Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Eosinophilic meningoencephalitis revealing classical Hodgkin lymphoma: a case report

Manon Havet

manon.havet@aphp.fr

AP-HP, Hôpital Henri Mondor

Valentine Perrain

AP-HP, Hôpital Henri Mondor

Blanche Bapst

AP-HP, Hôpital Henri Mondor

Axel André

AP-HP, Hôpital Henri Mondor

Mickael Bonnan

AP-HP, Hôpital Henri Mondor

Case Report

Keywords: Hodgkin lymphoma, Eosinophils, Meningitis, Encephalitis

Posted Date: May 19th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9354695/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background. Eosinophilic meningoencephalitis is a rare neurological manifestation of classical Hodgkin lymphoma and remains incompletely characterized to date.

Case presentation. We present a case of eosinophilic meningoencephalitis revealed by progressive headaches, profuse sweating and memory impairment. A brain magnetic resonance imaging (MRI) scan revealed multiple supratentorial hyperintensities on FLAIR sequences, and analysis of the cerebrospinal fluid (CSF) showed a lymphocytic and eosinophilic pleocytosis with elevated protein levels. Following the onset of altered consciousness, treatment with intravenous corticosteroids was initiated, leading to rapid improvement in symptoms. Follow-up brain and spinal MRI scan showed a decrease in FLAIR hyperintensities with persistent diffuse punctate contrast enhancement. Laboratory tests were normal, except for elevated circulating cell-free DNA levels in the blood, consistent with Hodgkin lymphoma, while CSF analysis was negative. A whole-body computed tomography scan revealed a mediastinal mass associated with thoracic lymphadenopathy. A lymph node biopsy confirmed a diagnosis of classical Hodgkin lymphoma. The patient was treated with systemic chemotherapy according to the BEACOPD-ABVD protocol, resulting in complete remission of the lymphoma. Eight months after treatment, the patient remains asymptomatic, with regression of the previously observed cerebral and spinal contrast enhancements.

Conclusion. The biological and radiological findings, together with the significant response to corticosteroids of the neurological involvement, suggest an autoimmune paraneoplastic process associated with lymphoma. However, direct neuro-meningeal infiltration cannot be definitively ruled out, especially given the presence of eosinophils in the CSF.

Background

Neurological disorders caused by classical Hodgkin lymphoma (CHL) are extremely uncommon. It most often manifests as meningeal infiltration[1] or as a secondary paraneoplastic neurological syndrome [2, 3]. These rare presentations remain poorly characterized. Here, we report a case of Hodgkin lymphoma presenting as steroid responsive eosinophilic meningoencephalitis.

Case report

A 37-year-old Moldovan woman presented with a week-long history of progressive headaches, profuse sweating and short-term memory loss. Her medical history was untreated Hashimoto’s thyroiditis.

Physical examination revealed a confusional state, diffuse brisk deep tendon reflexes, and bilateral Babinski sign. Her body temperature was 38.1°C and general examination was otherwise unremarkable.

Brain MRI demonstrated diffuse, bilateral supratentorial hyperintensities involving both white and gray matter on FLAIR sequence (Fig. 1-A). Cerebrospinal fluid analysis revealed an aseptic meningitis with

480 white blood cells/mm^3 (73% lymphocytes, 19% eosinophils) and high proteins level (133 mg/dL). Laboratory studies revealed a white cell count of 14 G/L without eosinophilia and C-reactive protein level of 129 mg/L.

The patient's clinical condition gradually worsened over the following days, with impaired consciousness, prompting the intravenous administration of methylprednisolone (one gramme per day during three days). Hours after the first dose, the patient showed clear clinical improvement and complete clinical resolution was obtained after three doses.

On follow-up brain MRI, lesion burden had decreased with diffuse punctate contrast enhancement (Fig. 1B-C). Spinal MRI showed multiple punctate enhancing intramedullary lesions at several levels, mainly in the cervical and upper thoracic regions (Fig. 2A-B). Inflammatory markers gradually improved in cerebrospinal fluid and blood analyses, while eosinophils slowly subsided in follow-up lumbar punctures. Intrathecal IgG synthesis was low. CSF cultures for mycobacteria and bacteria, and CSF serological studies for syphilis, toxoplasma, toxocariasis, rickettsiosis and cysticercosis were all negative. Metagenomic analysis of the CSF was also negative.

