

World Journal of *Clinical Cases*

World J Clin Cases 2021 August 6; 9(22): 6178-6581



Contents

Thrice Monthly Volume 9 Number 22 August 6, 2021

REVIEW

- 6178** COVID-19 infection and liver injury: Clinical features, biomarkers, potential mechanisms, treatment, and management challenges

Sivandzadeh GR, Askari H, Safarpour AR, Ejtehad F, Raeis-Abdollahi E, Vaez Lari A, Abazari MF, Tarkesh F, Bagheri Lankarani K

- 6201** Gastrointestinal manifestations of systemic sclerosis: An updated review

Luquez-Mindiola A, Atuesta AJ, Gómez-Aldana AJ

MINIREVIEWS

- 6218** Mesenchymal stem cell-derived exosomes: An emerging therapeutic strategy for normal and chronic wound healing

Zeng QL, Liu DW

- 6234** Role of autophagy in cholangiocarcinoma: Pathophysiology and implications for therapy

Ninfolle E, Pinto C, Benedetti A, Marziani M, Maroni L

ORIGINAL ARTICLE

Case Control Study

- 6244** Risk factors for intussusception in children with Henoch-Schönlein purpura: A case-control study

Zhao Q, Yang Y, He SW, Wang XT, Liu C

Retrospective Study

- 6254** Sequential therapy with combined trans-papillary endoscopic naso-pancreatic and endoscopic retrograde pancreatic drainage for pancreatic pseudocysts

He YG, Li J, Peng XH, Wu J, Xie MX, Tang YC, Zheng L, Huang XB

- 6268** Retrospective study of effect of whole-body vibration training on balance and walking function in stroke patients

Xie L, Yi SX, Peng QF, Liu P, Jiang H

- 6278** Risk factors for preoperative carcinogenesis of bile duct cysts in adults

Wu X, Li BL, Zheng CJ, He XD

- 6287** Diagnostic and prognostic value of secreted protein acidic and rich in cysteine in the diffuse large B-cell lymphoma

Pan PJ, Liu JX

- 6300** Jumbo cup in hip joint renovation may cause the center of rotation to increase

Peng YW, Shen JM, Zhang YC, Sun JY, Du YQ, Zhou YG

Clinical Trials Study

- 6308** Effect of exercise training on left ventricular remodeling in patients with myocardial infarction and possible mechanisms
Cai M, Wang L, Ren YL

Observational Study

- 6319** Analysis of sleep characteristics and clinical outcomes of 139 adult patients with infective endocarditis after surgery
Hu XM, Lin CD, Huang DY, Li XM, Lu F, Wei WT, Yu ZH, Liao HS, Huang F, Huang XZ, Jia FJ
- 6329** Health-related risky behaviors and their risk factors in adolescents with high-functioning autism
Sun YJ, Xu LZ, Ma ZH, Yang YL, Yin TN, Gong XY, Gao ZL, Liu YL, Liu J
- 6343** Selection of internal fixation method for femoral intertrochanteric fractures using a finite element method
Mu JX, Xiang SY, Ma QY, Gu HL

META-ANALYSIS

- 6357** Neoadjuvant chemotherapy for patients with resectable colorectal cancer liver metastases: A systematic review and meta-analysis
Zhang Y, Ge L, Weng J, Tuo WY, Liu B, Ma SX, Yang KH, Cai H

CASE REPORT

- 6380** Ruptured intracranial aneurysm presenting as cerebral circulation insufficiency: A case report
Zhao L, Zhao SQ, Tang XP
- 6388** Prostatic carcinosarcoma seven years after radical prostatectomy and hormonal therapy for prostatic adenocarcinoma: A case report
Huang X, Cai SL, Xie LP
- 6393** Pyogenic arthritis, pyoderma gangrenosum, and acne syndrome in a Chinese family: A case report and review of literature
Lu LY, Tang XY, Luo GJ, Tang MJ, Liu Y, Yu XJ
- 6403** Malaria-associated secondary hemophagocytic lympho-histiocytosis: A case report
Zhou X, Duan ML
- 6410** Ileal hemorrhagic infarction after carotid artery stenting: A case report and review of the literature
Xu XY, Shen W, Li G, Wang XF, Xu Y
- 6418** Inflammatory myofibroblastic tumor of the pancreatic neck: A case report and review of literature
Chen ZT, Lin YX, Li MX, Zhang T, Wan DL, Lin SZ
- 6428** Management of heterotopic cesarean scar pregnancy with preservation of intrauterine pregnancy: A case report
Chen ZY, Zhou Y, Qian Y, Luo JM, Huang XF, Zhang XM

- 6435** Manifestation of severe pneumonia in anti-PL-7 antisynthetase syndrome and B cell lymphoma: A case report
Xu XL, Zhang RH, Wang YH, Zhou JY
- 6443** Disseminated infection by *Fusarium solani* in acute lymphocytic leukemia: A case report
Yao YF, Feng J, Liu J, Chen CF, Yu B, Hu XP
- 6450** Primary hepatic neuroendocrine tumor – ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography findings: A case report
Rao YY, Zhang HJ, Wang XJ, Li MF
- 6457** Malignant peripheral nerve sheath tumor in an elderly patient with superficial spreading melanoma: A case report
Yang CM, Li JM, Wang R, Lu LG
- 6464** False positive anti-hepatitis A virus immunoglobulin M in autoimmune hepatitis/primary biliary cholangitis overlap syndrome: A case report
Yan J, He YS, Song Y, Chen XY, Liu HB, Rao CY
- 6469** Successful totally laparoscopic right trihepatectomy following conversion therapy for hepatocellular carcinoma: A case report
Zhang JJ, Wang ZX, Niu JX, Zhang M, An N, Li PF, Zheng WH
- 6478** Primary small cell esophageal carcinoma, chemotherapy sequential immunotherapy: A case report
Wu YH, Zhang K, Chen HG, Wu WB, Li XJ, Zhang J
- 6485** Subdural fluid collection rather than meningitis contributes to hydrocephalus after cervical laminoplasty: A case report
Huang HH, Cheng ZH, Ding BZ, Zhao J, Zhao CQ
- 6493** Phlegmonous gastritis developed during chemotherapy for acute lymphocytic leukemia: A case report
Saito M, Morioka M, Izumiyama K, Mori A, Ogasawara R, Kondo T, Miyajima T, Yokoyama E, Tanikawa S
- 6501** Spinal epidural hematoma after spinal manipulation therapy: Report of three cases and a literature review
Liu H, Zhang T, Qu T, Yang CW, Li SK
- 6510** Abdominal hemorrhage after peritoneal dialysis catheter insertion: A rare cause of luteal rupture: A case report
Gan LW, Li QC, Yu ZL, Zhang LL, Liu Q, Li Y, Ou ST
- 6515** Concealed mesenteric ischemia after total knee arthroplasty: A case report
Zhang SY, He BJ, Xu HH, Xiao MM, Zhang JJ, Tong PJ, Mao Q
- 6522** Chylothorax following posterior low lumbar fusion surgery: A case report
Huang XM, Luo M, Ran LY, You XH, Wu DW, Huang SS, Gong Q
- 6531** Non-immune hydrops fetalis: Two case reports
Maranto M, Cigna V, Orlandi E, Cucinella G, Lo Verso C, Duca V, Picciotto F

