



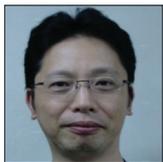
## Case Report

# Primary central nervous system lymphoma of the tectal plate in adult

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## ABSTRACT

**Background:** Primary central nervous system lymphoma (PCNSL) originating in the brainstem is uncommon. In particular, PCNSL confined to the tectal plate in adults has never been reported in the past. The case of a 53-year-old man who was diagnosed with PCNSL in the tectal plate is reported.

**Case Description:** The patient was referred to our hospital with a 1-month history of disorientation and magnetic resonance imaging showed hydrocephalus with an enhancing lesion in the tectum. Preoperative blood tests showed a high serum soluble interleukin-2 receptor level of 624 U/ml. Through a single burr hole, endoscopic third ventriculostomy and biopsy of the lesion were simultaneously performed with a flexible endoscope. The histological examination confirmed diffuse large B-cell lymphoma. The patient underwent chemotherapy and radiotherapy.

**Conclusion:** Malignant lymphoma of the tectum may occur in adults. By measuring the soluble interleukin-2 level preoperatively, it was possible to include malignant lymphoma in the differential diagnosis. In addition, the use of a neuroendoscope permits biopsy and hydrocephalus treatment to be performed simultaneously.

**Keywords:** Endoscopy, Primary central nervous system lymphoma, Tectum

## INTRODUCTION

Primary central nervous system lymphoma (PCNSL) originating in the brainstem has been reported to account for 10% of all PCNSL cases, including multiple lesions.<sup>[9]</sup> To the best of our knowledge, there has been only one pediatric case of PCNSL localized in the tectum reported.<sup>[2]</sup> The first adult case of PCNSL in the tectum, which was diagnosed by endoscopic tumor biopsy, is presented.

## CASE PRESENTATION

The patient was a 53-year-old man who had a history of testicular seminoma that was removed twice, at the ages of 41 and 48 years. The patient had been experiencing disorientation and difficulty in thinking for 1 month before the visit. His Karnofsky Performance Status (KPS) at the time of the first visit was 80. Contrast-enhanced magnetic resonance imaging (MRI) showed a markedly contrast-enhanced mass in the dorsal midbrain and obstructive hydrocephalus

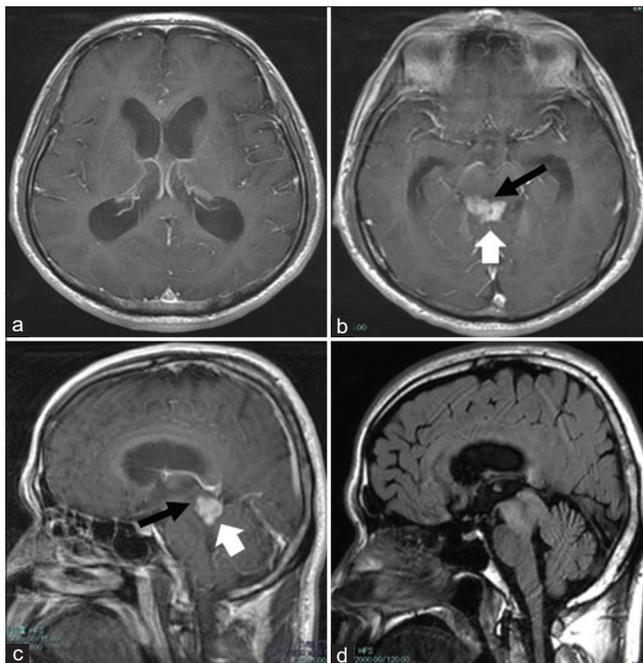
[Figure 1]. Systemic examination, including whole-body, contrast-enhanced computed tomography, showed no obvious abnormalities. Blood samples showed a high serum soluble interleukin-2 receptor level of 624 U/ml. In addition,  $\alpha$ -fetoprotein (3.1 ng/mL) and human chorionic gonadotropin (0.2 mIU/mL) were within normal limits. Neoplastic diseases such as PCNSL, tectal glioma, or intracranial metastasis of seminoma were considered in the differential diagnosis, and endoscopic tumor biopsy was performed with endoscopic third ventriculostomy (ETV). The patient was placed in a supine position under general anesthesia. The burr hole was located 11 cm from the nasion and 2 cm to the right of the midline. A Neuroport mini (Hakko Co., Nagano, Japan) was inserted into the anterior horn, and observation using a flexible endoscope (VEF-V, Olympus, Tokyo, Japan) showed that the aqueduct was stenotic due to the tumor, and the posterior part of the aqueduct was swollen [Figure 2a-c]. A biopsy of the swollen area was performed. The lesion was pale pink, soft, and had minimal bleeding after the biopsy. After thorough intraventricular lavage to prevent dissemination, a third ventriculostomy was performed using an expanding balloon catheter (Expander Balloon Catheter SI Fuji Systems, Tokyo, Japan) [Figure 2d]. Intraoperative cerebrospinal

