



HEMATOLOGICAL NEOPLASTIC DISEASES ASSOCIATED WITH UNUSUAL INVOLVEMENT OF CRANIAL NERVES: CASE SERIES AND IMAGES.

Radiology

Frederico Tavares Bonates*	MD, Doctor Residing in Radiology, Department of Radiology of the Fortaleza General Hospital, Fortaleza-CE, Brazil. *Corresponding Author
Daniel Gurgel Fernandes Távora	MD, MSc, Radiologist, Department of Radiology of the Fortaleza General Hospital, Fortaleza-CE, Brazil.
Francisco Barbosa de Araújo Neto	MD, Radiologist, Department of Radiology of the Fortaleza General Hospital, Fortaleza-CE, Brazil.
Sóstenes Muniz Sampaio Sabiá	MD, Doctor Residing in Radiology, Department of Radiology of the Fortaleza General Hospital, Fortaleza-CE, Brazil.
Pedro Henrique Felipe de Vasconcelos	MD, Doctor Residing in Radiology, Department of Radiology of the Fortaleza General Hospital, Fortaleza-CE, Brazil.

ABSTRACT

Neurolymphomatosis is characterized by direct infiltration of the central nervous system, nerve roots / plexus or peripheral nerves by a hematological neoplasm. When secondary, it occurs as relapse or progression of lymphoma or leukemia previously diagnosed. The involvement of cranial nerves by hematological diseases is an uncommon finding, with imaging exams, notably magnetic resonance imaging, playing an important role in identifying compatible findings.

KEYWORDS

Hematological diseases; Lymphoma; Leukemia; Neurolymphomatosis; Cranial nerves; Magnetic Resonance Imaging.

INTRODUCTION

Neurolymphomatosis is characterized by direct infiltration of the central nervous system, nerve roots / plexus or peripheral nerves by a hematological neoplasm (1). When secondary, it occurs as a recurrence or progression of lymphoma or leukemia previously diagnosed (2). Cranial nerve involvement was estimated as a manifestation of malignant neoplastic diseases in about 30% of cases in a series of 1000 patients, with approximately 15% of these patients having hematological neoplastic diseases (3). Diffuse infiltration of cranial pairs is the least common metastatic clinical presentation of neurolymphomatosis (4), and when it occurs, it commonly affects multiple cranial nerves instead of isolated involvement of a cranial pair (5).

Objective and Method

Describe the main findings in MRI related to secondary neurolymphomatosis associated with infiltration of cranial nerves by patients with leukemia and lymphoma, in order to assist in the differential diagnosis, through the introduction of selected cases through the experience of the authors.

DISCUSSION

Neurolymphomatosis is a rare condition of infiltration of the central or peripheral nervous system due to hematological diseases, usually due to B-cell non-Hodgkin's lymphoma (6,7). Symptoms are classified into four patterns, such as painful involvement of nerves or roots, cranial neuropathy with or without pain, painless involvement of peripheral nerves and painful or painless involvement of a single peripheral nerve at presentation (7).

Cranial neuropathies exhibit several etiologies, such as vascular diseases, solid or hematological malignancies, infections, trauma and inflammatory or infectious pathologies.

Isolated or multiple cranial neuropathies may be the first sign of neoplastic meningitis, usually occurring in advanced stages of the disease (8), being more common in hematological neoplasms (9). In a series of patients with hematological neoplastic diseases with cranial nerve involvement, about 40% were due to myeloid leukemia, the remainder due to other causes (3).

Lymphoma is a malignant neoplasm resulting from lymphocytes or lymphoblasts, which may be restricted to the lymphatic system or

present extra-nodal involvement. The lymphoma subtype most commonly associated with secondary neurolymphomatosis is non-Hodgkin's B-cell lymphoma, the main symptoms of which are headache, changes in mental status, seizures and paralysis of cranial nerves, with the III, IV, VI and VII pairs being the most common. affected (10). Leukemias are hematological neoplasms in which hematopoietic cell proliferation occurs at an undifferentiated or partially differentiated stage of maturation. The involvement of cranial nerves is a known manifestation of systemic leukemia, although it rarely occurs as a single symptom (11).

Magnetic resonance imaging of the skull is always the method of choice and can be decisive in differentiating neurolymphomatosis associated with involvement of the central nervous system and cranial nerves (12, 13).

CONCLUSION

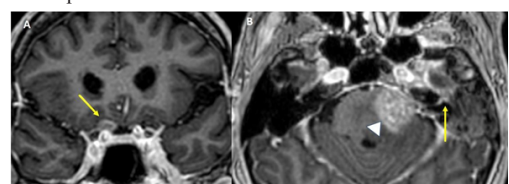
The involvement of cranial nerves by hematological diseases is an uncommon finding, usually associated with the relapse or progression of the underlying disease, which makes it important to know the signs of MRI to make a quick diagnosis, which can enable early treatment and a better prognosis in the course of the disease.

