SMART syndrome mimicking glioblastoma recurrence 6 years after surgical excision and radiotherapy: A Case Report

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Stroke-like migraine attacks after radiation therapy (SMART) syndrome
- a rare, reversible syndrome that occurs in patients having received radiotherapy for intracranial neoplasms.
- occurs quite a few years after intracranial irradiation.
- patients typically present with headache, seizures, or other focal neurological deficits mimicking disease recurrence or sub-acute stroke.

The exact mechanism of SMART syndrome: unknown. Preliminary investigations suggested post-radiation neuronal dysfunction may be the underlying mechanism.¹
35-year-old gentleman, table tennis coach

Admitted to our unit with malignant and vascular right parieto-occipital tumour in MRI presenting with left sided headache in 2014.

Craniotomy and excision of brain tumour in 2014.
- Pathology: glioblastoma multiforme, negative for MGMT.

Gliolan fluorescence guided excision 2 weeks after the first operation due to residual tumor in post-operative MRI.

Post-operative chemoradiotherapy and adjuvant temozolomide were completed in 2015.

Patient survived till today 6 years after the operation at the age of 41, and worked as a table tennis coach still.

He presented to us in May 2020 with headache, fever and transient left upper limb weakness. His symptoms resolved in weeks, and he was able still to work.
MRI in May 2020 - gyriform enhancement pattern over right cerebrum, worrisome of tumour recurrence.

MRI in Aug 2020 - resolved abnormal gyriform signal change and swelling in the right cerebrum, no tumour recurrence.
## Discussion

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<th>SMART syndrome</th>
<th>Stroke</th>
<th>Recurrent tumour</th>
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<tr>
<td><strong>Clinical features</strong></td>
<td>- History of brain irradiation for cancer</td>
<td>- Cerebrovascular risk factors such as atrial fibrillation, carotid stenosis, hypertension, hyperlipidaemia</td>
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<td>- Partial/complete reversal of symptoms</td>
<td>- Acute symptoms</td>
<td>- Progressive symptoms</td>
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<td><strong>Typical MRI features</strong></td>
<td><strong>Increased T2 hyperintensity and gyral enhancement in the previously radiated area</strong></td>
<td><strong>Intravascular thrombus</strong></td>
<td><strong>Well circumscribed lesion</strong></td>
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<td>- Vascular hyperintensity on FLAIR</td>
<td>- Increased perfusion in the affected area</td>
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<td>- Vascular territory in MRI finding</td>
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<td><strong>Short-term follow-up MRI</strong></td>
<td><strong>Partial/complete reversal of MRI findings</strong></td>
<td><strong>Persistence of the abnormal signal</strong></td>
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The occurrence of SMART syndrome as a rare delayed complication of brain tumour irradiation may be potentially misdiagnosed as tumour recurrence or stroke.

Given its self-limiting nature, early recognition of this syndrome is paramount.

It has a favourable response to conservative treatment with complete or partial reversal of their radiological findings within months.

Proper recognition of this syndrome can prevent invasive diagnostic techniques such as brain biopsy or vascular imaging.

There is no proven method for treatment of SMART syndrome. Some authors suggest steroid pulse therapy may provide speedy recovery from and diagnosis of SMART syndrome, and it should be considered before invasive investigations.

References:
2 Daniel April, MD,1 Neil Lall, MD,2 Andrew Steven, MD1. Stroke-Like Migraine Attacks After Radiation Therapy Syndrome. Ochsner Journal 20:6–9, 2020 DOI: 10.31486/toj.19.0090

~The End~

Conclusion

- The occurrence of SMART syndrome as a rare delayed complication of brain tumour irradiation may be potentially misdiagnosed as tumour recurrence or stroke.
- Given its self-limiting nature, early recognition of this syndrome is paramount.
- It has a favourable response to conservative treatment with complete or partial reversal of their radiological findings within months.
- Proper recognition of this syndrome can prevent invasive diagnostic techniques such as brain biopsy or vascular imaging.
- There is no proven method for treatment of SMART syndrome. Some authors suggest steroid pulse therapy may provide speedy recovery from and diagnosis of SMART syndrome, and it should be considered before invasive investigations.