IMAGES BETWEEN GLIOBLASTOMA AND BRAIN METASTASIS BASED ON CONVENTIONAL MRI AND RADIOMICS

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ABSTRACT

Background: Differentiating glioblastoma from brain metastases on conventional MRI is often challenging due to overlapping features (ring enhancement, vasogenic edema, and mass effect). Radiomics offers a quantitative signal that can potentially complement subjective readings.

Objective: To assess the ability of a combination of conventional MRI features and first-order radiomics to differentiate glioblastoma from metastases and to develop a clinical predictive score.

Methods: This retrospective study of patients with intraaxial lesions undergoing MRI included assessment of conventional features (number of lesions, shape, enhancement pattern, midline crossing, edema character) and extraction of first-order features from postcontrast T1-weighted ROIs. Predictor selection was performed based on likelihood ratios and logistic regression to obtain weights, and a scoring system was developed. Performance was evaluated using ROC curves and the Youden index for optimal cutoff points.

Results: The most informative conventional features were solitary lesions, irregular ring enhancement, midline crossing, and proportional edema. In the radiomics domain, thresholds of mean ≥ 87.5 , median ≥ 90 , minimum ≥ 10.5 , and variance ≥ 529.5 were consistently associated with glioblastoma. The combined scoring model demonstrated very high diagnostic performance (AUC 0.997; 95% CI 0.993-1.000) with a cutoff of ≥ -31.5 , resulting in a sensitivity of 96.8% and a specificity of 100%.

Conclusion: The combination of conventional MRI features and first-order radiomics was able to distinguish glioblastoma from metastases with excellent accuracy, and the proposed score has the potential to be a clinical decision-aid in neuroradiology practice.