- 6538** Bystander effect and abscopal effect in recurrent thymic carcinoma treated with carbon-ion radiation therapy: A case report
Zhang YS, Zhang YH, Li XJ, Hu TC, Chen WZ, Pan X, Chai HY, Ye YC
- 6544** Management of an intracranial hypotension patient with diplopia as the primary symptom: A case report
Wei TT, Huang H, Chen G, He FF
- 6552** Spontaneous rupture of adrenal myelolipoma as a cause of acute flank pain: A case report
Kim DS, Lee JW, Lee SH
- 6557** Neonatal necrotizing enterocolitis caused by umbilical arterial catheter-associated abdominal aortic embolism: A case report
Huang X, Hu YL, Zhao Y, Chen Q, Li YX
- 6566** Primary mucosa-associated lymphoid tissue lymphoma in the midbrain: A case report
Zhao YR, Hu RH, Wu R, Xu JK
- 6575** Extensive cutaneous metastasis of recurrent gastric cancer: A case report
Chen JW, Zheng LZ, Xu DH, Lin W

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Salma Ahi, MD, Assistant Professor, Research Center for Noncommunicable Diseases, Jahrom University of Medical Sciences, Jahrom 193, Iran. salmaahi.61@gmail.com

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for WJCC as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yan-Xia Xing; **Production Department Director:** Yun-Jie Ma; **Editorial Office Director:** Jin-Lei Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

August 6, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Primary mucosa-associated lymphoid tissue lymphoma in the midbrain: A case report

Yong-Rui Zhao, Rong-Hua Hu, Rui Wu, Jian-Kun Xu

ORCID number: Yong-Rui Zhao 0000-0002-7849-0850; Rong-Hua Hu 0000-0001-9499-2642; Rui Wu 0000-0003-1192-5781; Jian-Kun Xu 0000-0003-2447-6348.

Author contributions: Zhao YR carried out the literature search and image and data collection, and drafted the manuscript; Hu RH reviewed the literature and drafted the manuscript; Wu R was the pathologist involved in the case, reviewed the literature, and drafted the manuscript; Xu JK made substantial contributions to the manuscript, including revising it critically for intellectual content; all authors read and approved the final manuscript.

Informed consent statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest to report.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Open-Access: This article is an open-access article that was

Yong-Rui Zhao, Jian-Kun Xu, Department of Radiation Oncology, Xuanwu Hospital, Capital Medical University, Beijing 100053, China

Rong-Hua Hu, Department of Hematology, Xuanwu Hospital, Capital Medical University, Beijing 100053, China

Rui Wu, Department of Pathology, Peking University Third Hospital, School of Basic Medical Sciences, Peking University Health Science Center, Beijing 100191, China

Corresponding author: Jian-Kun Xu, MD, PhD, Doctor, Department of Radiation Oncology, Xuanwu Hospital, Capital Medical University, No. 45 Changchun Street, Xicheng District, Beijing 100053, China. xjk_7563@163.com

Abstract

BACKGROUND

Primary non-dural central nervous system mucosa-associated lymphoid tissue (MALT) lymphoma is a rare indolent B-cell lymphoma, with only a few reported cases worldwide.

CASE SUMMARY

A 33-year-old man presented with a 5-mo history of left blepharoptosis and a 4-mo history of right limb numbness and weakness. Magnetic resonance imaging showed a significantly enhanced mass in the left midbrain. Subsequent positron emission tomography revealed that the lesion had increased glucose uptake. A stereotactic robotic biopsy supported a diagnosis of MALT lymphoma. Then he was treated with radiation therapy (30Gy/15F), which resulted in complete remission. We also review the literature on brain parenchymal-based MALT lymphoma, including the clinical presentation, treatment options, and outcomes.

CONCLUSION

Although there is no consensus on the optimal treatment for this rare disease, patients can respond well when treated with radiotherapy alone.

Key Words: Mucosa-associated lymphoid tissue lymphoma; B-cell lymphoma; Central nervous system; Brain parenchyma; Radiotherapy; Case report

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Specialty type: Neurosciences

Country/Territory of origin: China

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C, C
Grade D (Fair): D
Grade E (Poor): 0

Received: April 12, 2021

Peer-review started: April 12, 2021

First decision: April 23, 2021

Revised: May 1, 2021

Accepted: May 15, 2021

Article in press: May 15, 2021

Published online: August 6, 2021

P-Reviewer: Fagioli F, Li C, Ono T,

S-Editor: Yan JP

L-Editor: Wang TQ

P-Editor: Li JH



Core Tip: Primary central nervous system mucosa-associated lymphoid tissue (MALT) lymphoma is a rare disease, especially in the brain parenchyma. A clear diagnosis is important because it can be cured. This report presents the treatment of MALT lymphoma developing in the midbrain. The patient received local radiotherapy and was in complete remission without apparent adverse effects.