Autoimmune testing, including antinuclear antibodies, anti-neutrophil cytoplasmic antibodies (ANCA), antineuronal antibodies as well as anti-myelin oligodendrocyte glycoprotein (anti-MOG) antibodies were negative. Anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-TG) antibodies were positive in blood sample but negative on CSF analysis.

CSF cytology revealed no malignant cells. Hematological analyses, including B- and T-cell clonality assessment and MYD88 mutation testing, were negative. Lymphocyte immunophenotyping showed an absence of B cells. Cytokine measurements revealed IL-6 and IL-10 levels of 3.9 and 1.04 ng/L, respectively. Circulating cell-free deoxyribonucleic acid (cfDNA) was undetectable in the CSF but detectable in peripheral blood, exhibiting a profile consistent with the histopathological diagnosis of CHL.

Whole-body computed tomography (CT) and positron emission tomography–computed tomography (PET-CT) demonstrated an anterior mediastinal mass with increased fluorodeoxyglucose (FDG) uptake (maximum standardized uptake value [SUVmax] 19.4) and associated anterior superior mediastinal lymphadenopathy (SUVmax 13.5), without evidence of extramediastinal disease. Pathological examination of a biopsy from the right supraclavicular lymph node confirmed nodular sclerosis Hodgkin lymphoma, classified as stage IIB.

Systemic chemotherapy with BEACOPD (bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, prednisone, and dacarbazine), followed by ABVD (doxorubicin, bleomycin, vinblastine, and dacarbazine), resulted in complete remission of the lymphoma on PET-CT. No hematological or neurological relapse has been observed after lymphoma treatment ended. Brain and spinal follow up MRI, eight months after the end of treatment, showed complete regression of enhancing lesions (Fig. 1D-E, Fig. 2D-E).

Discussion

Several central nervous system disorders have been reported in the course of Classical Hodgkin Lymphoma, particularly paraneoplastic syndromes and neuro-meningeal infiltration. We describe a case of eosinophilic meningoencephalitis whose pathophysiology remains uncertain.

Classic paraneoplastic syndromes described in association with CHL[3] do not appear to correspond to our patient's presentation, suggesting that alternative mechanisms may be involved. In fact, the clinical, biological, and radiological findings resemble those observed in acute disseminated encephalomyelitis (ADEM), particularly with respect to the inflammatory characteristics of the lesions and the rapid, marked response to corticosteroid therapy. This pronounced steroid responsiveness further supports the hypothesis of an underlying inflammatory or immune-mediated process. Furthermore, the absence of tumor cells in the CSF, together with the detection of cfDNA consistent with Hodgkin lymphoma in the blood but not in the CSF, also argues in favor of a dysimmune rather than a direct neoplastic mechanism of central nervous system (CNS) involvement.

Nevertheless, neuromeningeal infiltration by Hodgkin lymphoma cells cannot be definitively ruled out. Eosinophilic meningitis is a recognized manifestation of meningeal involvement in classical Hodgkin lymphoma. Previous reports[4– 6] have shown that minimal tumor infiltration can be missed on cytology and only detected after repeated lumbar punctures, indicating that localized CNS involvement may occur despite initially negative findings. In two such cases [5, 6], lymphoma cells were identified in brain tissue sections, confirming intracranial involvement of CHL. From a pathophysiological perspective, eosinophils are considered to play a key role in the development and maintenance of CHL within the tumor microenvironment, particularly by contributing to the pathogenesis and proliferation of neoplastic cells [7]. However, it remains unclear whether a similar mechanism could explain the meningeal infiltration in our case.

To date, no comparable cases have been described in the literature, precluding any firm conclusion as to whether eosinophilic infiltration reflects neuro-meningeal involvement of Hodgkin lymphoma or a secondary inflammatory response induced by the lymphoma. A biopsy was not performed in our patient due to the early administration of corticosteroids for significant disturbances of consciousness, which resulted in marked regression of the FLAIR hyperintensities. Notably, follow-up after systemic chemotherapy also showed regression of the hyperintensities and contrast enhancement, although interpretation of the treatment response remains challenging given the rarity of this presentation and uncertainties regarding the integrity of the blood–brain barrier in this context. Collectively, these findings underscore the complexity of central nervous system involvement in Hodgkin lymphoma and highlight the potential for overlapping mechanisms, in which inflammatory and neoplastic processes may coexist or interact.

Conclusion

The marked corticosteroid responsiveness and the inflammatory ‘ADEM-like features' of the lesions suggest an immune-mediated process associated with Hodgkin lymphoma. However, a direct neuromeningeal infiltration by the lymphoma cannot be formally excluded. The role of eosinophils remains to be clarified.