Images/Cases and Legends

Figure/Case 1:

Patient 1: Male, 66 years old, diagnosed with non-Hodgkin's lymphoma for about five years, evolving with visual impairment, headache and facial paralysis.

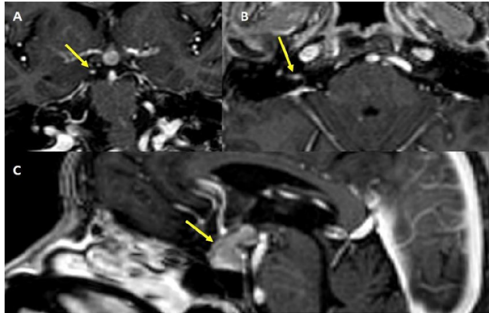
SPGR3D T1 post contrast MRI with reformatation in Coronal (A) and Axial (B) planes. There is thickening and enhancement of the right optic nerve (arrow in A). The left facial nerve shows asymmetrical enhancement (arrow in B). Arrowhead in B also depicts an extra-axial lesion at the posterior fossa.



Figure/Case 2:

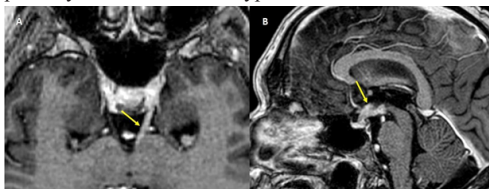
Patient 2: Female, 48 years old, diagnosed with acute lymphoblastic leukemia, after treatment with two cycles of chemotherapy, evolving with facial paralysis on the right and eye pain.

SPGR3D T1 post contrast MRI with reformatation in Coronal (A), Axial (B) and Sagittal (C) planes. There is thickening and abnormal enhancement of the right oculomotor nerve (arrow in A) and right facial nerve (arrow in B). Arrow in C demonstrates infiltration of the pituitary gland and infundibulum.

**Figure/Case 3:**

Patient 3: Male, 51 years old, diagnosed with previous non-Hodgkin's lymphoma, presenting left eye pain associated with holocranial headache for 3 days.

SPGR3D T1 post contrast MRI with reformatation in Axial (A) and Sagittal (B) planes. There is thickening and abnormal enhancement of the left oculomotor nerve (arrow in A). Arrow in B reveals infiltration of the pituitary infundibulum and hypothalamus.

**REFERENCES**

- 1- Kamiya-Matsuoka C, Shroff S, Gildersleeve K, Hormozdi B, Manning JT, Woodman KH. Neurolymphomatosis: a caseseries of clinical manifestations, treatments, and outcomes. *JNeuro Sci.* 2014;343(1-2):144-8.
- 2- Tanaka H, Yoshino K, Sakaida E, Hashimoto S, Takeda Y, Kawajiri C, et al. Secondary neurolymphomatosis detected by whole-body diffusion-weighted magnetic resonance imaging: a case report. *J Clin Exp Hematop.* 2013;53(3):221-6.
- 3- Keane JR. Multiple cranial nerve palsies. *Arch Neurol.* 2005;62(11):1714-1717.
- 4- Scott BJ, Douglas VC, Tihan T, Rubenstein JL, Josephson SA. A systematic approach to the diagnosis of suspected central nervous system lymphoma. *JAMA Neurol.* 2013;70(3):311-9.
- 5- Liu Z, Jiang T, Hou N, Jia Y. Peripheral neurolymphomatosis with tracheal asphyxia: a case report and literature review. *BMC Neurol.* 2015;15:149.
- 6- Hughes RA, Britton T, Richards M. Effects of lymphoma on the peripheral nervous system. *J R Soc Med.* 1994;87:526-30.
- 7- Baehring JM, Damek D, Martin EC, Betensky RA, Hochberg FH. Neurolymphomatosis. *Neuro Oncol.* 2003;5:104-15. doi: 10.1215/15228517-5-2-104.
- 8- Gleissner B, Chamberlain MC. Neoplastic meningitis. *Lancet Neurol.* 2006;5(5):443-452.
- 9- Van Oostenbrugge RJ, Twijnstra D. Presenting features and value of diagnostic procedures in leptomeningeal metastases. *Neurology.* 1999;53(2):382-385.
- 10- Melissa Guzzetta, DO; Steven Drexler, MD; Brian Buonocore, MD; Virginia Donovan, MD. Primary CNS T-cell lymphoma of the spinal cord: case report and literature review. *Lab Med.* 2015;46(2):159-163.
- 11- Krishnamurthy S, Weinstock AL, Smith SH et al. Facial palsy, an unusual presenting feature of childhood leukemia. *Pediatr Neurol* 2002;27:68-70.
- 12- Ferrer A, Bosch F, Villamor N, Rozman M, Graus F, Gutierrez G, et al. Central nervous system involvement in mantle cell lymphoma. *Ann Oncol.* 2008;19:135-41.
- 13- Gan HK, Azad A, Cher L, Mitchell PL. Neurolymphomatosis: diagnosis, management, and outcomes in patients treated with rituximab. *Neuro Oncol.* 2010;12:212-5.