Citation: Zhao YR, Hu RH, Wu R, Xu JK. Primary mucosa-associated lymphoid tissue lymphoma in the midbrain: A case report. *World J Clin Cases* 2021; 9(22): 6566-6574

URL: <https://www.wjgnet.com/2307-8960/full/v9/i22/6566.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v9.i22.6566>

INTRODUCTION

Primary central nervous system lymphoma (PCNSL) is an extranodal non-Hodgkin lymphoma (NHL). Approximately 90% of PCNSL cases are diffuse large B-cell lymphomas, defined as aggressive neoplasms[1]. The incidence of primary central nervous system (CNS) indolent lymphoma is much lower, and marginal zone lymphoma (MZL) is comparatively the most common type. Mucosa-associated lymphoid tissue (MALT) lymphoma, also known as extranodal MZL, is one subtype of MZL. It is a B-cell lymphoma originating from mucosal-associated lymphoid tissue, originally described as a low-grade lymphoma in the gastrointestinal tract by Isaacson and Wright[2]. The stomach is the most common primary site of MALT lymphoma; the salivary glands, thyroid, ocular adnexa, lungs, and breasts are other common sites [3]. Primary CNS MALT lymphoma is rare. Most previous case reports and case series have reported primary CNS MALT lymphoma arising in the dura mimicking meningioma or subdural haematoma[4-6]. Rare cases involving the brain parenchyma have been reported, and some patients are clinically misdiagnosed with glioma[7,8]. There are also case reports that describe spinal or both brain and spinal involvement[9, 10].

Herein, we present a case of primary CNS MALT lymphoma occurring in the midbrain. To the best of our knowledge, this is the first report of midbrain MALT lymphoma. We also present a review of MALT lymphoma arising in the brain parenchyma, including the clinical presentation, treatment options, and outcomes.

CASE PRESENTATION

Chief complaints

A 33-year-old human immunodeficiency virus-negative man visited our hospital in April 2020 with left blepharoptosis and right limb numbness and weakness.

History of present illness

The patient's symptoms started 5 mo ago with left blepharoptosis and were not taken seriously. Four months earlier, the patient began to experience right limb numbness and weakness.

History of past illness

The patient had a 1-year history of non-insulin-dependent type 2 diabetes mellitus and tuberculosis (TB). TB lesions were confined to the lung. Computed tomography (CT) of the chest showed multiple nodular infiltrations on both sides of the lung, and the main lesion was located in the right upper lobe. He was receiving anti-TB treatment with rifampicin, isoniazid, ethambutol, and moxifloxacin.

Personal and family history

There was no special history or personal history. The patient had no known family history of cancer.

Physical examination

Neurologic examination revealed right-sided limb numbness at the distal end, the muscle strength of the right limb was weakened (grade 4), and the superficial sensation in the right limb was hypoaesthesia, without any other pathological signs.

Laboratory examinations

Laboratory evaluations revealed that the level of C-reactive protein was 21.6 mg/L, the erythrocyte sedimentation rate was 33 mm/h, the blood glucose level was 6.8 mmol/L, and the T-SPOT-TB test was positive.

Imaging examinations

A CT scan, as well as a magnetic resonance imaging (MRI) scan, revealed a significantly enhanced mass of 1.9 cm × 1.8 cm in size in the left midbrain (Figure 1A-C). Flaky edema could be seen around the lesion, and no signal abnormalities were noted elsewhere in the brain. Due to the relatively homogeneous enhancement of the lesion, the clinical impression was that the lesion most likely represented a lymphoma. Fluorodeoxyglucose positron emission tomography (PET) showed that the maximum standardized uptake volume (SUV) was 7.48, which matched with an enhanced lesion of the brain (Figure 1D). At the same time, a lesion in the right third fore rib was identified, and the maximum SUV was 5.70.

Further diagnostic work-up

A stereotactic robotic biopsy of the brain was performed by the left frontal-lateral paraventricular approach on June 4, 2020. The patient was in a supine position under general anesthesia. The biopsy needle was implanted into the center of the lesion according to the preoperative plan, and the pathological tissue was cut out. The histopathological evaluation of the midbrain lesion supported a diagnosis of indolent B-cell lymphoma. The morphology indicated infiltration of low-grade B-cell lymphoma with a perivascular growth pattern (Figure 2). Immunohistochemical detection showed CD20+, CD79a+, and CD38+/- results but negativity for CD3 and CD5. The Ki-67 proliferation rate was 10%-20% (Figure 3), and the other results were LCA (+), CD138 (-), CD21 (-), CD68 (scattered +), PAX-5 (+), and TdT (-). Polymerase chain reaction (PCR) analysis detected clonal rearrangement of the immunoglobulin heavy chain gene (*IgH*) (Figure 4). DNA sequencing indicted no mutations in the B-cell lymphoma genes, including *Bcl-2*.

Routine biochemical examination of cerebrospinal fluid (CSF) from lumbar puncture showed a cell count of 132×10^6 /L, leucocyte count of 32×10^6 /L, glucose level of 3.94 mmol/L, protein level of 54 mg/dL, and chlorine level of 124 mmol/L. The pathology of CSF was scattered lymphocytes, erythrocytes, and mononuclear cells. Bone marrow aspiration and biopsy with flow cytometry were normal, and ophthalmologic evaluations revealed no abnormalities. However, the rapid urease test for *Helicobacter pylori* was positive. Then, a rib lesion biopsy was performed on August 10, 2020.

FINAL DIAGNOSIS

The final pathological result was MALT lymphoma. The pathology of the rib was callus formation.

TREATMENT

The patient received local external beam radiotherapy without chemotherapy, and target delineation was based on the fusion image obtained from simulated CT and MRI. The gross target volume (GTV) was defined on MRI and PET, excluding the edema zone. The planning GTV (PGTV) was the GTV plus 3 mm of setup margin. Initially, we intended to administer a radiotherapy dose of 24 Gy, but re-examination by MRI showed residual lesion during the treatment course after 20 Gy was administered (Figure 5). We added 6 Gy to the total dose of 30 Gy. Radiotherapy was administered in the period from September 7, 2020 to September 25, 2020.

