AN CLINICAL CASES
received 23 December 2020 | accepted 1 March 2021 | published 14 May 2021
Doi: https://doi.org/10.31157/archneurosciencesmex.v26i2.265

Germinoma with subependymal quadriventricular, cerebellar, and rostral brainstem spread

Villarreal-García Enrique [a] ✉ | Contreras-Guerrero Javier [a] | Fragoza-Sánchez Edgar [a]
Quiñones-González Alba Monserrat [b] | Díaz-Juárez Eduardo [c] | Medina-Romero José Raymundo [c]

a. Neurosurgery Residency, Department of Neurosurgery, General Hospital 450, Ministry of Health, Durango, Mexico.
b. Pathology Residency, Department of Pathology, General Hospital 450, Ministry of Health, Durango, Mexico.
c. Department of Neurosurgery, General Hospital 450, Ministry of Health, Durango, Mexico.

Correspondencia
Enrique Villarreal García. Hospital General 450. Secretaría de Salud. Boulevard José María Patoni S/N, El Ciprés, C.P. 34206, Durango, Durango México.

✉ kikevg90_05@hotmail.com

Abstract

Introduction: germinoma of the central nervous system have a predilection for the midline, the differential diagnosis is broad, immunohistochemistry determines the definitive diagnosis.

Clinical case: a 19-year-old male begins with double vision when staring or following objects, bilateral frontal headache, without radiation, stabbing. Decreased visual acuity was added, with third cranial nerve palsy to conjugated gaze supraversion, absent Babinski, intention tremor, ataxic gait to TANDEM and dizziness when performing it. Upon admission; clinical diagnosis, cerebellar verm syndrome; imaging diagnosis, likely primary brain lymphoma and non-communicating hydrocephalus; surgical management, placement of the right precoronal point, ventriculo-peritoneal shunt valve, and sampling of cerebrospinal fluid; tumor markers, negative; pharmacological management, ceftriaxone and albendazole; incisional biopsy due to left parietal stereotactic surgery, intraoperative biopsy, lymphoid atypia; histopathological diagnosis, neoplastic lesion; immunohistochemical diagnosis, germinoma.

Conclusion: this is the first described case of a midline germinoma with diffuse subependymal quadriventricular, cerebellar and rostral brain stem spread.

Keywords: *germinoma, immunohistochemistry, quadriventricular, subependymal, tumor marker.*

Introduction

Central nervous system neoplasms include those originating in germ cells, which show the biological and histological parallel behavior of their gonadal counterparts. [1,2,3] They exhibit a predilection for the midline, a characteristic they share with the rest of extragonadal germ cell tumors, the World Health Organization (WHO) classifies germ cell tumors of the central nervous system as germinomas and non-germinomas.[1,4]

Central nervous system germ cell tumors include germinomas, teratomas, yolk sac tumors, embryonal carcinoma, and choriocarcinoma, each with distinctive biological and histological features. [1,3,5]

The most prevalent are germinomas (41.1%), followed by mixed germ cell tumors (32%), teratomas (19.6%), embryonal carcinomas (3.3%), yolk sac tumors (2%), and choriocarcinomas (2%). [1]

From a macroscopic point of view, germ cell tumors show a gray/pink color and a size of 1 to 8 centimeters. [1,5]

Microscopically, they are distinguished by a mixed cell population composed of lymphocytes and large germ cells with clear or acidophilic cytoplasm, prominent nucleoli and a round nucleus in a central location. [1,6]

They occur predominantly in children and young adults. [1,3] The most common location is the suprasellar region (34 to 49%) in females and, the pineal region (38 to 57%) in males. [1,6]

Diffuse periventricular lesions in young adults have a wide range of differential diagnoses, including lymphomas, inflammatory, infectious, and neoplastic processes. Diagnostic confirmation is performed with tumor markers and a confirmatory immunohistochemical study. [1,6]

Three cases of diffuse subependymal germinomas with periventricular distribution have been reported in the literature [1,4,5,] but none with diffuse quadriventricular subependymal, diencephalon, cerebellar, and brainstem spread in its rostral portion.

