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Research Article

Radiological Features of Series of Extracerebral and Intracerebral Lymphoma Diseases

Hanwen ZHANG[*], Yongqian Mo[*], Zhaoguang ZHOU[✉,*], Guiwen LYU[✉,*]

Department of Radiology, the First Affiliated Hospital of Shenzhen University, Health Science Center; Shenzhen Second People's Hospital, Shenzhen, 518035, China.

*** These authors contributed equally.**
✉ **Correspondence**
Corresponding author: Guiwen LYU, Department of Radiology, the First Affiliated Hospital of Shenzhen University, Health Science Center; Shenzhen Second People's Hospital, Shenzhen, 518035, China. Email: peterlgw@163.com. Telephone number: 13538109404.

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Abstract

Extracerebral lymphoma is not very common, herein, we report a series of cases including extracerebral and intracerebral lymphoma, especially rare sellar plasmablastic lymphoma. These tumors were commonly presented as isointense on T1WI, hypointense on T2WI, restricted diffusion, and significant contrast enhancement. Lower perfusion may indicate a specific diagnosis.

Key words: Lymphoma, Seller Plasmablastic Lymphoma, Magnetic Resonance Imaging

Introduction

A Central nervous system lymphoma is an invasive non-Hodgkin's lymphoma that occurs in the brain parenchyma, spinal cord, and pia mater [1]. The principle of treatment is methotrexate-based chemotherapy combined with radiotherapy [2]. In order to avoid unnecessary neurological damage caused by surgery, it is necessary to fully understand the characteristics of conventional MRI and MR perfusion imaging of lymphoma. This study retrospectively analyzed the conventional MRI, DWI, and PWI findings of pathologically confirmed lymphoma patients, including extracerebral and intracerebral lymphoma, with the aim of improving the diagnostic accuracy of the disease.

Case Presentation

A 50-years-old female patient had a headache for more than six months and recently the symptom was worsened. Nearly three days, her vision was blurred and blocked. Then she was admitted to our hospital.

As shown in Figure 1, the CT images indicated a slightly higher density mass in the left side of the saddle. The size was 20 mm×19 mm. The lesion destroyed the sphenoid sinus and slope.

The MRI examination confirmed the mass, and revealed slightly hypointense on T2-weighted, with significant contrast enhancement. The left internal carotid artery and left cavernous sinus were wrapped around. The area of the mass presented larger than CT, reached 33 mm×25 mm. The volume of pituitary is normal, without abnormal enhancement. Pathology confirmed plasmablastic lymphoma (PBL). Immunohistochemistry: CD43 (+). Gene diagnosis results: positive B lymphocytic gene rearrangement test, MYD88 gene wild type.

A 54-years-old male patient presented left head mass. In the MRI image, there are isointense on T1WI and hypointense on T2WI. The MRI images showed a wide range of tumors in the left side of the lateral temporal bone. The size was 48 mm×10 mm, while the border of the tumor is unclear. Diffusion showed hyperintense on DWI and hypointense on ADC, which indicated restricted diffusion. The mass manifested significant contrast enhancement, but the perfusion is low.

The other 11 patients were diagnosed with intracerebral lymphoma in a total of 13 patients. The conventional MRI showed that most tumors showed hypointense on T2WI (11/13), mostly form was fist-like (6/13). Some of the edges were sharper (10/13), and the cystic components were rare (1/10). Significant contrast enhancement can be seen (12/13). Most of them were slightly hyperintense on DWI, and hypointense on ADC (13/13). Only 6 cases underwent perfused perfusion-weighted imaging, manifested low perfusion on CBV (5/6).

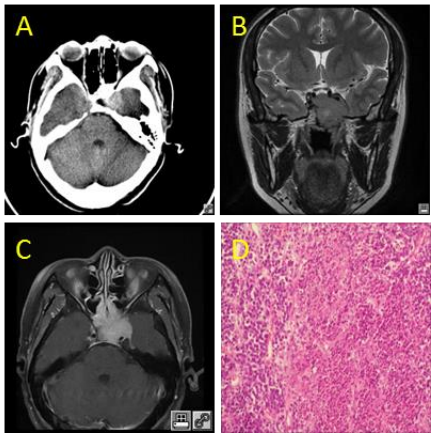

Figure 1 A) Axial CT image; B) Coronal T2WI image; C) Axial T1- contrast enhancement image; D) Pathology image.

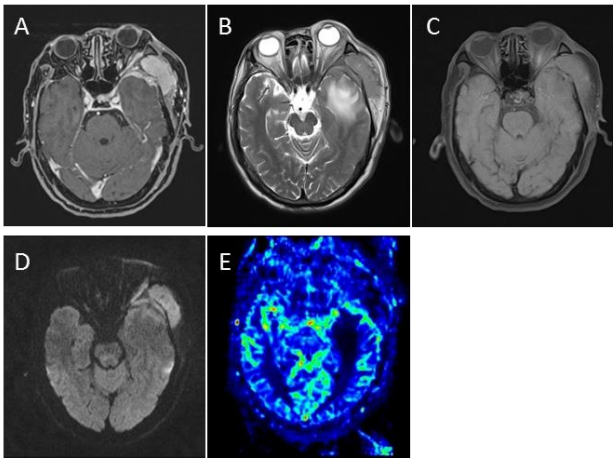

Figure 2 A) T2WI image; B) T1WI image; C) DWI image; D) T1- contrast enhancement image; E) PWI image.