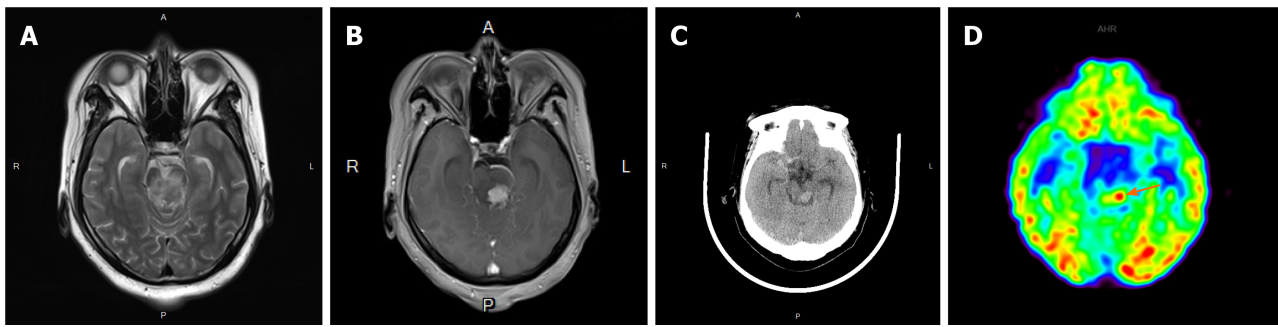


Figure 1 Imaging before treatment. A: Axial T2-weighted image shows heterogeneous intensity in the midbrain, and the midbrain aqueduct was compressed; B: Contrast-enhanced magnetic resonance imaging showing a significantly enhanced 1.9 cm × 1.8 cm-sized mass in the left midbrain; C: The lesion had high density on computed tomography; D: Fluorodeoxyglucose positron emission tomography showing that the lesion had increased glucose uptake (arrow). The maximum standardized uptake volume was 7.48.

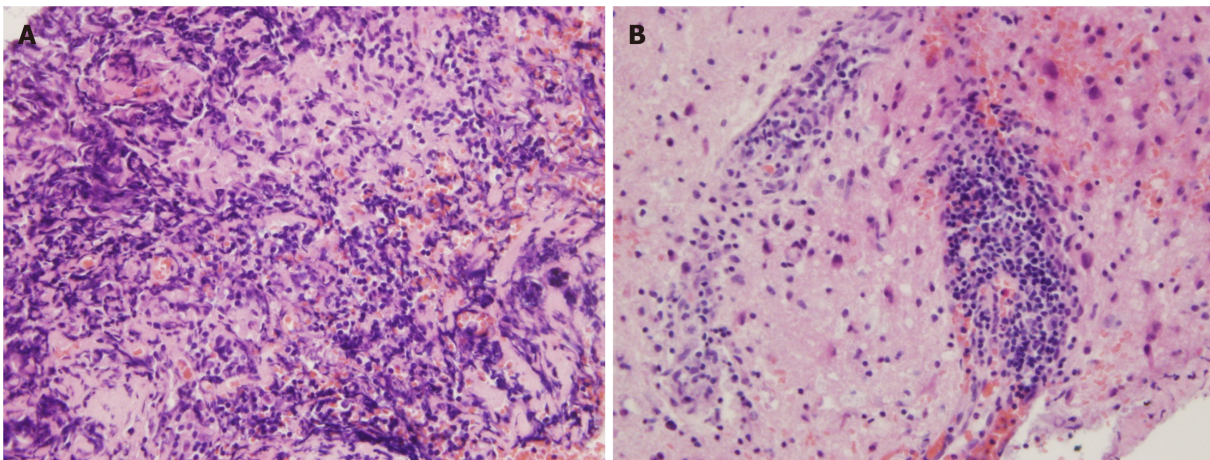


Figure 2 Histologic features. A biopsy showed perivascular infiltrates of small-sized lymphocytes. A: Hematoxylin and eosin staining, 20 ×; B: Hematoxylin and eosin staining, 40 ×.

OUTCOME AND FOLLOW-UP

One month after radiotherapy, follow-up MRI showed no abnormal enhancement, and perfusion-weighted imaging showed no hyperperfusion (Figure 6). After 6 mo of follow-up, the patient's clinical symptoms significantly improved. The patient's muscle strength recovered to grade 5-, and the superficial sensation was normal. He could walk normally, but he could not hold heavy things in his right hand and sometimes felt numbness in the right limb at the distal end. The follow-up data showed no recurrence.

DISCUSSION

MZL is an NHL arising from post-germinal center marginal zone B cells. According to the 2016 World Health Organization classification, MZL is subdivided into three types: Extranodal MZL or MALT lymphoma, nodal MZL, and splenic MZL[11]. MALT lymphoma is the most typical type, but primary CNS MALT lymphoma is an extremely rare entity, especially in the brain parenchyma. Initial studies showed that the most common location was the dura[12]. Only seven cases with brain parenchyma involvement have been reported, including our patient. The site of origin was the midbrain in our patient. The lesion location and clinical characteristics of the other six patients are shown in Table 1. Clinical symptoms are not specific, depending on the site of the lesion.