(A) Initial brain MRI FLAIR sequence: bilateral diffuse supratentorial hyperintensities involving both white and gray matter.

(B-C) MRI after corticosteroid therapy. **(B)** FLAIR sequence: reduction of previously observed hyperintensities. **(C)** Gadolinium-enhanced T1-weight sequence: presence of diffuse punctate contrast enhancement at location of FLAIR lesions.

(D-E) MRI eight months after treatment ended. **(D)** FLAIR sequence: reduction of previously observed hyperintensities. **(E)** Gadolinium-enhanced T1-weight sequence: regression of previously observed punctate contrast-enhancing lesions.

(A-C) illustrating spine MRI shortly after corticosteroid therapy. **(A)** Sagittal gadolinium-enhanced T1 (T1-enh.) sequence showing punctate contrast-enhancing lesions in the cervical and upper thoracic spinal cord. **(B)** Axial T1-enh. sequence showing punctate contrast-enhancing lesions at C5 level. **(C)** Sagittal T2 spin-echo sequence showing no abnormal hyperintensity.

(D-F) illustrating follow up spine MRI eight months after treatment ended. **(D)** Sagittal T1-enh. image demonstrating regression of previously observed punctate contrast enhancement. **(E)** Axial T1-enh. sequence showing regression of punctate contrast-enhancing lesions at C5 level. **(F)** Sagittal T2 spin-echo sequence showing no abnormal hyperintensity.

Abbreviations

ADEM	Acute Disseminated Encephalomyelitis
ANCA	Anti-Neutrophil Cytoplasmic Antibodies
Anti-MOG	Anti-Myelin Oligodendrocyte Glycoprotein
Anti-TG	Anti-Thyroglobulin
Anti-TPO	Anti-Thyroid Peroxidase
cfDNA	Cell-Free Deoxyribonucleic Acid
CHL	Classical Hodgkin Lymphoma
CNS	Central Nervous System
CSF	Cerebrospinal Fluid

CT	Computed Tomography
FDG	Fluorodeoxyglucose
MRI	Magnetic Resonance Imaging
PET-CT	Positron Emission Tomography– Computed Tomography
SUVmax	Maximum Standardized Uptake Value

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

The patient gave written informed consent for their personal or clinical details along with any identifying images to be published in this study.

Availability of data and materials

The data supporting the conclusions of the study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare no competing interests

Funding

None

Authors' contributions

MH, AA, VP were involved in clinical diagnosis and care; BB was involved in radiological diagnosis; MH collected the data and drafted the manuscript; MH, VP, AA, BB, MB revised the manuscript; VP, MB supervised this study. All authors reviewed and approved the final manuscript.

Acknowledgements

We thank the healthcare team involved and the patient for consenting to publication.

References

1. Lee H, Ahn S, Cha SH, Cho WH. Intracranial involvement of systemic Hodgkin lymphoma : a case report and literature review. Brain Tumor Res Treat. 2024 Jan;12(1):63-69.
2. El Fakih R, Bajuaifer YS, Shah AY, Sulaiman R, Almohamady R, El Gohary G, et al. Paraneoplastic syndromes associated with classic Hodgkin lymphoma : a systematic literature review. Ann Hematol. 2024 Apr;103(4):1131-1137.
3. Graus F, Ariño H, Dalmau J. Paraneoplastic neurological syndromes in Hodgkin and non-Hodgkin lymphomas. Blood. 2014 May 22;123(21):3230-3238.
4. Strayer DR, Bender RA. Eosinophilic meningitis complicating Hodgkin's disease: a report of a case and review of the literature. Cancer. 1977 Jul;40(1):406-409.
5. Patchell R, Perry MC. Eosinophilic meningitis in Hodgkin disease. Neurology. 1981 Jul;31(7):887-888.
6. Calame JJ, van't Wout JW, van Dijk JG, Bots GT. A case of eosinophilic meningo-encephalitis accompanied by eosinophilic inflammation of the myenteric plexus in Hodgkin's disease. Histopathology. 1986 May;10(5):535-539.
7. Danielson DT, Aguilera NS, Auerbach A. Head and neck classic Hodgkin, T and NK lymphomas with eosinophilia. Head Neck Pathol. 2025 Jan 28;19(1):10.