Clinical Case

A 19-year-old male with a history of alcoholism, who began sexual activity at 16 years of age; homosexual activity, with condom use, one year prior to admission.

The condition began two months prior to admission, with double vision when focusing or following objects, accompanied by bilateral frontal headache, without radiation, morning and daily stabbing with an intensity of 2/10 on the visual analog scale (VAS), and improving without the need for analgesics.

One month prior to admission, the patient presented decreased visual acuity, difficulty reading, and increased headache up to 6/10 on the VAS with the same characteristics: increased duration and reduced pain with analgesic use; he denied nocturnal headaches and reported adequate sleep habits.

At initial evaluation, brain functions were: 15-point Glasgow (ECG), orientation, reasoning, calculation, judgment, and no memory alteration.
Cranial Nerves. II, difficulty reading at 30 cm, III, paralysis to conjugate gaze supraversion. Motor and sensory examination without relevant findings; cerebellum, intention tremor, gait ataxia to TANDEM gait performance with vertigo. Initial laboratory: leukocytes 10,600 uL, neutrophils 72.1%, lymphocytes 18.6%, monocytes 6.3%, eosinophils 1.3%, basophils 1.7%.
Imaging studies: diencephalic lesion with mixed densities, atypical distribution pattern and dilation of the ventricular system, Evans index 0.33.

Image 1. Brain magnetic resonance imaging axial, sagittal and coronal sections in T1 sequence

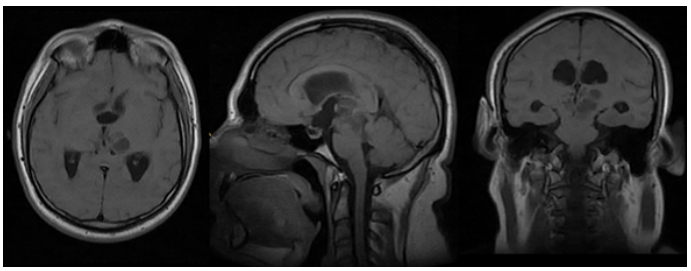


Image 2. Brain magnetic resonance imaging axial, coronal, sagittal section in T2 sequence.

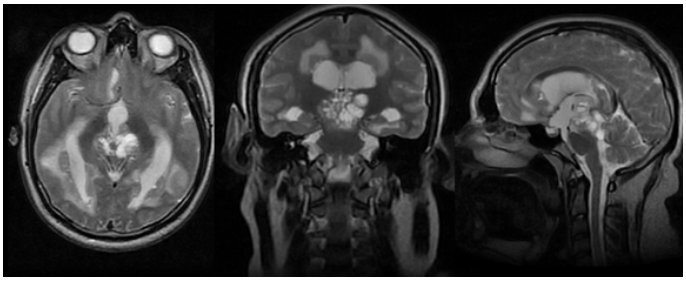


Image 3. Brain magnetic resonance imaging, axial coronal and sagittal section in T1 sequence with gadolinium.

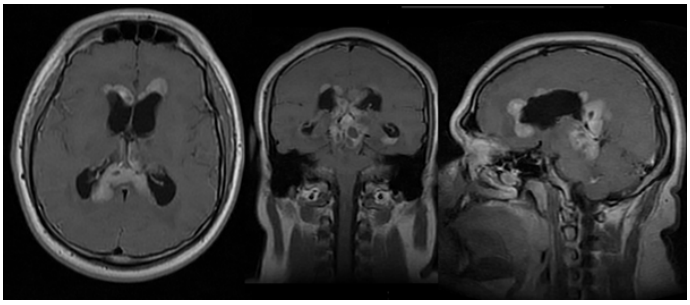
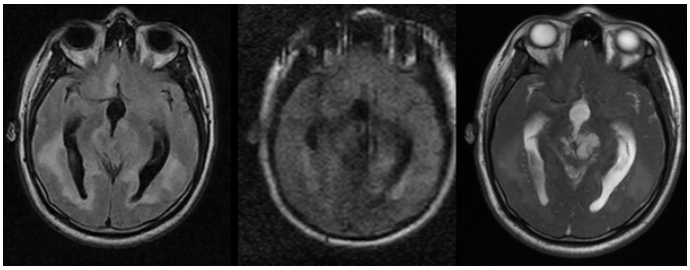


Image 4. Axial section of brain magnetic resonance with FLAIR sequence, diffusion, and FIESTA sequence.