The CNS has no mucosa or MALT tissue, and dural-based MALT lymphoma can be explained by the embryological analogy that meningotheelial cells of the arachnoid membrane could be analogous to epithelial cells, where MALT lymphomas arise[13-

Table 1 Clinical summary of patients with primary non-dural central nervous system mucosa-associated lymphoid tissue lymphoma

Ref.	Age (yr)	Sex	Location	Presentation	Treatment	Outcome
Tu <i>et al</i> [13]	66	M	R, frontal	Seizures	Radiation (WBRT, dose NA)	CR
Park <i>et al</i> [8]	18	M	L, basal ganglia	Right-sided central facial nerve palsy, right-sided weakness, dizziness, dysarthria	Radiation (CTV = GTV + 15 mm, PTV = CTV + 5 mm; 30.6 Gy/17F)	CR
Papanicolaou-Sengos <i>et al</i> [14]	70	M	L, posteriorputamen	Right extremity numbness, dysarthria, blurry vision	Chemotherapy (dexamethasone, temozolamide, rituximab)	SD
Schiefer <i>et al</i> [15]	39	F	R, frontal	Seizures	Chemotherapy (intrathecal: Methotrexate, cytarabin, dexamethasone; Intravenous: High-dose methotrexate)	SD
Aqil <i>et al</i> [7]	48	M	L, frontal	Seizures, memory loss	Radiation (WBRT, 24 Gy; GTV boosted 6 Gy)	CR
Ueba <i>et al</i> [10]	53	M	R, temporal; L, occipital; spinal cord	Recent memory disturbance, gait disturbance, urinary incontinence	Chemotherapy (high-dose methotrexate, cytarabine)	PR

WBRT: Whole brain radiation therapy; CTV: Clinical target volume; GTV: Gross target volume; PTV: Planning target volume; CR: Complete remission; PR: Partial remission; SD: Stable disease; NA: Not available; M: Male; F: Female.

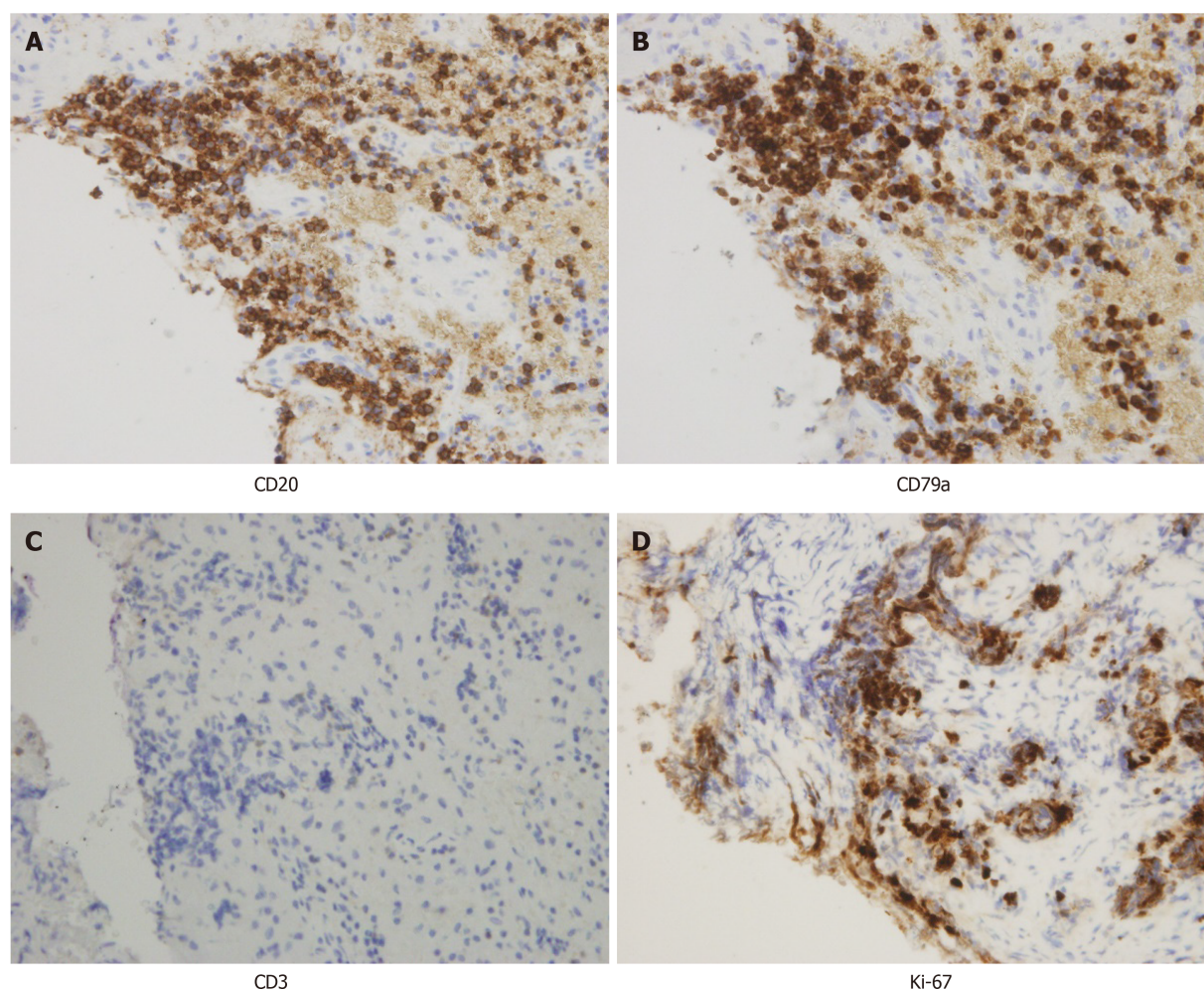


Figure 3 Immunohistochemical features. The tumor cells were positive for B-lymphocyte marker CD20/CD79a and negative for T-lymphocyte marker CD3. 10%-20% of the cells were positive for Ki-67. A: CD20; B: CD79a; C: CD3; D: Ki-67.

16]. However, non-dural-based MALT lymphoma is questionably explained by this theory. It is currently believed that the etiology of MALT lymphoma is related to chronic immune stimulation caused by infection or inflammation. For instance, gastric MALT lymphoma is associated with *Helicobacter pylori*, Sjögren syndrome, or

