Atypical meningioma – is it time to standardise surgical sampling techniques?

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Letter to the editor

The World Health Organisation (WHO) Classification of Tumors of the Central Nervous System has recently been updated.1 Whilst dramatic changes have been made to gliomas with the inclusion of molecular markers, a more subtle change has been made to meningiomas that may have implications for clinical trials. The brain tumor community are focusing collaborative research on grade II and III meningiomas through an international consortium (<http://www.soc-neuro-onc.org/events/172/>). There are several international clinical trials for atypical meningiomas including ROAM/EORTC 1308,2 EORTC 1320 (<https://clinicaltrials.gov/ct2/show/NCT02234050>), RTOG 0593 (<https://www.rtog.org/ClinicalTrials/ProtocolTable/StudyDetails.aspx?study=0539>) and NRG-BN003 (personal communication, L. Rogers). Trial entry is contingent upon accurate histopathological diagnosis. The updated WHO classification includes an important change, namely that brain invasion in addition to mitotic count of 4-20 mitoses per 10 high power microscopic fields, is now diagnostic for atypical meningioma. Whilst the new WHO change is unlikely to lead to increased reporting, as previously observed,3 it has potential implications for neurosurgeons. The surgical technique for meningioma resection is internal tumor decompression or ‘piecemeal’ resection, followed by microsurgical dissection of the tumor-brain interface. The process of tumor debulking leads to sample loss in the suction and only rarely can the neurosurgeon perform en bloc resection and provide the neuropathologist with the ‘perfect’ specimen. The impact of surgical sampling on glioma grading is well recognised, but perhaps underappreciated and little discussed in meningiomas.4 Although neuropathologists often work with limited surgical samples, the neurosurgeon should provide the best possible specimens for diagnosis and research. Accurate assessment of brain invasion is important for meningioma prognostication,5,6 and sampling limitations may miss a brain-invasive meningioma leading to under-grading and a potentially different management course than the one most suitable, including participation in clinical trials.

The updated WHO classification places an emphasis on accurate assessment of brain invasion. Meningiomas broadly fall into two categories: the minority that do not invade the pial surface and can be resected without disruption of the brain, and the majority where parenchymal disruption occurs during surgery.4 In the former, sampling of the resection cavity would not be appropriate, however in the latter, the neurosurgeon may observe macroscopic brain invasion, and this raises an important question: “should sampling of the tumor-brain interface be made to specifically to address the issue of microscopic brain invasion?” This would involve a paradigm shift in surgical practice, but one that should be considered. As a corollary, an absence of brain tissue in the surgical specimen precludes the possibility of neuropathological assessment of invasion and leads to a second question: “should pathologists report the presence/absence of brain tissue with which to assess invasion?” Previous studies have shown that extensive and systematic surgical sampling in combination with thorough histopathology assessment increases reporting of brain invasion.4 Here we propose a possible paradigm.

**Neurosurgeon’s role:**

* Label samples known or likely to contain brain tissue as ‘tumor-brain interface’.

**Neuropathologist’ role:**

* Inspect highlighted samples for the presence of brain tissue.

Based on the above the following statements can be made:

1. Brain invasion present
2. Brain invasion absent

A more pertinent question is whether the time is ripe to move away from histopathology definitions and rely on identifying molecular markers of recurrence and response to therapy - so-called molecular oncology. Although this is possible for gliomas, our molecular understanding of meningiomas is insufficiently developed at the present time. Accurate grading and systematic tissue collection for research, as part of an international collaboration is required due to the rarity of atypical (and anaplastic) meningiomas.

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