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Case Report

Multiple primary diffuse large B-cell lymphoma masquerading as meningioma

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ABSTRACT

Background: Primary non-Hodgkin's lymphoma with multiple extra- and intra-calvarial extensions without systemic spread in an immunocompetent patient is extremely rare. They masquerade commonly as meningioma and can present as mass lesions with raised intracranial pressure.

Case Description: We report one such case of primary diffuse large B-cell lymphoma (DLBCL) in a young female involving the scalp, dural involvement in the right frontal region, left parietal, and posterior fossa and mimicking both clinically and radiologically as meningioma. She was managed surgically. Histological examination showed features suggestive of DLBCL (germinal center type). She was planned for adjuvant therapy. However, at 2 months following surgery, she succumbed due to systemic involvement of the disease.

Conclusion: DLBCL is seen rarely in neurosurgical practice. They can present as tumors with adjacent extra- and intra-cranial masses. They pose a diagnostic challenge as it can be easily confused with meningioma. Tumor resection is performed to confirm diagnosis and in patients who present with raised intracranial pressure. Chemotherapy is the preferred treatment, and adjuvant therapy should be started early.

Keywords: Adjuvant therapy, Diffuse large B-cell lymphoma (DLBCL), Lymphoma, Non-hodgkin's lymphoma

INTRODUCTION

Primary central nervous system lymphoma (PCNSL) is often situated in the midline or periventricular region. In contrast to PCNSL, diffuse large B-cell lymphoma (DLBCL) is rare, accounts for 2.4% of all PCNSL, and is usually seen in the dura and/or vault. They can extend into the brain as well as into the skull and scalp, presenting as both intracranial and extracranial tumors mimicking meningiomas. They pose a diagnostic challenge to the treating neurosurgeon. These are very rare, and only five such cases are reported in literature so far.[5,8-10,15]

We report a 25-year-old female with both intra- and extra-cranial multiple extra-axial dural primary DLBCL masquerading as meningioma who underwent tumor resection. We reviewed the pertinent literature to apprise the readers of this rare presentation of lymphoma.

CASE REPORT

A 25-year-old female presented to our center with complaints of palpable swelling in the right frontal region for the past 10 months and headache for the past 4 months. She had no focal neurological deficits. Contrast enhanced magnetic resonance imaging brain and contrast enhanced computed tomography head showed a T1 hypointense, T2 isohyperintense axial lesion in the right frontal region with heterogeneous enhancement and prominent peritumoral vasogenic edema with hyperostosis of overlying bone and extension into extracranial space [Figures 1 and 2]. There was another lesion in the posterior fossa. She underwent excision of both extra- and intra-cranial right frontal tumors. The tumor was pinkish-white, firm, and rubbery, with mild vascularity in the subperiosteal plane. The frontal bone was hyperostotic with scalloping. Right frontal craniotomy was done. The intracranial tumor was attached to the falx and was similar in consistency to the extracranial tumor. There was a pial invasion as well. Gross total tumor excision could be achieved [Figure 3a]. Histopathological examination (HPE) showed sheets of atypical lymphoid cells with high N: C ratio, round to irregular nuclear membrane, hyperchromatic nuclei, and inconspicuous nucleoli. Immunohistochemistry was positive for CD3, CD20, CD10, and BCL-6 and negative for MUM-1, C-MYC, and Epstein–Barr virus (latent membrane protein-1) with >90% MIB labeling index. Features were suggestive of DLBCL (germinal center type). She was discharged from the hospital in a stable condition. She presented to our emergency department with features of raised intracranial pressure 14 days after the first surgery. She was found to have hydrocephalus on imaging, for which she underwent a right occipital ventriculoperitoneal shunt. She also underwent excision of the tumor in the posterior fossa, as the posterior fossa tumor had increased significantly in size [Figure 3b]. HPE of the posterior fossa tumor lesion was the same as that of the frontal region. The patient was advised adjuvant chemotherapy, but she did not get it. She expired 2 months later.

DISCUSSION

PCNSL is an aggressive, malignant non-Hodgkin lymphoma in the central nervous system and may affect the dura mater, leptomeninges, brain parenchyma, cranial nerves, eyes, cerebrospinal fluid, and spinal cord.[4] It accounts for 3–4% of all primary brain tumors, with a reported incidence of 0.5/1,00,000/year.[1,4] It can affect both immunosuppressed and immunocompetent patients.[4] It occurs frequently in patients with AIDS. They usually affect the elderly