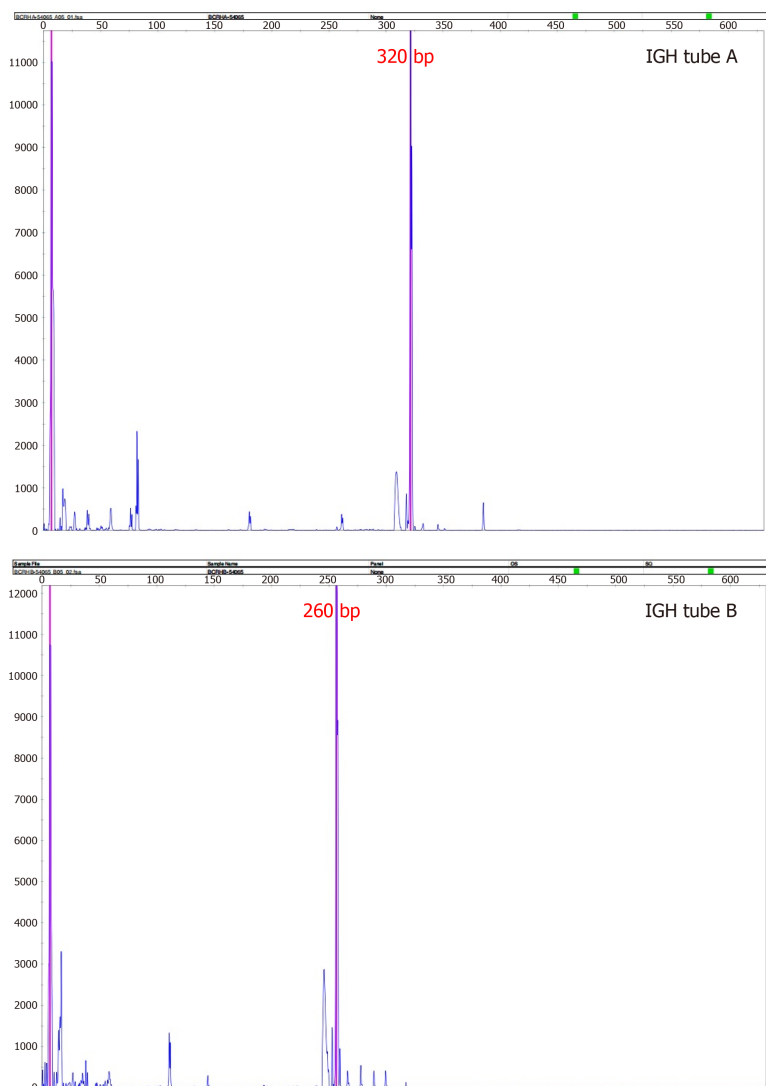


Figure 4 IdentiClone IGH+IGK B-cell clonality polymerase chain reaction test. The detection of clonal immunoglobulin heavy chain gene rearrangement was positive.

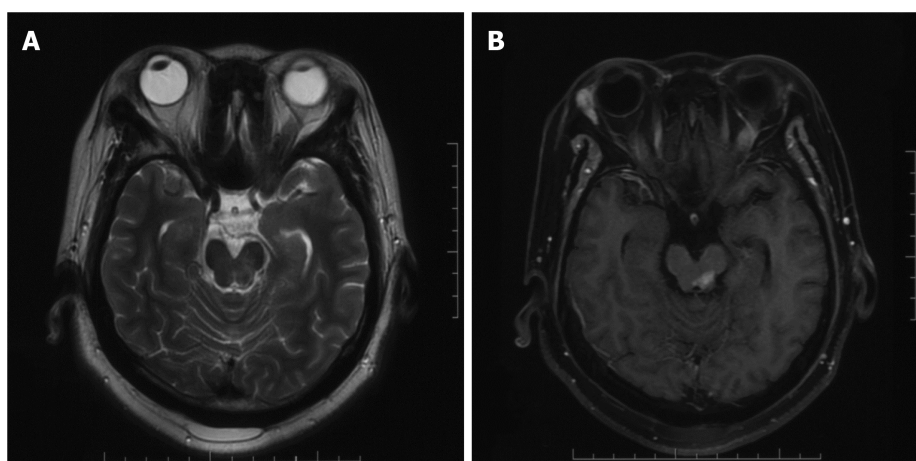


Figure 5 Magnetic resonance imaging reexamination after 20 Gy radiotherapy. A: T2-weighted image showing mixed signal in the left midbrain; B: Contrast-enhanced magnetic resonance imaging showing residual lesion.

Hashimoto thyroiditis and carries a significant risk for the development of MZL[17]. Interestingly, our patient had a 1-year history of TB and received standardized anti-TB treatment. After admission, the *Helicobacter pylori* examination was positive, and the

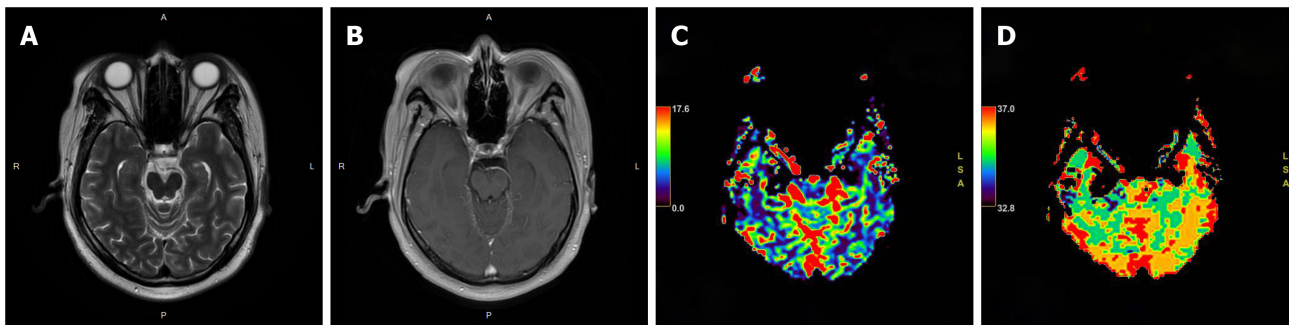


Figure 6 Follow-up magnetic resonance imaging. A: T2-weighted image showing no mass effect; B: Contrast-enhanced magnetic resonance imaging showing no abnormal enhancement; C and D: Perfusion-weighted imaging showing no abnormal perfusion.

patient also underwent *Helicobacter pylori* eradication therapy. The pathogenesis may be explained by the inflammation-based theory. However, we have no direct evidence that primary CNS MALT lymphoma is associated with *Mycobacterium tuberculosis* or *Helicobacter pylori* infection.