A ventriculo-peritoneal shunt valve was placed at the right precoronal point.

Cerebrospinal fluid; leukocytosis 2 cells/mm3, CSF proteins 22 mg/dl, glucose 75 mg/dl, appearance clear water.

TORCH serology and viral panel: VDRL, FTA-ABS, IgG HSV Type I, IgG, AntiHSV, AntiHSVIgM Type I&II, AntiHSVIgM Type II gray zone. Positive results, Anti-Toxoplasma IgM&IgG, Anti-Rubella IgG&IgM, Anti-CMV IgG&IgM; negative results, tumor markers: Alpha-fetoprotein (AFP) 2.38//, Carcinoembryonic antigen 1.82//, Human chorionic gonadotropin- beta 1.2//. Pharmacological management, ceftriaxone 1 gram intravenous every 12 hours and albendazole 200 mg every 8 hours orally.

Improvement in headache and visual acuity after 48 hours of hospitalization.

Stereotactic incisional left parietal biopsy with intraoperative result of lymphoid atypia and histopathological result of germinoma.

Image 5. 10x magnification, neoplastic lesion composed of large cells ranging from round to polygonal shape, with granular eosinophilic and clear cytoplasm, well-defined cell borders, large round nuclei, some exhibiting coarse chromatin and prominent nucleoli. Atypical mitoses are observed, with 13 counted in 10 high-power fields.

At 40x magnification, the cells are arranged in nests, delimited by incomplete fibrous septa through which mature, non-atypical lymphocytes are seen coursing, arranged perivascularly within the Virchow–Robin spaces.

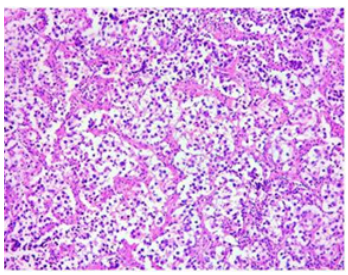


Image 5a. 10X

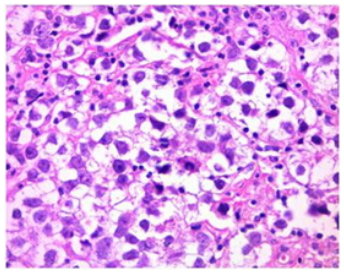
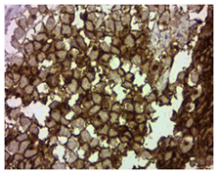
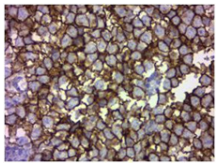


Image 5b.40X

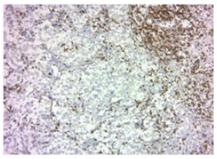
Image 6. Immunohistochemical staining for placental alkaline phosphatase (PLAP), CD117 and CD5 with periodic acid-Schiff identified lability to diastase. Positive immunohistochemistry for membrane and cytoplasm PLAP (Image 6a), as well as membrane CD117 (c-kit) (Image 6b), study with focally positive CD20 (B lymphocytes) and CD5 (T lymphocytes) lymphocytes that characteristically constitute the tumor (Image 6c).