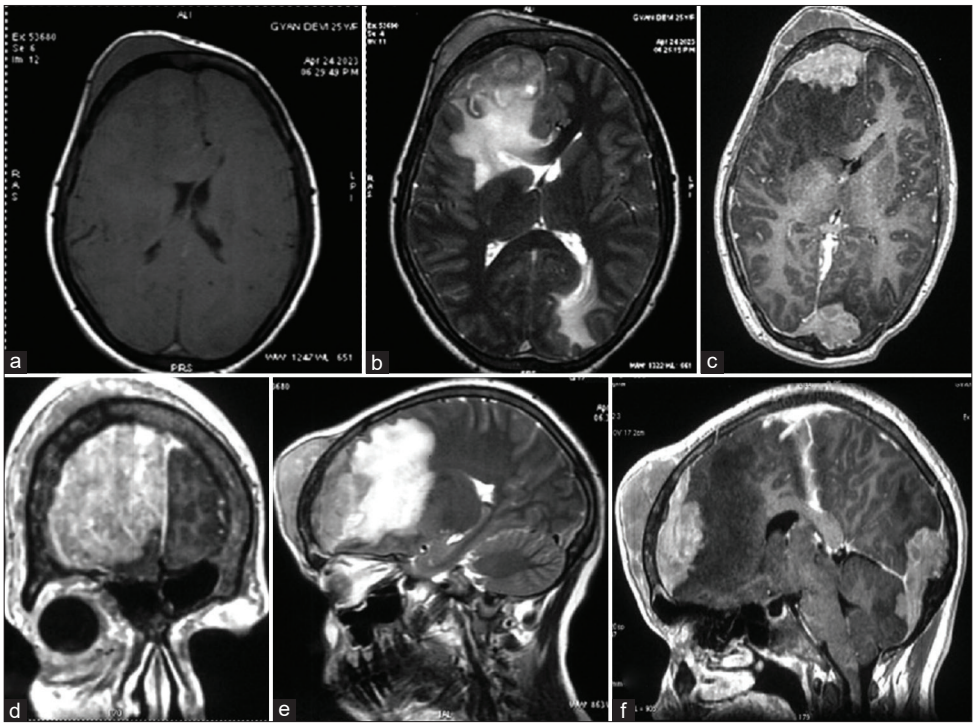

Figure 1: Magnetic resonance imaging brain – (a) T1 axial sequence, (b) T2 axial sequence, (c) T1 C+ axial sequence, (d) T1 C+ coronal sequence, (e) T2 sagittal sequence, and (f) T1 C+ sagittal sequence – showing a T1 hypointense, T2 iso-hyperintense axial lesion in the right frontal region with heterogeneous enhancement with prominent peritumoral vasogenic edema with extension into extracalvarial space and another similar lesion in the posterior fossa.

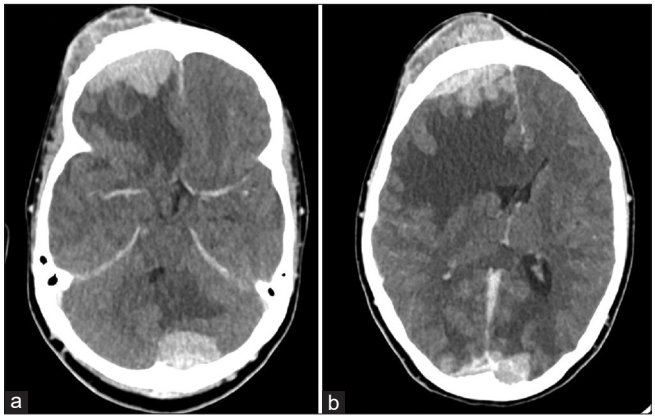

Figure 2: Contrast-enhanced computed tomography head – (a and b) axial cuts – showing contrast-enhancing lesion in the right frontal region with extension into extra calvarial space with perilesional edema and another similar lesion in the posterior fossa with mass effect.

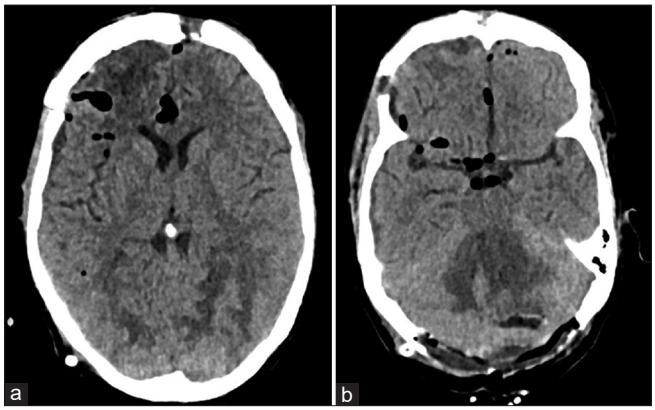

Figure 3: Postoperative computed tomography head – (a and b) (a) axial cuts – showing tumor decompression of the right frontal lesion and (b) tumor decompression of posterior fossa lesion with posterior fossa decompression.

