Epileptic seizure relapse as a predictor of radiological recurrence in primary brain tumors

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Introduction: Epileptic seizures are a common manifestation in patients with primary brain tumors, particularly in gliomas, in which typically present as focal seizures due to localized cortical involvement[1]. These seizures may precede, accompany, or follow tumor diagnosis and progression[2]. Primary brain tumors, such as gliomas, are managed through a combination of surgery, radiotherapy, and chemotherapy, with surveillance imaging guiding treatment decisions[3]. Recognizing clinical warning signs of recurrence remains crucial[4]: this study investigates the prognostic role of seizure recurrence in anticipating tumor progression.

Methods: In this prospective study, we included patients aged 24 to 80 years with histologically confirmed intra-axial primary brain tumors referred to the Radiation Oncology and Epilepsy Center of Policlinico Umberto I between April 2024 and June 2025, following neurosurgical intervention and eligibility for radiotherapy or chemotherapy. Patients with secondary CNS tumors, age <18 or >80 years, or deemed ineligible for oncologic treatment were excluded. Data collection included onset symptoms of the tumor, serial MRI scans, histology reports, surgical and adjuvant treatments, detailed seizure episodes and antiepileptic therapy, and timing and presentation of tumor recurrence.

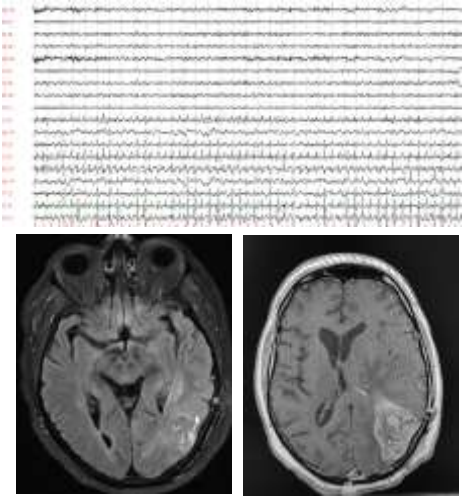

Fig 1-2-3: Disease progression in a patient with focal status epilepticus

Results: Fifty-seven adult patients (mean age 53.15 ± 14.2 years) were enrolled between April 2024 and June 2025, including 21 women (36.84%).

- High-grade gliomas (HGG) accounted for 82.46% (n=47) of cases.
- Gross total resection was achieved in 42.1% (n=24).
- Seizures represented the presenting symptom in 70.17% of patients (n=40);
- Among them, 47.5% (n=19) fulfilled the 2017 ILAE criteria for a formal diagnosis of epilepsy[5].
- In our cohort 59.64% (n=34) patients developed disease recurrence or progression.
- Among patients with disease recurrence/progression, 47.05% (n=16) experienced focal seizures and 14.70% (n=5) focal status epilepticus/seizure clusters prior to radiological evidence of progression, with a mean lead time of 7.0 ± 7.2 months (p = 0.0025).
- Of the five patients who presented with focal status epilepticus at recurrence, three died within a short timeframe (mean survival 3.7 ± 2.1 months), suggesting a potential association between seizure clusters/status and poorer prognosis.

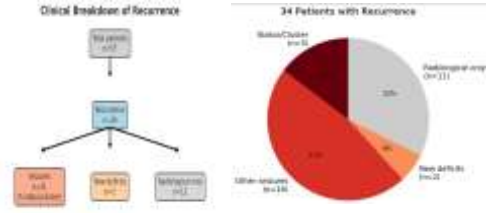

Fig 3-4: Clinical presentation at disease recurrence/progression

- **Conclusion**: This study highlights the critical role of seizure monitoring in patients with primary brain tumors, as seizure recurrence may precede radiological evidence of disease progression, especially in patient with HGG diagnosis. Ongoing follow-up aims to further characterize the prognostic value of focal status epilepticus and seizure clusters in terms of overall survival.

1. Aronica E, Ciusani E, Coppola A, Costa C, Russo E, Salmaggi A, Perversi F, Maschio M. Epilepsy and brain tumors: Two sides of the same coin. J Neurol Sci. 2023
2. Avila EK, Tobochnik S, Inati SK, Koekkoek JAF, McKhann GM, Riviello JJ, Rudà R, Schiff D, Tatum WO, Templer JW, Weller M, Wen PY. Brain tumor-related epilepsy management: A Society for Neuro-oncology (SNO) consensus review on current management. Neuro Oncol. 2024 Jan
3. Tan AC, Ashley DM, López GY, Malinzak M, Friedman HS, Khasraw M. Management of glioblastoma: State of the art and future directions. CA Cancer J Clin. 2020 Jul
4. Di Bonaventura C, Albini M, D'Elia A, Fattouch J, Fanella M, Morano A, Lucignani G, Manfredi M, Colonnese C, Salvati M, Vanacore N, Berardelli A, Giallonardo AT. Epileptic seizures heralding a relapse in high grade gliomas. Seizure. 2017
5. https://www.ilae.org/guidelines/definition-and-classification