A Case Report of Intracranial Angiomatoid Fibrous Histiocytoma: The first case in Asia and of the oldest age so far

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Case Description

- A case report of intracranial AFH being treated and followed-up at the Department of Neurosurgery, PMH, since 2018
- First case of intracranial AFH in Asia and of the oldest patient with intracranial AFH ever reported
- F/67
- Self-ambulatory
- Past medical history:
  - Ischaemic heart disease, on aspirin
  - Hypothyroidism, on thyroxine replacement
- Presentation:
  - Worsening vertigo in mid-2018
  - P/E: right intention tremor with no other neurological deficit
- Investigations:
  - MRI brain:
    - A right posterior cranial fossa extra-axial torcular lesion
    - Vasogenic edema
    - Mild hydrocephalus
    - Abutting the torcular herophili, right transverse sinus and occipital sinus
  - PET-CT: no evidence of any primary malignancy or distant metastasis
  - Tumour markers: unremarkable

Pre-operative MRI in July 2018 showed a 2.9x2.8x3.1cm (TSxAPxCC) right posterior cranial fossa extra-axial mass with vasogenic edema.
Operations

- First tumour excision in August 2018
  - Small residual tumour left behind due to close adherence to torcular sinus
- Recurrence 7 months after first excision
  - Presented with worsening vertigo again
  - MRI brain: interval enlargement of residual tumour
- Second tumour excision in July 2019
  - Clear resection margin achieved with opening of torcular sinus
- No recurrence on subsequent follow-up MRI scans

Residual tumour after first operation

MRI brain in October 2018 showed a 10x6x7mm (transaxial x height) residual nodular lesion with rim enhancement at the resection margin.

Recurrence after first operation

MRI brain in March 2019 showed interval enlargement of the residual tumour (1.6x1x1.9cm) with perifocal edema. It abutted the straight sinus as shown.

No recurrence after second operation

MRI brain in August 2019 showed no evidence of tumour recurrence.
Pathology

- Pathological features of the resected specimen:
  - Dense plasmacytosis
  - Focal increase in IgG4-positive plasma cells
- Uncertain significance of the pathological features
  - Fall short of diagnostic histological criteria of IgG4-related disease
  - May correlate with serum IgG4 level
- Diagnosis of intracranial AFH confirmed with AFH-consistent genetic markers
  - Fluorescence in-situ hybridization (FISH): EWSR1 gene rearrangement in >50% of tumour cells
  - Reverse transcription and real-time PCR: negative for EWSR1-ATF1 and EWSR1-CREB1 fusion transcripts
  - Illumina Pan-cancer RNA-sequencing panel analysis: positive for chimeric transcript EWSR1-CREM and chimeric transcript CRKL-PI4KA

Dense plasmacytosis

CD68 staining for IgG4-positive plasma cells

FISH showed EWSR1 gene rearrangement.
Discussion

- Angiomatoid fibrous histiocytoma (AFH)
  - Rare low-grade soft tissue neoplasm
  - More commonly affects the extremities
  - More commonly occurs in children and young adults
  - Infrequently recurs and rarely metastasizes
  - Only 5 case reports of intracranial AFH published worldwide so far
- The ages of the previously published cases ranged from 17 to 58. The age of our patient is 67, which is the oldest so far.
- All of the previously published cases were reported in the United States or the United Kingdom. Our patient is the first reported case in Asia with intracranial AFH.
- EWSR1 gene rearrangement with or without EWSR1 fusion gene have been described in 4 of the previously published 5 case reports.
- Gross total excision was the treatment for 4 of the previous cases, 3 out of which had no recurrence after gross total excision.

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Age/Sex</th>
<th>Presentation</th>
<th>Tumour location</th>
<th>Genetic marker(s)</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dunham et al., 2008</td>
<td>25/Male</td>
<td>Headache, vomiting and visual disturbance</td>
<td>Left occipital lobe</td>
<td>EWSR-ATF1 fusion gene</td>
<td>Gross total excision</td>
<td>No recurrence</td>
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<tr>
<td>Ochalski et al., 2010</td>
<td>35/Male</td>
<td>Right facial weakness</td>
<td>Left temporal lobe</td>
<td>Rearranged EWSR1</td>
<td>8 times of gross total excision, and GKR</td>
<td>8 recurrences, and death from hydrocephalus</td>
</tr>
<tr>
<td>Hansen et al., 2015</td>
<td>17/Female</td>
<td>Headache, visual disturbance and anaemia</td>
<td>Bilateral occipital lobes</td>
<td>None</td>
<td>Gross total excision</td>
<td>No recurrence</td>
</tr>
<tr>
<td>Alshareef et al., 2016</td>
<td>58/Female</td>
<td>Right facial weakness and pain</td>
<td>Right porous trigeminus</td>
<td>Rearranged EWSR1</td>
<td>Gross total excision</td>
<td>No recurrence</td>
</tr>
<tr>
<td>Sion et al., 2020</td>
<td>43/Male</td>
<td>Headache, visual disturbance and transient dysphasia</td>
<td>Left occipital lobe and left suboccipital lobe</td>
<td>EWSR1-ATF1 fusion gene</td>
<td>Excision with significant debulking (95%)</td>
<td>Surveillance with MRI in 6 months</td>
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Conclusion

- **Intracranial** involvement of AFH is exceedingly rare.
  - Only a few case reports are available worldwide.
  - Our case is the first case in Asia and is of the oldest age so far.
- **EWSR1 gene rearrangement** with or without EWSR1-ATF1 fusion gene is a typical feature to support the diagnosis of AFH.
- The behaviour of AFH could be **locally invasive** with **rapid growth**.
- **Gross total resection** is the treatment of choice for AFH.