Isomorphic astrocytomas can spontaneously regress following subtotal surgical resection, similarly to pilocytic astrocytomas; a clinical case in a pediatric patient

Kacper Grudzień, Jerzy Skuciński, Olga Milczarek, Stanisław Kwiatkowski, Dariusz Adamek
Jagiellonian University Medical College in Cracow

INTRODUCTION

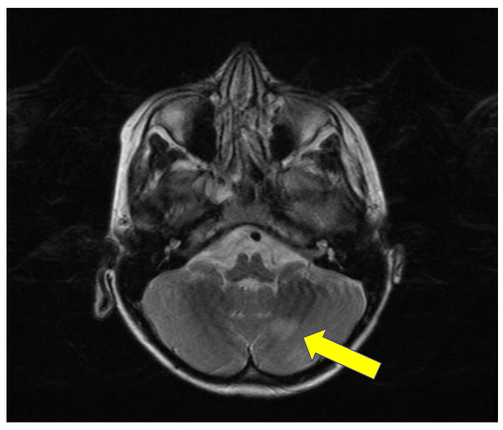
- Patient AS, 9-year-old
- Male
- Presented with cerebellar ataxia

CASE HISTORY

- The patient was admitted out of his mother's concern with his intensifying difficulty walking and performing everyday tasks
- The mother's observations were confirmed by the attending doctor
- As an anatomical cause of the patient's condition was suspected, a magnetic resonance imaging with spectroscopy was scheduled

INVESTIGATIONS

- A hyperintense lesion in the left cerebellar hemisphere was evidenced in magnetic resonance imaging
- The subsequent spectroscopy yielded the following results within the mass' location:
  - ❖↑ Choline and myoinositol
  - ❖↓ N-acetylaspartate
- Having taken this information into account, the radiologist labeled the finding as a neoplasm



Initial presentation of the finding

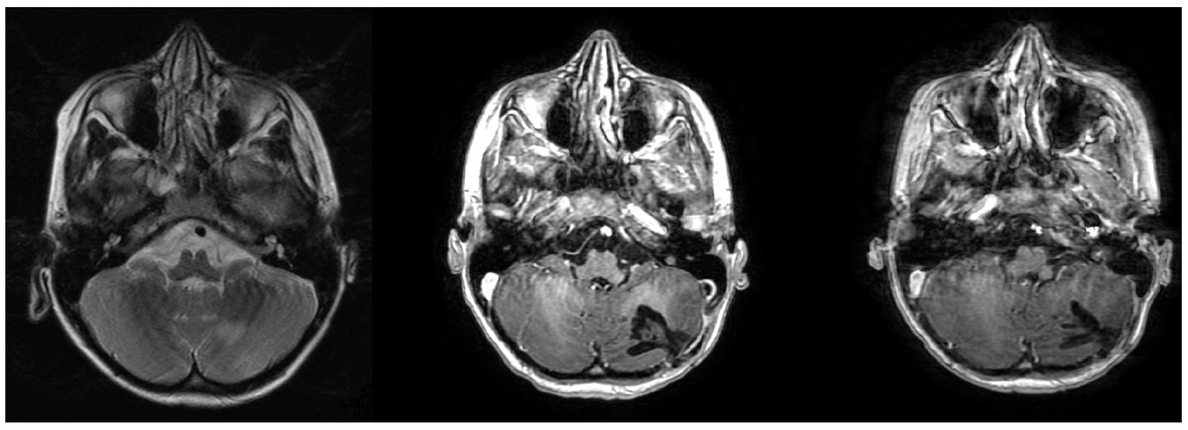
TREATMENT/RESULTS

- The tumor was subjected to a subtotal excision with an intraoperative histopathological examination
- The specimen initially occured to the pathologist as a low-grade astrocytoma, and as such, an initial diagnosis of *pilocytic astrocytoma* was proposed
- No adjuvant treatment was put into effect
- In detailed histopathological tests, the tumor, despite evincing benign morphology, bore no apparent features of a pilocytic astrocytoma
- As a result, further investigation was instigated and, following literature review, the diagnosis of the so-called isomorphic astrocytoma was adopted. That seemed to be the most appropriate option in the diagnostic differentiation, despite its absence in the official WHO classification of tumors of the central nervous system[1]

Molecular marker	Pilocytic Astrocytoma	Specimen
OLIG2	+	-
Rosenthal fibers	+	-
Eosinophilic granular bodies	+	-
Synaptophysin	+	-
Vascular lesions (proliferation/sclerosis/ necrosis sites)	+	-

Key histopathological differences between a typical pilocytic astrocytoma and the tumor in question

- In a 1-year follow-up period, the remaining tumor mass was radiologically controlled in two separate magnetic resonance imagings, half a year and a year after the surgery, which evidenced shrinking and gradual atrophy of the leftover neoplasm



Progression of findings in magnetic resonance imaging. Left to right: Pre-operative T2, post-operative (half a year after) T1 with contrast, post-operative (a year after) T1 with contrast

DISCUSSIONS

- The first report of a newly-discovered tumor subtype, the *isomorphic astrocytoma*, is attibuted to Blümcke et al. in their publication in the Acta Neuropathologica journal in 2004[1]
- The authors have pointed to the features of the neoplasm that render it unique from the pilocytic astrocytoma, advocating for its own entry in the official WHO classification of the tumors of the central nervous system
- Both pilocytic and isomorphic astrocytomas are members of the *Low-grade Epilepsy-associated Tumors* (LEAT) group[2]
- This subset encompasses tumors associated with a history of long-lasting, drug-resistant epilepsy in the affected individuals, particularly younger people[2]
- The phenomenon of tumor regression following subtotal excision is well-documented in pilocytic astrocytomas[3,4], yet, to the authors' knowledge, it is the first such a report in an isomorphic astrocytoma
- It is possibly a significant finding, as despite the tumors' distinct pathological presentations, they might share some key characteristics, such as the aforementioned propensity for spontaneous regressions folllowing partial excisions
- The underlying mechanism of regression in not yet well understood. It is possible that the excision of a critical mass of the tumor stymies its ability to maintain its activity through limiting the blood supply to such a point, that the mass' energetic demands cannot be met, limiting its ability to perform effective vasculogenesis, leading to atrophy of its cells and allowing the host's immune system to take action against the remaining neoplasm

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JAGIELLONIAN UNIVERSITY MEDICAL COLLEGE

Kacper Grudzień
kacper.grudzien@student.uj.edu.pl