in their seventh and eighth decades. Our patient was immunocompetent and presented at a younger age compared to the other cases described in the literature. On magnetic resonance imaging, they may appear as an extra-axial lesion with broad contact with the dura mater and can demonstrate a dural-tail sign suggestive of "meningioma-like lesions."[3]

HPE of tumor tissue reveals lymphoid cells with irregular morphology (abundant eosinophilic cytoplasm, frequent mitosis, and necrotic foci).[11] On immunohistochemistry of 51 patients with PCNS–DLBCL, the majority showed strong positivity for CD20, CD79a, and neoplastic cells expressed pan-B-cell markers (CD20, CD79a, and PAX5), 73% stained positive for BCL-2, 31% stained positive for CD10, 49% stained positive for CD3, and 18% showed >90% Ki-67 index.[11]

Our patient had a large extracranial component of the lesion, which is unusual in the case of brain pathologies. The mechanism of an intra- and extra-cranial tumor is hypothesized to be an extension of the tumor through emissary veins near the dural lesion.[8] DLBCL should be considered a potential differential diagnosis in a patient with adjacent intra- and extra-cranial masses. To the best of our knowledge, only five such cases are reported in the literature.[5,8-10,15] The mean age was 51.7 ± 17.6 years with M:F ratio of 3:3. The parietal region was the most common location in 66.7% (4/6). About 50% underwent biopsy (3/6) and 50% underwent tumor resection (3/6). The mortality rate was 33.3% (2/6); both of them are young adults compared to other patients (elderly patients). The remaining 4 patients (66.7%) are doing well on the latest follow-up.

We reviewed the literature for extra- and intra-cranial primary DLBCL, which is enumerated in Table 1.

The standard of care is chemotherapy with or without adjuvant radiotherapy for PCNSL patients.[4] Cytoreduction has not been considered a viable option in the treatment algorithm of PCNSL in the past.[2] Tumor resection is only performed in patients with lesions that mimic other pathologies or to treat raised intracranial pressure with impending herniation.[12] However, compared to biopsy, patients who undergo tumor resection have shown prolonged survival.[13,16] Several recent studies have challenged this and reported it to be both safe and prolong survival.[6,12,16] Weller *et al*. performed a *post hoc* analysis, which showed worse outcomes in patients undergoing biopsy compared to the surgical resection group.[16] Rae *et al*., in a retrospective study, showed a longer survival following tumor resection.[12] However, the available literature is limited to retrospective/ *post hoc* analysis with selection bias. Thus, a prospective study on tumor resection in PCNSL patients is necessary.

Very few studies have systematically analyzed the effect of adjuvant therapy following resection, and these can help us to choose the appropriate adjuvant therapy for favorable outcomes.[7] Kinslow *et al*. retrospectively analyzed the prognostic factor and survival among various treatment categories (biopsy alone, biopsy + radiotherapy, surgery alone, and surgery + radiotherapy), which showed that adjuvant radiotherapy was associated with improved survival in PCNSL patients who underwent surgery regardless of the extent of resection.[7] However, adjuvant radiotherapy (low or standard dose) is neurotoxic.

Predictors of survival are age, immunological status (immunocompetent or immunocompromised), and gender.[14] Unfavorable independent markers for progression-free survival are multifocal lesions and deep brain involvement.[11] Survival improved over time due to the increasing use of high-dose methotrexate-based chemotherapy and better supportive care. In a population-based study by Shan and Hu, immunocompromised patients (both DLBCL and non-DLBCL) who received chemotherapy

Table 1: Summary of literature review of intra- and extra-cranial primary DLBCL.

Author, year	Age	Sex	Location	Intervention	Histology	Adjuvant therapy	Outcome
Tomaszek *et al.*, 1984[15]	23	M	Right parietal region	Biopsy	Hodgkin's lymphoma	NA	Expired at 2 years follow-up
Holtas *et al.*, 1985[5]	60	F	Left frontal region	Biopsy	Undifferentiated large cell lymphoma	Steroids	Alive at 6 months follow-up
Nishimoto *et al.*, 2003[9]	63	M	Left parietal region	Biopsy	DLBCL	CHOP regimen	Alive
Ochiai *et al.*, 2010[10]	72	M	Left temporoparietal region	Tumor resection	DLBCL	WBRT and CHOP regimen	Alive at 1-year follow-up
Matejka *et al.*, 2023[8]	67	F	Left parietal region	Tumor resection	DLBCL	MATRix regimen	Alive at 2 months follow-up
Index case	25	F	Right frontal region and posterior fossa	Tumor resection	DLBCL	NA	Expired at 2 months follow-up