Figures

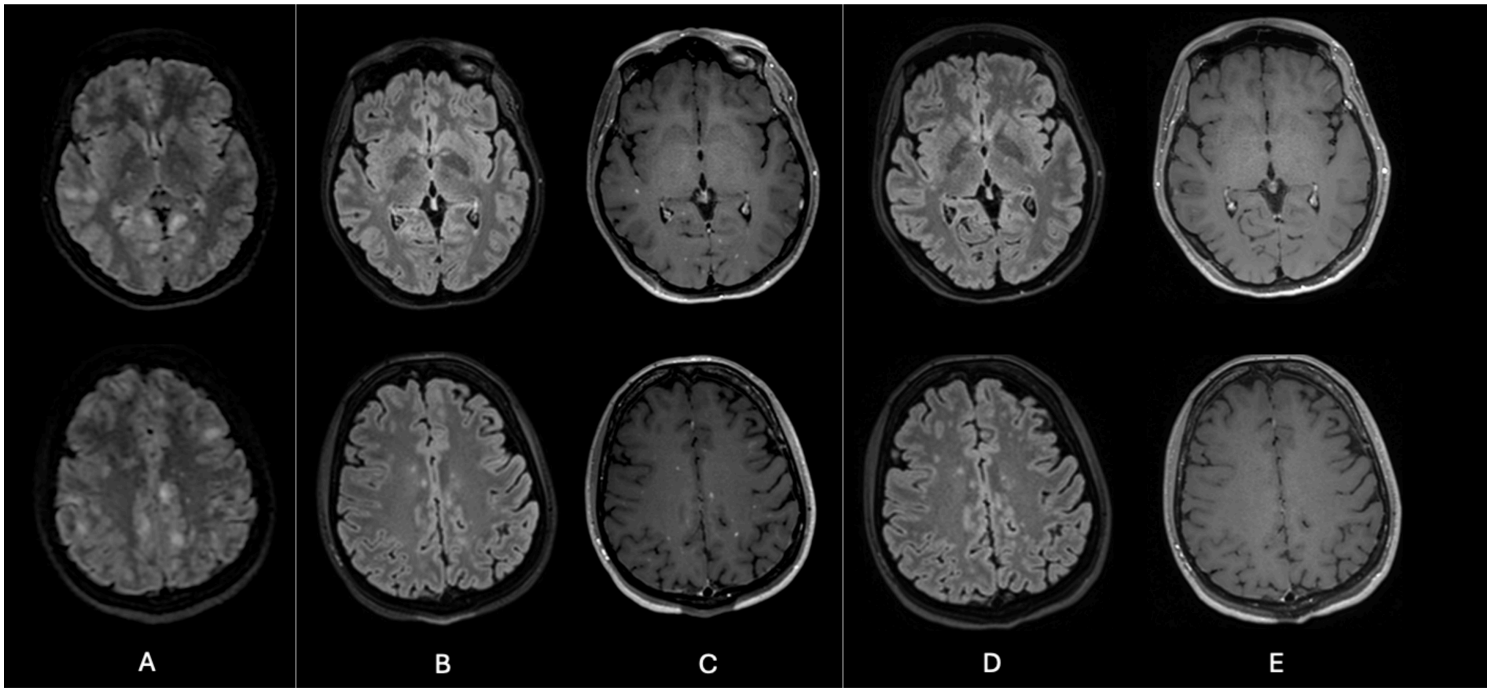


Figure 1

Evolution of axial brain MRI findings during the course of the patient’s treatment.

(A) Initial brain MRI FLAIR sequence: bilateral diffuse supratentorial hyperintensities involving both white and gray matter.

(B-C) MRI after corticosteroid therapy. **(B)** FLAIR sequence: reduction of previously observed hyperintensities. **(C)**Gadolinium-enhanced T1-weight sequence: presence of diffuse punctate contrast enhancement at location of FLAIR lesions.

(D-E) MRI eight months after treatment ended. **(D)** FLAIR sequence: reduction of previously observed hyperintensities. **(E)** Gadolinium-enhanced T1-weight sequence: regression of previously observed punctate contrast-enhancing lesions.