fluid cytology showed a small number of atypical cells with bifurcated nuclear irregularities. Immunohistochemical study of the specimen showed that the tumor cells were CD3 negative, CD20 positive, and CD79a positive, indicating that the tumor was B-cell lymphoma.<sup>[4]</sup> The final histopathological diagnosis of the tumor was diffuse large B-cell lymphoma [Figure 3]. The patient's postoperative course was uneventful and no new neurological deficit occurred. He underwent three courses of high-dose methotrexate (3.5 mg/m<sup>2</sup>) and whole-brain irradiation (30 Gy in 15 fractions). His KPS was 100 when he was discharged home.

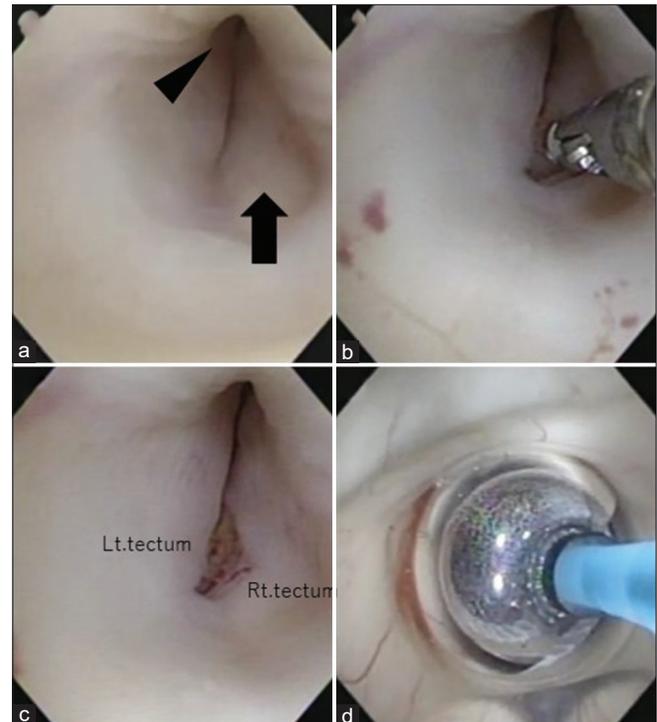
## DISCUSSION

PCNSL accounts for 2.4–3% of all brain tumors and 4–6% of all extranodal lymphomas.<sup>[13]</sup> Most PCNSLs are supratentorial (60%) and involve the frontal lobe, thalamus, basal ganglia, and periventricular brain parenchyma.<sup>[10]</sup> Although some reported cases infiltrated the tectum as a part of multiple lesions or extension of the main lesion into the tectum, our report is very unusual as the tumor was localized only at the tectum.<sup>[8,12,14]</sup>

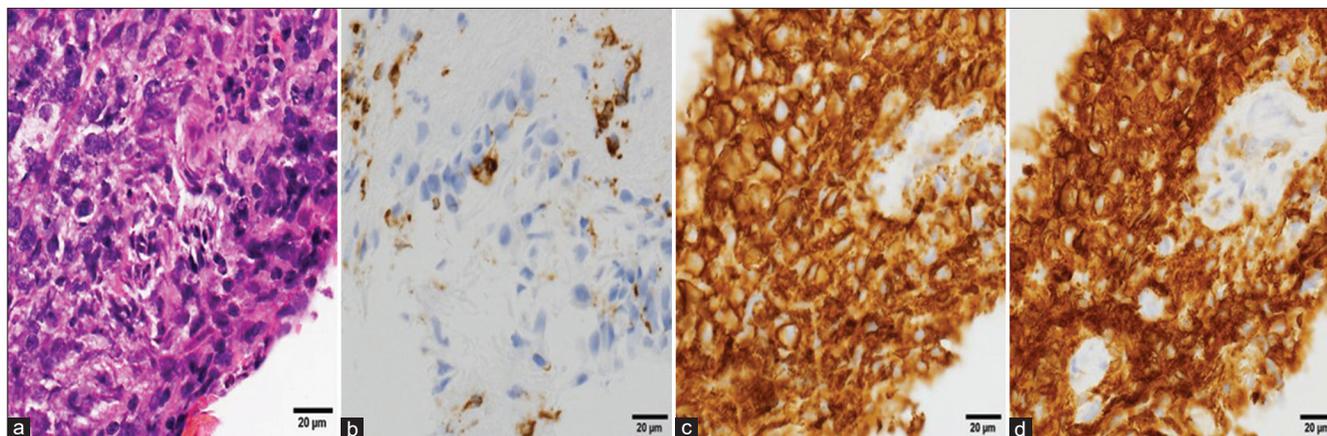
To the best of our knowledge, only one case of PCNSL in the tectum has been reported in a child and the current



