Journal of Hematology & Multiple Myeloma

Case Report
Published: 31 Jul, 2023

Assessment of CNS Involvement in a Patient with Multiple Myeloma with CT and MRI: A Case Report

Thomas B, Persefoni M, Christina B and Anastasia Z*

Department of Clinical Radiology, University Hospital of Ioannina, Greece

Abstract

We report a case of leptomeningeal involvement of the brain and spinal cord in a multiple myeloma patient under treatment. The patient was referred to the hematology department due to altered mental status and sensory deficits of the upper extremities. Brain CT after contrast administration revealed abnormally enhancing leptomeninges. Additionally, brain and full spine MRI were performed to estimate disease burden and document marrow infiltration. We emphasize the role of CT and conventional and contrast-enhanced MRI in depicting CNS involvement.

Keywords: Multiple myeloma; CT; MRI; Infiltration of CNS

Case Presentation

A 79-years-old woman diagnosed with multiple myeloma receiving treatment presented with numbness of the upper extremities and changes in mental function and behavior.

Contrast-enhanced Computed Tomography (CT) of the brain demonstrated abnormally enhancing leptomeninges (Figure 1). A hyperdense and avidly enhancing macronodular lesion was depicted in the right parietal lobe with perilesional edema and mass effect abutting the adjacent dura (Figure 2). In addition, there were identified multiple osteolytic lesions throughout the calvarium, compatible with plasma cell infiltrated bone lesions.

Brain MRI showed the lesion in the parietal lobe as an enhancing lesion with direct contact with the dura surrounded by interstitial edema (Figure 3). In addition, there was noted diffuse leptomeningeal enhancement of the cerebellum (Figure 4) with increased signal of the adjacent white matter of the cerebellum and of the cerebellar vermis in T2w images, corresponding to edema.

There was also diffuse micronodular leptomeningeal enhancement along the spinal cord with local extension of soft tissue masses causing narrowing of the anterior and posterior subarachnoid space (Figure 5).

Diffuse heterogeneity of the spinal bone marrow with multiple regions of low T_1 signal in the vertebrae confirmed the presence of foci of multiple myeloma.

Discussion

Multiple Myeloma (MM) is a hematologic malignancy characterized by an uncontrolled proliferation of malignant plasma cells and monoclonal protein in the blood or urine. Plasma cells usually are confined to bone marrow however they can spread and infiltrate any systemic organ which is seen in 10% to 16% of myeloma cases leading to organ dysfunction [1,2].

Nowadays, extramedullary myeloma rates are reported higher than in the past, likely related to the widespread imaging by CT, MRI and FDG PET/CT [3].

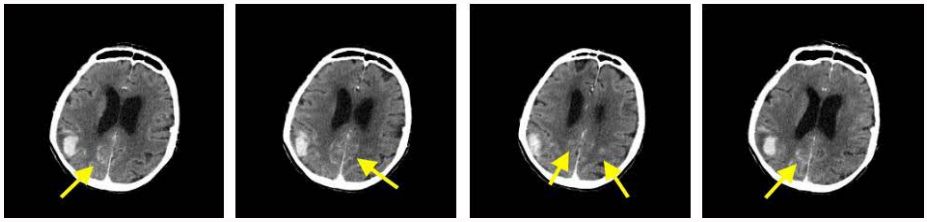

Figure 1: CT of the brain with intravascular contrast injection showing micronodular leptomeningeal enhancement on the right parietal lobe bilaterally.

OPEN ACCESS

Correspondence:
Margariti Persefoni, Department of Clinical Radiology, University Hospital of Ioannina, St Niarchou, Greece

Received Date: *06 Jul 2023*
Accepted Date: *19 Jul 2023*
Published Date: *31 Jul 2023*

Citation:
Thomas B, Persefoni M, Christina B, Anastasia Z. Assessment of CNS Involvement in a Patient with Multiple Myeloma with CT and MRI: A Case Report. J Hematol Mult Myeloma. 2023; 6(1): 1027.

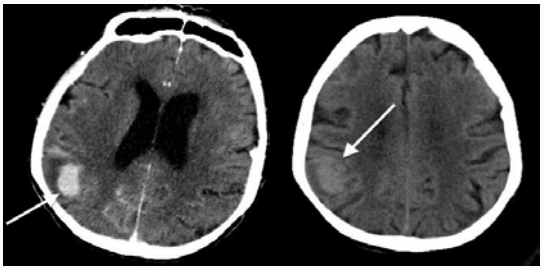

Figure 2: CT of the brain before and after contrast injection showing a hyperdense and avidly enhancing macronodular lesion on the right parietal lobe with perilesional edema and mass effect abutting the adjacent dura.