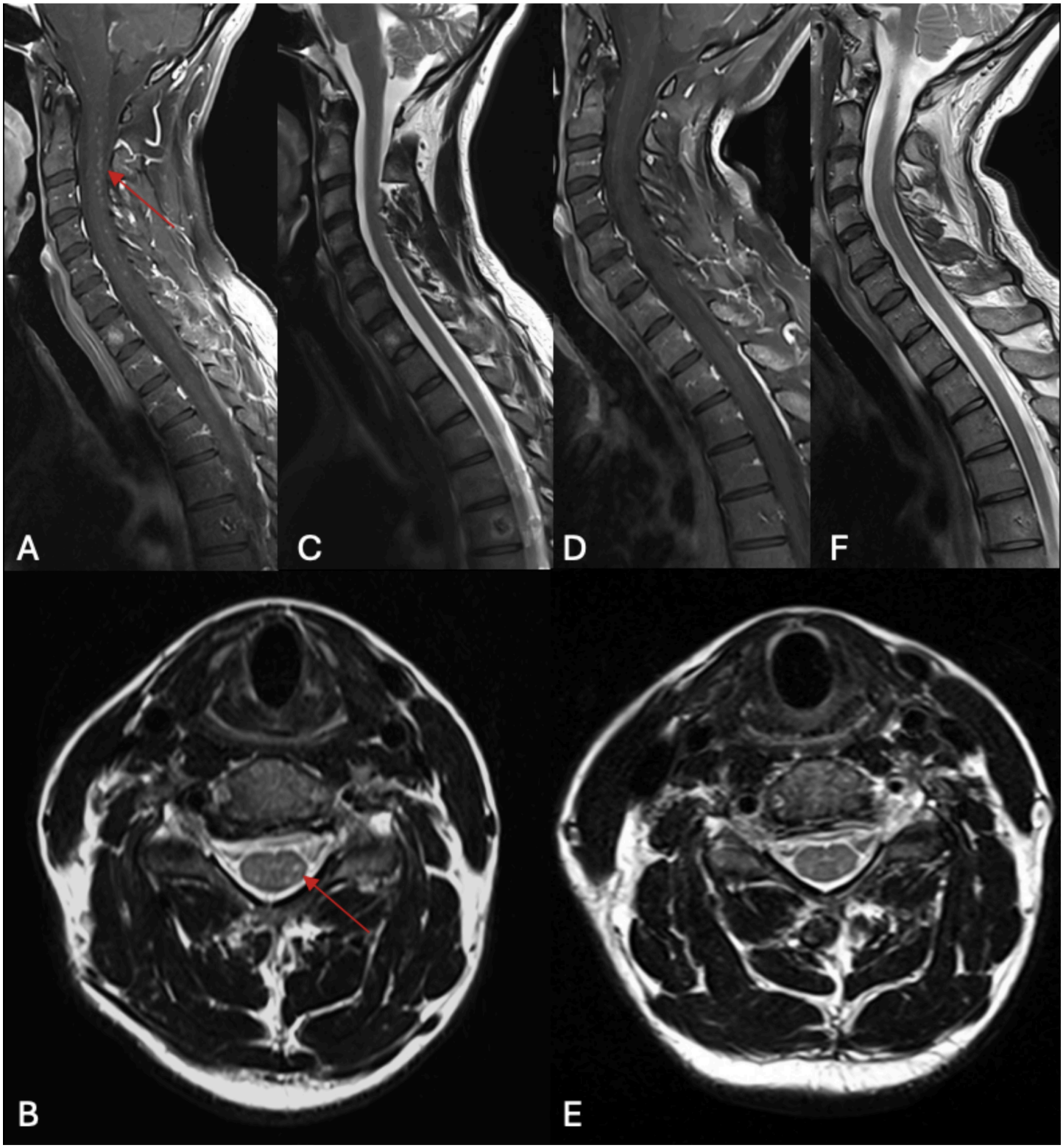


Figure 2

Evolution of spinal MRI findings during the course of the patient's treatment

(A-C) illustrating spine MRI shortly after corticosteroid therapy. **(A)** Sagittal gadolinium-enhanced T1 (T1-enh.) sequence showing punctate contrast-enhancing lesions in the cervical and upper thoracic spinal

cord. **(B)**Axial T1-enh. sequence showing punctate contrast-enhancing lesions at C5 level. **(C)**Sagittal T2 spin-echo sequence showing no abnormal hyperintensity.

(D-F) illustrating follow up spine MRI eight months after treatment ended. **(D)**Sagittal T1-enh. image demonstrating regression of previously observed punctate contrast enhancement. **(E)** Axial T1-enh. sequence showing regression of punctate contrast-enhancing lesions at C5 level. **(F)** Sagittal T2 spin-echo sequence showing no abnormal hyperintensity.