6a. PLAP in membrane and cytoplasm (400X)



6b. CD117 in cellular membrane (400X)



6c. CD5 T lymphocyte cellular membrane (100X)

Discusion

The initial laboratory studies suggested infectious disease with extension to the central nervous system as the main differential diagnosis, however, the imaging studies showed an unusual dissemination pattern; the age of the patient, the subependymal quadriventricular, cerebellar, and rostral brainstem spread broadened the diagnostic possibilities. [6,7]

In this scenario, the biopsy of subependymal tissue with histopathological architecture for germinoma was complemented with negative tumor markers and positive

immunohistochemistry for placental alkaline phosphatase (PLAP), a test considered the gold standard for germinoma. [1,4,5,7]

In the central nervous system, germ cell tumors are morphologically, immunophenotypically, and in some genetic aspects, homologous to gonadal and extra-axial germ cell neoplasms.[7]

The main types of germ cell tumors are germinoma, teratoma, yolk sac tumor, embryonal carcinoma, and choriocarcinoma, each one is categorized according to the tumor marker they secrete and to that to which they are most sensitive. Yolk sac tumors and choriocarcinomas often present elevated alpha-fetoprotein (AFP) and human chorionic gonadotropin (-HCG), respectively. In this case, negative markers were suggestive of germinoma.[3,7] An intra-axial neoplastic lesion of the midline in a patient in the first two decades of life does suggest a germ cell tumor, however, due to the atypical distribution of the tumoral lesion, a biopsy became essential for histopathological and immunohistochemical diagnoses, which are pathognomonic of germinoma. The literature reports 17 cases of germinomas, most of them in Asian countries; delimited to the ventricles, with a midline epicenter and invasion of lateral ventricles, or with a midline epicenter and non-diffuse involvement of one or multiple ventricles or non-pure germinoma with diffuse subependymal extension.[3] In addition, three cases of pure intracranial germinoma with extensive seeding to the lateral ventricles and third ventricle 3,4 are reported. The case presented here corresponds to the first described case of pure midline germinoma with diffuse subependymal quadriventricular, cerebellar, and rostral brainstem spread, as suggested by imaging and histopathology, and confirmed by the immunohistochemical study, and therein lies its importance.

Conclusion

Intracranial germinomas are rare. They occur during childhood and adolescence. Unlike the other germ cell tumors, the former are negative for tumor markers, exhibit predilection for the midline, and their definitive diagnosis is determined by immunohistochemistry. They are radio- and chemo-sensitive, with a high percentage of patient survival rate and complete resolution.

This work presents the first described case of midline germinoma with diffuse subependymal quadriventricular, cerebellar, and rostral brainstem spread.

References

1. Louis DN, Ohgaki H, Wiestler OD, Cavenee WK, Burger PC, Jouvet A, Scheithauer BW, Kleihues P. The 2007 WHO classification of tumours of the central nervous system. Acta Neuropathol. 2007; 114(2):97–109. Doi:10.1007/s00401-007-0243-4
2. Lieuw KH, Haas-Kogan D, Ablin A. Intracranial germ cell tumors. in: Gupta N., Banerjee A., Haas-Kogan D. (eds) Pediatric CNS tumors. Pediatric Oncology. Springer, Berlin, Heidelberg.2004. Doi: https://doi.org/10.1007/978-3-662-09227-9_7
3. Krueger EM, Invergo DL, Lin JJ. Germinoma with diffuse subependymal spread: acase report. Cureus. 2016; 8(6):e643. DOI: 10.7759/cureus.643
4. Suresh TN, Mahadevan A, Santosh V, Shankar SK. Subarachnoid spread of germinoma mimicking tuberculous meningitis.Neurology India. 2004; 52(2):251-253. https://www.neurologyindia.com/text.asp?2004/52/2/251/11057
5. Yang C, Jagjivan B, Rao K. Germinoma-unusual presentation: a case report. Conn Med. 2004; 68(10):617–19. PMID: 15626137.
6. Félix IA. Atlas de neuropatología. Editorial Auroch, México. 2000: 41-51.
7. David N. Louis, Hiroko Ohgaki, Otmar D. Wiestler,Webster K. Cavenee (Eds):WHO Classification of tumours of the central nervous system (revised 4th edition).IARC; Lyon 2016.

Artículo sin conflicto de interés