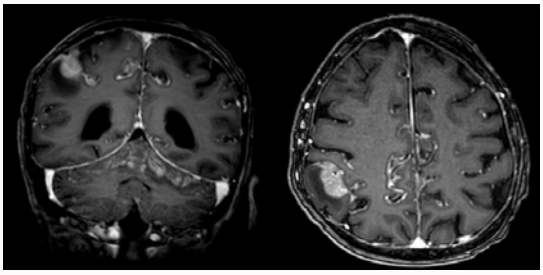

Figure 3: Coronal and axial T_1 W after contrast injection showing the enhancing lesion in the parietal lobe, in contact with the dura matter, surrounded by edema.

Figure 4: Axial T_1 weighted image with intravascular gadolinium depicting leptomeningeal enhancement of the cerebellum.

According to Bladé et al. [4], extramedullary myeloma may originate from two different pathways. The first one involves contiguous extraskeletal extension of myelomatous masses. The less common mechanism involves hematogenous metastatic spread of a subclone of myeloma cells that has decreased expression of cell surface adhesion receptors, allowing for bone marrow escape [4].

The Central Nervous System (CNS) is an unusual location of extramedullary involvement and is diagnosed in less than 1% of MM patients [1-3]. Therefore, the available data on CNS MM are extremely sparse and mainly come from case reports and retrospective studies on a limited number of patients.

CNS involvement by MM can be primary MM or relapsing MM with CNS infiltration. The involvement of CNS presents with cerebral, cranial nerve and spinal nerve roots symptoms. The prognosis of patients with CNS MM is dismal, with a median survival of 1.5 months [2,5].

It may manifest as Dural myeloma or intraparenchymal infiltration of the brain or spinal cord, or with diffuse leptomeningeal involvement [2,6]. Dural involvement of myeloma without parenchymal or leptomeningeal disease is even rarer. Intraventricular involvement of CNS-MM, has been reported only in a single case report [7].

Figure 5: Sagittal T_1 weighted image of the cervical spine showing micronodular leptomeningeal enhancement and local extension to the spinal cord parenchyma.

On CT and MRI there are depicted pachymeningeal and leptomeningeal micro- or macro-nodular enhancing deposits followed by intraparenchymal brain lesions and direct extra-axial extension of disease from the adjacent bony calvarium.

Our case presented with both leptomeningeal disease and with intraparenchymal extension in contact with a thickened dura matter.

The intracranial and intraspinal tumors appear hyperdense on CT and enhance with contrast [8]. Although variable appearances have been documented on MRI the tumors are mostly high signal intensity on the T_2 sequences but may be isointense, isointense to slightly hypointense with respect to grey matter on T_1-weighted sequences. There may be homogenous or heterogenous enhancement. In large tumors vasogenic edema of the adjacent brain parenchyma maybe seen [3].

Conclusion

Although rare, CNS involvement in multiple myeloma patients should be kept in mind when facing with altered clinical behavior. CT and MRI can help to depict the intracranial myeloma and investigate the origin of infiltration, either from the bone or dura directly infiltrating the brain/spine or by hematogenous spread.

References

1. Paludo J, Painuly U, Kumar S, Gonsalves WI, Rajkumar V, Buadi F, et al. Myelomatous involvement of the central nervous system. Clin Lymphoma Myeloma Leuk. 2016;16(11):644-54.
2. Nieuwenhuizen L, Biesma DH. Central nervous system myelomatosis: Review of the literature. Eur J Haematol. 2008;80(1):1-9.
3. Lee W, Chen RC, Swaminathan SK, Ho CL. Extramedullary multiple myeloma with central nervous system and multiorgan involvement: Case report and literature review. J Radiol Case Rep. 2019;13(12):1-12.
4. Bladé J, Fernández de Larrea C, Rosiñol L, Cibeira MT, Jiménez R, Powles R. Soft-tissue plasmacytomas in multiple myeloma: Incidence, mechanisms of extramedullary spread, and treatment approach. J Clin Oncol. 2011;29(28):3805-12.
5. Petersen SL, Wagner A, Gimsing P. Cerebral and meningeal multiple

myeloma after autologous stem cell transplantation. A case report and review of the literature. Am J Hematol. 1999;62(4):228-33.

6. Patriarca F, Zaja F, Silvestri F, Sperotto A, Scalise A, Gigli G, et al. Meningeal and cerebral involvement in multiple myeloma patients. Ann Hematol. 2001;80(12):758-62.
7. Eum JH, Jeibmann A, Wiesmann W, Paulus W, Ebel H. Multiple myeloma manifesting as an intraventricular brain tumor. J Neurosurg. 2009;110(4):737-9.
8. Gregorio LM, Soyemi TO. Multiple myeloma presenting as dural plasmacytoma. Radiol Case Rep. 2019;14(8):1007-13.