Discussion

I Lymphoma is often related to the decline of immune function, affected by viruses, radiation or chemotherapy drugs. The symptoms often manifest as headache, epilepsy or focal dyskinesia, but most of the regular chemoradiotherapy can be cured, but some are easy to relapse [3]. Lymphoma occurs in the deep white matter area of the brain or at the junction of gray matter and white matter. It presents a single or multiple mass, nodular lesion or shape infiltration along the white matter pathway, and subependymal infiltration. It is associated with many small arteries and a perivascular space, and the lesions are often in contact with the cerebrospinal fluid [4].

The DWI of lymphoma lesions showed hyperintense of diffuse restriction as a "meningioma-like signal", which was related to its high cell density, low interstitial water, interstitial reticular fiber and high nuclear/plasma ratio [5]. The 10 lesions in this group showed a "sharp sign", which showed the irregular solid lesions with sharp edge. The direction of the sharp angle is consistent with the direction of the supply artery and white matter fibers of the brain parenchyma [6]. It is speculated that the "sharp sign" is caused by the infiltration of tumor cells along the perivascular space and the white matter fibers to different degrees of the adjacent brain parenchyma [7]. The

infiltration of the white matter fiber bundle is hindered and may be the characteristic of lymphoma [8].

The enhancement of lymphoma often manifests as a mass or "fist-like", nodular and homogeneous enhancement, which is related to the extensive invasion of the microcirculatory vessel wall and the destruction of the blood-brain barrier [9]. The PWI of lymphoma was hypoperfused, and its CBV was lower than that of normal brain tissue. The time-signal curve showed a slow increase and gradually reached peak. The low perfusion characteristics are related to the lack of angiogenesis in tumor tissues and the microcirculation vessels being squeezed and infiltrated by tumor cells [10]. Hypoperfusion is a characteristic sign of lymphoma and can be used as one of the indicators to distinguish from other malignant tumors in the brain such as gliomas and metastases.

Intracerebral lymphoma is common in clinic, but extracerebral lymphoma is not. Herein, we report a case of sellar plasmablastic lymphoma, which is especially rare.

The most common tumor of saddle-space occupied mass is pituitary adenoma [11]. As sella lymphoma is rare in clinic, it often causes misdiagnosis [12]. Now, many people believe that intracerebral lymphoma originates from extramembranous ventricular mesangial cells, pial tissue cells and microglial cells. Non-Hodgkin's lymphoma (NHL), mostly derived from B cells [13]. This case is a plasma cell lymphoma is a rare diffuse large B-cell lymphoma (DLBCL) subtype [14], which is highly invasive. PBL is more common in HIV male patients in the oral mucosa and more typical parts of the disease, the most common gastrointestinal tract, lymph nodes and skin of extraoral lesions [15]. It happens more specifically in the brain. The saddle lymphoma is the same as other parts of the intracerebral lymphoma, with a short course and rapid development [16]. In this case, vision decreased dramatically within a few days. Due to the rich cytoplasm of tumor cells, less interstitial water and a higher proportion of nuclei, the CT image density is higher. Mostly, T1WI and T2WI signals are slightly hypointense, calcification and hemorrhage are rare [17]. The blood-brain barrier is destroyed which leads to enhancement. At the same time, lymphoma cells have a "vascularization phenomenon", which is often arranged concentrically around the blood vessels, and is in a "sleeve-like" infiltration, adjacent to visible bone damage [18].

The PBL in the sellar region needs to be differentiated from common invasive pituitary adenomas, chordoma and giant cell tumor. Invasive pituitary adenomas in the sellar region are mostly hypointense on T1WI and hyperintense on T2WI. Adjacent bones are destroyed obviously [19]. Chordoma is often located near the midline, mainly characterized by irregular soft tissue mass, uneven tumor signal. Calcification, hemorrhage and cystic changes are more common. The tumor is invasive and can damage adjacent bone structures [20]. Giant cell tumor of skull base is characterized by hypointense on T1WI and T2WI, uneven tumor signal intensity, and calcification, cystic changes and hemorrhage are common [21].

In conclusion, extracerebral and intracerebral lymphomas generally present as solid tumors which extend either intra- or extra-cerebral with bone destruction. Intratumoral cystic/necrosis hemorrhage, or calcification is uncommon. Restricted diffusion, and lower perfusion may indicate a specific diagnosis. Multi-parametric functional MRI may be helpful for the diagnosis of lymphomas.

Declarations

1) ***Consent to publication***
   We declare that all authors agreed to publish the manuscript at this journal based on the signed Copyright Transfer Agreement and followed publication ethics.
2) ***Ethical approval and consent to participants***
   Not applicable.
3) ***Disclosure of conflict of interests***

We declare that no conflict of interest exists.

4) Funding

None

5) Availability of data and material

We declare that the data supporting the results reported in the article are available in the published article.

6) Authors' Contributions

Authors contributed to this paper with the design (Lyu Guiwen), literature search (Mo Yongqian), drafting (Zhang Hanwen), revision (Lye Guiwen), editing (Zhou Zhaoguang) and final approval (Lyu Guiwen).

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8) Authors' biography

None

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