NA: Not available, DLBCL: Diffuse large B-cell lymphoma, CHOP: Cyclophosphamide, doxorubicin, vincristine, and prednisolone; MATRix: Methotrexate, cytarabine, thiotepa, and rituximab, WBRT: Whole brain radiotherapy

showed survival benefits.[14] In immunocompetent patients with DLBCL who received chemotherapy, therapy had more benefits due to improvement in chemotherapy drugs and regimens, whereas radiotherapy alone may lead to central neurotoxicity.[14] However, in non-DLBCL patients, the results were reversed. It is probably due to the less aggressive evolution of non-DLBCL in comparison to DLBCL and a less radical approach may show favorable survival.[14] Radiation alone should not be considered for the DLBCL subtype, whereas, in non-DLBCL, it may show excellent outcomes. The use of appropriate chemotherapy regimens shows survival benefits over time.[14]

CONCLUSION

DLBCL, a non-Hodgkin's lymphoma, is seen rarely in neurosurgical practice. They can present as tumors with adjacent extra- and intracranial masses. They pose a diagnostic challenge as it can be easily confused with meningioma. DLBCL should be in the working diagnosis of such lesions. Tumor resection is performed to confirm diagnosis and in patients who present with raised intracranial pressure. Chemotherapy is the preferred treatment, and adjuvant therapy should be started early.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI.

REFERENCES

1. Calimeri T, Steffanoni S, Gagliardi F, Chiara A, Ferreri A. How we treat primary central nervous system lymphoma. ESMO Open 2021;6:100213.
2. DeAngelis L, Yahalom J, Heinemann M, Cirrincione C, Thaler H, Krol G. Primary CNS lymphoma: Combined treatment with chemotherapy and radiotherapy. Neurology 1990;40:80-6.
3. Garcia-Grimshaw M, Posadas-Pinto D, Delgado-de la Mora J, Jimenez-Ruiz A. Secondary diffuse large B-cell lymphoma mimicking meningioma. Cureus 2019;11:e5833.
4. Grommes C, Rubenstein JL, DeAngelis LM, Ferreri AJ, Batchelor TT. Comprehensive approach to diagnosis and treatment of newly diagnosed primary CNS lymphoma. Neurooncology 2019;21:296-305.
5. Holtås S, Monajati A, Utz R. Computed tomography of malignant lymphoma involving the skull. J Comput Assist Tomogr 1985;9:725-7.
6. Jelicic J, Balint MT, Raicevic S, Ilic R, Stanisavljevic D,

Bila J, *et al*. The possible benefit from total tumour resection in primary diffuse large B-cell lymphoma of central nervous system-a one-decade single-centre experience. Br J Neurosurg 2016;30:80-5.
7. Kinslow CJ, Rae AI, Neugut AI, Adams CM, Cheng SK, Sheth SA, *et al*. Surgery plus adjuvant radiotherapy for primary central nervous system lymphoma. Br J Neurosurg 2020;34:690-6.
8. Matejka M, Beredjiklian CM, Rezai A, Kraus TF, Pizem D, Klausner F, *et al*. Extra-and intracranial diffuse large B-cell lymphoma (DLBCL) mimicking meningioma: A case report and literature review. Cureus 2023;15:e42500.
9. Nishimoto T, Yuki K, Sasaki T, Imada Y, Murakami T, Kodama Y. A case of subcutaneous malignant lymphoma with dura mater lesion. No Shinkei Geka 2003;31:43-7.
10. Ochiai H, Kawano H, Miyaoka R, Kawano N, Shimao Y, Kawasaki K. Primary diffuse large B-cell lymphomas of the temporoparietal dura mater and scalp without intervening skull bone invasion-case report. Neurol Med Chir 2010;50:595-8.
11. Qi Z, Duan L, Yuan G, Liu J, Li J, Li G, *et al*. Clinical impact of the histopathological index and neuroimaging features status in primary central nervous system diffuse large B-cell lymphoma: A single-center retrospective analysis of 51 cases. Front Oncol 2022;12:769895.
12. Rae AI, Mehta A, Cloney M, Kinslow CJ, Wang TJ, Bhagat G, *et al*. Craniotomy and survival for primary central nervous system lymphoma. Neurosurgery 2019;84:935-44.
13. Schellekes N, Barbotti A, Abramov Y, Sitt R, Di Meco F, Ram Z, *et al*. Resection of primary central nervous system lymphoma: Impact of patient selection on overall survival. J Neurosurg 2021;135:1016-25.
14. Shan Y, Hu Y. Prognostic factors and survival in primary central nervous system lymphoma: A population-based study. Dis Markers 2018;2018:7860494.
15. Tomaszek DE, Tyson GW, Stang P, Bouldin T. Contiguous scalp, skull, and epidural Hodgkin's disease. Surg Neurol 1984;21:182-4.
16. Weller M, Martus P, Roth P, Thiel E, Korfel A. Surgery for primary CNS lymphoma? Challenging a paradigm. Neurooncology 2012;14:1481-4.

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