**Supplement files**

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**Figure S1** GSM Case 28: a 3-year-old boy. Axial T2-wieghted (A) and T2-Flair (B) images show a well-demarcated hyper-intense mass with mild hypo-to-iso-intense solid components (A, white asterisk) and an irregular uneven rim-wall (A, arrow heads) in the right temporal lobe. Mild-to-moderate adjacent edema (Ⅰ-Ⅱ) (B, arrow heads) is present. C. Axial pre-contrast T1-weighted image shows the mass appearing as iso-to-hypo-intense compared to adjacent normal brain. Note the mild-moderate-marked hyper-intense component located in the central part of the tumor (A, B, C, black asterisk), which indicates hemorrhage at different stages deposited in the necrotic cavity in the tumor. A moderate mass effect and right ventricle deformation due to compression can also be observed. Plain CT (D) shows the mass as a mixed hypo-to-iso-density mass with blurred boundaries (arrow heads). A more hypoattenuated region was identified in the center of the tumor (asterisk). Axial (E) and coronal (F) post-contrast T1-weighted images show ring-like asymmetrical thick rim enhancement with mural nodules (white arrow, E, F). Intratumoral tiny blood vasculature can also be observed (black arrow, E, F). Also, an eccentric cystic structure is clearly shown (F, asterisk), and the tumor was recognized as type Ⅱc. Gliosarcoma was identified after surgery.



**Figure S2** Case 29: a 23-year-old male patient. Axial T2WI image (A) demonstrates a hyperintense lesion with a punctate hypointense component located in the right basal ganglia, accompanied by mild peritumoral edema (Ⅰ). On axial T1WI (B), the lesion appears as a corresponding iso-to-hypo-intensity. Axial (C) and coronal (D) enhanced images show that an aneurysmal-like enhanced nodule (arrow) was found in the lesion, demonstrating a mild enhancement pattern. Two tiny drainage (or blood supply) blood vessels attached to both ends of the tumor are clearly observed (arrow head).

***MR and CT imaging***

MR images were obtained with a 1.5-T superconductive unit (Singa HD xt, GE Medical Systems, Umatilla, FL, United States), and a synergy spine coil was used. Contrast-enhanced sagittal, coronal, and transverse T1-weighted images were obtained after an intravenous injection of gadopentetate dimeglumine (Magnevist, Schering, Berlin, Germany) at a dose of 0.2 mmol/kg at a rate of 1.5 mL/s.

The CT examination was performed with a 320-detector volume CT system (Aquilion ONE, Toshiba, Japan) or a Somatom Definition dual-source CT (DSCT, Siemens Medical System, Forchheim, Germany). To obtain enhanced images, a 100-mL intravenous bolus dose of a non-ionic iodinated contrast agent (iopromide; Ultravist; Schering AG, Berlin, Germany) was administered at a rate of 3-4 mL/s.

*Criteria for subtypes on MRI images*

Tumors were assigned to Subtype Ⅰ when the tumor appeared as a cystic mass with ring- or rim-like enhancement of the tumor wall, for which the thickening was mild-to-moderate and the inner wall was smooth. When the degree of wall thickening was intermediate or marked (with a gradually increasing solid component of the tumor), accompanied by an inner wall that was becoming uneven and irregular in appearance (paliform pattern), then the tumor was classed as a subtype Ⅱ or Ⅲ. Subtype II tumors showed a lesser degree of wall thickening than subtype III tumors. Additionally, the inner side of the thickened walls in subtype III tumors were more likely to be uneven and irregular in appearance. When most areas of the tumor were composed of enhanced solid components, it was classified as subtype Ⅳ.