**Figure 1:** MR images obtained before surgery. (a and b): Gd-enhanced T1-weighted axial images. (c): Gd-enhanced T1-weighted sagittal images. The size of the tumor is 19 × 13 × 13 mm<sup>3</sup>, and it is present in the tectum (white arrow, b, c). The aqueduct can be seen on the ventral side of the tumor (black arrow, b,c). Both inferior horns of the lateral ventricle are enlarged. (d): FLAIR sagittal images. A FLAIR high-signal area is observed in the entire midbrain surrounding the Gd-enhanced lesion.



**Figure 2:** Intraoperative findings. (a) Swollen tectal plate (black arrow) with aqueductal stenosis (arrowhead). (b and c) Partial removal of the abnormal lesion using a flexible endoscope and biopsy forceps. (d) After the biopsy of the lesion is completed, a third ventriculostomy is performed. In this picture, the floor of the third ventricle is expanded with a balloon.



**Figure 3:** Histopathological findings of the tumor. (a) Hematoxylin and eosin staining ( $\times 40$ ) shows dense proliferation of bare nucleated cells with enlarged nuclei and increased chromatin density. (b-d) The tumor cells are CD3 negative (b), CD20 positive (c), and CD79a positive (d) on immunohistochemistry.

report is the first adult case.<sup>[2]</sup> Since the present patient had a previous seminoma, the differential diagnosis of the lesion included PCNSL, tectal glioma, and intracranial metastasis of seminoma.<sup>[1,5,7]</sup> We routinely measure soluble IL2 receptor levels in adults with contrast-enhanced lesions to rule out PCNSL. Because the patient's serum soluble interleukin-2 receptor level was high, the possibility of PCNSL was not low. Tectal gliomas usually do not show contrast effects on contrast-enhanced MRI, but it is difficult to make the diagnosis from imaging findings, and a definitive diagnosis by histopathological examination is essential.<sup>[3]</sup>

In the previous pediatric case, the pathological diagnosis was made by total resection of the tumor by craniotomy.<sup>[2]</sup> In the present case, only endoscopic biopsy was performed and the entire tumor was not removed to avoid any sequelae. The occipital transtentorial approach was not selected because it is difficult to obtain a lesion in the same position when using ETV for the treatment of hydrocephalus in combination with a tumor biopsy. Approaching the lesion in the midbrain aqueduct using a neuroendoscope is relatively safe and reduces surgical invasiveness, which is useful in cases such as the present one.<sup>[6]</sup>

In this study, tumor biopsy and ETV were performed at the same time using a flexible endoscope because it causes less brain retraction than a rigid endoscope, which allows a single trajectory to perform a biopsy and ETV.<sup>[15]</sup> Neuroendoscopic biopsy of tectal lesions is safe and has few complications, including central gray matter damage in the midbrain.<sup>[7]</sup>

The periaqueductal gray matter is thought to contain the centers of the ascending reticular activating system, which lies mainly on the ventral side of the aqueduct. Fortunately, since the tumor was located in the tectum, the dorsal part of the aqueduct, it was possible to biopsy the tumor relatively safely. After removing the ependyma, the brain parenchyma was not sampled deeply so as avoid causing damage to the

superior and inferior colliculi. The use of endoscopes is highly beneficial for patients because it allows them to quickly move on to chemotherapy and other treatments without complications and with as little invasion as possible.

Extracranial malignant lymphomas have been reported to develop as second malignancies after radiation or chemotherapy for pure seminoma.<sup>[11]</sup> This patient had bilateral orchiectomies for Stage 1 seminoma and no radiotherapy or chemotherapy was given before the onset of PCNSL. Therefore, it was assumed that his tumor was not a secondary cancer.

## CONCLUSION

To the best of our knowledge, this is the first case report of PCNSL occurring in the tectum of an adult, and biopsy and ETV of the tectal lesion were safely performed using a flexible endoscope. The preoperative serum soluble interleukin-2 receptor level was helpful in the differential diagnosis of this lesion.

## Ethical approval and informed consent

This study was approved by the Ethics Committee of Kansai Medical University (No. 2020055). Need for written patient consent was waived by the ethics committee because data were deidentified.

## Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

## Financial Support and Sponsorship

Nil.

## Conflicts of Interest

There are no conflicts of interest.

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