The diagnosis of MALT lymphoma should be confirmed by histopathological and immunohistochemical features. Differential diagnoses include lymphoplasmacytic lymphoma (LPL) and follicular lymphoma. The immunohistochemistry results of follicular lymphoma usually indicate positivity for CD10 and Bcl-2[18]. LPL and MALT lymphoma have similar morphological and immunohistochemical profiles, but relative to MALT lymphoma, LPL typically involves the bone marrow and is associated with Waldenstrom's macroglobulinemia[19]. Our patient's immunohistochemical findings indicated CD20+ and CD79a+ results, the Ki-67 index was 10%-20%, and there was no bone marrow involvement and no clinical history of Waldenstrom's macroglobulinemia. At the same time, clonal rearrangement of *IgH* was detected by PCR. According to these findings, the diagnosis was most consistent with MALT lymphoma.

There is no standard treatment for CNS MALT lymphoma. The treatment modalities reported in the existing literature include surgery, radiotherapy, and chemotherapy. As shown in Table 1, among patients with lesions arising from the brain parenchyma, three of the six patients received chemotherapy: Two patients had stable disease, one showed tumor remission, and the other three received radiotherapy and had a complete response. In other words, radiotherapy may provide superior outcomes in parenchymal-based cases[20].

MALT lymphoma tends to be indolent and radiosensitive. In 2011, a randomized phase III trial reported that there was no difference in clinical efficacy between radiotherapy doses of 24 Gy and 40-45 Gy for indolent NHL[21]. Currently, reduced-dose (24-30 Gy) radiotherapy is preferred for indolent lymphoma. Unlike high-grade CNS lymphoma, the role of intrathecal chemotherapy or systemic chemotherapy in low-grade CNS lymphoma currently remains unclear[22]. Because of the particularity of the lesion location, the lesion in our patient could not be totally resected by surgery and he achieved complete remission by radiotherapy alone. Involved-site radiation therapy is an effective initial treatment for extranodal MZL[23]. The radiation field in our case included only the primary lesion demonstrated on MRI and PET, not as reported in the prior literature[7,8,13]. Reexamination during treatment showed residual disease, so we believe that 1 mo after the end of radiotherapy might be the best timing to evaluate the effect.

Considering the low biological and clinical aggressiveness of MALT lymphoma, it is curable in cases of localized disease. The data showed that there was no recurrence during the follow-up of up to 22 mo in primary left basal ganglia MALT lymphoma with radiation therapy[8]. The follow-up of our patient was short (6 mo), and we will continue to pay attention to any changes in the patient's condition.

CONCLUSION

In conclusion, primary non-dural CNS MALT lymphoma is a rare disease. The exact mechanism is still unclear. Diagnosis is based on morphological and immunohistochemical findings. It is radiosensitive and can be cured with radiotherapy. Chemotherapy alone cannot achieve good treatment outcomes. Due to the small

number of cases, it is difficult to draw conclusions regarding the use of radiotherapy as the primary treatment for brain parenchymal-based MALT lymphoma. More clinical data are needed to confirm this opinion.

ACKNOWLEDGEMENTS

We acknowledge Wang YM, a neurosurgeon of Xuanwu Hospital Capital Medical University, for his special contribution to this case. We acknowledge the work of colleagues in the Pathology and Radiology Department in offering the original images and data related to this article.

REFERENCES

- 1 **Batchelor TT.** Primary central nervous system lymphoma: A curable disease. *Hematol Oncol* 2019; **37** Suppl 1: 15-18 [PMID: [31187523](#) DOI: [10.1002/hon.2598](#)]
- 2 **Isaacson P, Wright DH.** Malignant lymphoma of mucosa-associated lymphoid tissue. A distinctive type of B-cell lymphoma. *Cancer* 1983; **52**: 1410-1416 [PMID: [6193858](#) DOI: [10.1002/1097-0142\(19831015\)52:8<1410::aid-cnrcr2820520813>3.0.co;2-3](#)]
- 3 **Khalil MO, Morton LM, Devesa SS, Check DP, Curtis RE, Weisenburger DD, Dores GM.** Incidence of marginal zone lymphoma in the United States, 2001-2009 with a focus on primary anatomic site. *Br J Haematol* 2014; **165**: 67-77 [PMID: [24417667](#) DOI: [10.1111/bjh.12730](#)]
- 4 **Razaq W, Goel A, Amin A, Grossbard ML.** Primary central nervous system mucosa-associated lymphoid tissue lymphoma: case report and literature review. *Clin Lymphoma Myeloma* 2009; **9**: E5-E9 [PMID: [19525185](#) DOI: [10.3816/CLM.2009.n.052](#)]
- 5 **Jesionek-Kupnicka D, Smolewski P, Kupnicki P, Pluciennik E, Zawlik I, Papierz W, Kordek R.** Primary extranodal marginal zone B-cell lymphoma of the mucosa-associated lymphoid tissue type in the central nervous system (MZL CNS) presented as traumatic subdural hematoma and subarachnoid bleeding - case report. *Clin Neuropathol* 2013; **32**: 384-392 [PMID: [23557903](#) DOI: [10.5414/NP300579](#)]
- 6 **Choi JY, Chung JH, Park YJ, Jung GY, Yoon TW, Kim YJ, Lim Tk, Kim BS, Nam SH.** Extranodal Marginal Zone B-Cell Lymphoma of Mucosa-Associated Tissue Type Involving the Dura. *Cancer Res Treat* 2016; **48**: 859-863 [PMID: [26194368](#) DOI: [10.4143/crt.2014.334](#)]
- 7 **Aqil B, Rouah E, Verstovsek G.** Primary CNS marginal zone lymphoma: a case report and review of the literature. *Open J Pathol* 2013; **3**: 55-59 [DOI: [10.4236/ojpathology.2013.32010](#)]
- 8 **Park I, Huh J, Kim JH, Lee SW, Ryu MH, Kang YK.** Primary central nervous system marginal zone B-cell lymphoma of the Basal Ganglia mimicking low-grade glioma: a case report and review of the literature. *Clin Lymphoma Myeloma* 2008; **8**: 305-308 [PMID: [18854286](#) DOI: [10.3816/CLM.2008.n.043](#)]
- 9 **Ahmadi SA, Frank S, Hänggi D, Eicker SO.** Primary spinal marginal zone lymphoma: case report and review of the literature. *Neurosurgery* 2012; **71**: E495-508; discussion E508 [PMID: [22314752](#) DOI: [10.1227/NEU.0b013e31824e50fb](#)]
- 10 **Ueba T, Okawa M, Abe H, Inoue T, Takano K, Hayashi H, Nabeshima K, Oshima K.** Central nervous system marginal zone B-cell lymphoma of mucosa-associated lymphoid tissue type involving the brain and spinal cord parenchyma. *Neuropathology* 2013; **33**: 306-311 [PMID: [22994302](#) DOI: [10.1111/j.1440-1789.2012.01350.x](#)]
- 11 **Swerdlow SH, Campo E, Pileri SA, Harris NL, Stein H, Siebert R, Advani R, Ghielmini M, Salles GA, Zelenetz AD, Jaffe ES.** The 2016 revision of the World Health Organization classification of lymphoid neoplasms. *Blood* 2016; **127**: 2375-2390 [PMID: [26980727](#) DOI: [10.1182/blood-2016-01-643569](#)]
- 12 **Sunderland AJ, Steiner RE, Al Zahrani M, Pinnix CC, Dabaja BS, Gunther JR, Nastoupil LJ, Jerkeman M, Joske D, Cull G, El-Galaly T, Villa D, Cheah CY.** An international multicenter retrospective analysis of patients with extranodal marginal zone lymphoma and histologically confirmed central nervous system and dural involvement. *Cancer Med* 2020; **9**: 663-670 [PMID: [31808316](#) DOI: [10.1002/cam4.2732](#)]
- 13 **Tu PH, Giannini C, Judkins AR, Schwalb JM, Burack R, O'Neill BP, Yachnis AT, Burger PC, Scheithauer BW, Perry A.** Clinicopathologic and genetic profile of intracranial marginal zone lymphoma: a primary low-grade CNS lymphoma that mimics meningioma. *J Clin Oncol* 2005; **23**: 5718-5727 [PMID: [16009945](#) DOI: [10.1200/JCO.2005.17.624](#)]
- 14 **Papanicolau-Sengos A, Wang-Rodriguez J, Wang HY, Lee RR, Wong A, Hansen LA, Mahooti S, Rashidi HH.** Rare case of a primary non-dural central nervous system low grade B-cell lymphoma and literature review. *Int J Clin Exp Pathol* 2012; **5**: 89-95 [PMID: [22295152](#)]
- 15 **Schiefer AI, Vastagh I, Molnar MJ, Bereczki D, Varallyay G, Deak B, Csomor J, Turanyi E, Kovacs GG, Müllauer L.** Extranodal marginal zone lymphoma of the CNS arising after a long-standing history of atypical white matter disease. *Leuk Res* 2012; **36**: e155-e157 [PMID: [22520340](#) DOI: [10.1016/j.leukres.2012.03.022](#)]

- 16 **Kumar S**, Kumar D, Kaldjian EP, Bauserman S, Raffeld M, Jaffe ES. Primary low-grade B-cell lymphoma of the dura: a mucosa associated lymphoid tissue-type lymphoma. *Am J Surg Pathol* 1997; **21**: 81-87 [PMID: [8990144](#) DOI: [10.1097/0000478-199701000-00009](#)]
- 17 **Zucca E**, Bertoni F, Vannata B, Cavalli F. Emerging role of infectious etiologies in the pathogenesis of marginal zone B-cell lymphomas. *Clin Cancer Res* 2014; **20**: 5207-5216 [PMID: [25320370](#) DOI: [10.1158/1078-0432.CCR-14-0496](#)]
- 18 **Freedman A**, Jacobsen E. Follicular lymphoma: 2020 update on diagnosis and management. *Am J Hematol* 2020; **95**: 316-327 [PMID: [31814159](#) DOI: [10.1002/ajh.25696](#)]
- 19 **Owen RG**, Treon SP, Al-Katib A, Fonseca R, Greipp PR, McMaster ML, Morra E, Pangalis GA, San Miguel JF, Branagan AR, Dimopoulos MA. Clinicopathological definition of Waldenstrom's macroglobulinemia: consensus panel recommendations from the Second International Workshop on Waldenstrom's Macroglobulinemia. *Semin Oncol* 2003; **30**: 110-115 [PMID: [12720118](#) DOI: [10.1053/sonc.2003.50082](#)]
- 20 **Nomani L**, Cotta CV, Hsi ED, Ferry JA, Cook JR. Extranodal Marginal Zone Lymphoma of the Central Nervous System Includes Parenchymal-Based Cases With Characteristic Features. *Am J Clin Pathol* 2020; **154**: 124-132 [PMID: [32318699](#) DOI: [10.1093/ajcp/aqaa032](#)]
- 21 **Lowry L**, Smith P, Qian W, Falk S, Benstead K, Illidge T, Linch D, Robinson M, Jack A, Hoskin P. Reduced dose radiotherapy for local control in non-Hodgkin lymphoma: a randomised phase III trial. *Radiother Oncol* 2011; **100**: 86-92 [PMID: [21664710](#) DOI: [10.1016/j.radonc.2011.05.013](#)]
- 22 **Ayanambakkam A**, Ibrahim S, Bilal K, Cherry MA. Extranodal Marginal Zone Lymphoma of the Central Nervous System. *Clin Lymphoma Myeloma Leuk* 2018; **18**: 34-37.e8 [PMID: [29103980](#) DOI: [10.1016/j.clml.2017.09.012](#)]
- 23 **Teckie S**, Qi S, Chelius M, Lovie S, Hsu M, Noy A, Portlock C, Yahalom J. Long-term outcome of 487 patients with early-stage extra-nodal marginal zone lymphoma. *Ann Oncol* 2017; **28**: 1064-1069 [PMID: [28327924](#) DOI: [10.1093/annonc/mdx025](#)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

