Central neurocytoma with atypical imaging appearance

A 30-year-old patient presented to the emergency department with 3 days history of headache, nausea and vomiting. Memory loss and disorientation in time and space were reported, without other neurological manifestations.

Imaging Findings:

Unenhanced CT showing a small, well-circumscribed, intraventricular mass located in the left lateral ventricle, associated with monoventricular dilatation and compression of the contralateral ventricle. (Fig. 1a, c) After intravenous contrast administration the mass showed a slight or moderate enhancement. (Fig. 1b, d)

MRI sequences showed a small isointense mass on T1-weighed images and ipsilateral ventricular dilation (Fig. 2a) with slight enhancement after intravenous contrast administration. (Fig. 2b) Increased T2 signal intensity was seen in the adjacent periventricular white matter. (Fig. 2c)

Axial T2 gradient slice showed a small hypointense area within the intraventricular mass (Fig. 2e), compatible with calcification, and restricted diffusion could be proved in the left intraventricular mass in B1000 and ADC sequences. (Fig. 2f)

Fig. 3 showed small blue rounded cell appearance with Haematoxylin - Eosin stain, negativity to glial cell immunohistochemistry (GFAP) and positive markers for neuronal differentiation (NeuN).

Discussion:

The differential diagnosis for intraventricular tumours is broad, which underlines the importance of anatomic and histologic structures of the ventricular system, in order to understand the different entities. [1]

Ependymal cells cover the ventricles and give rise to ependymomas. Subjacent to the ependymal lining is a layer of subependymal plate composed of glial cells, which are thought to be the cells of origin of subependymomas. [2] However, the glial cells and residual neuronal precursor cells of the septum pellucidum may transform into central
neurocytomas. Extraventricular neurocytomas arise in the brain parenchyma, cerebellum, and spinal cord, although the term central neurocytoma is reserved for neurocytomas of the ventricular system. [2]

Central neurocytomas are rare intraventricular tumours that occur in the lateral ventricle and may extend to the third ventricle. [3] Central neurocytomas represent 0.25%–0.5% of all intracranial tumours with the mean age at presentation of 29 years. [4]

Central neurocytomas are considered WHO grade II tumours, and have strikingly similar features to oligodendrogliomas. [5] The identification of pineocytomatous rosettes distinguishes these tumours from oligodendrogliomas in most cases. [4]

Central neurocytomas usually express immunoreactivity for synaptophysin and neuron-specific enolase, both markers for neuronal differentiation, helping in differentiating these tumours from oligodendrogliomas. [3]

Typically, cross-sectional imaging appearance of a central neurocytoma is of a well-circumscribed, heavily lobulated, intraventricular mass with numerous intratumoral cyst-like areas, located in the anterior portion of the lateral ventricle, near the foramen of Monro. [1] Thus, many of cases of central neurocytoma present with monoventricular dilatation, resulting in symptoms of increased intracranial pressure. [2]

On CT images, the lesions are hyperattenuated compared with the brain parenchyma, with slight to moderate to intense enhancement after the intravenous administration of contrast media. [1] Almost half of the cases may contain calcification, but haemorrhage is considered rare. [3]

On MR images, central neurocytomas are isointense to grey matter on T1-weighted images and hyperintense on T2-weighted images. Attachment to the lateral ventricle wall or the septum pellucidum is frequently seen. Prominent flow voids and increased T2 signal intensity may be present in the adjacent periventricular white matter. [2]

In our case, the imaging features were not typical for neurocytoma, while no cystic lesions, nor marked hyperintensity on T2-weighed sequences were observed. We believe that those differences might be explained by the small size and the prompt diagnostic examinations, performed in this patient. The pathology and immunoreactivity were the clue finding in differentiating this tumour from oligodendrogliomas.

Gross total resection is usually curative, but recurrence and CSF dissemination have been reported. [6]

**Differential Diagnosis List:** Central neurocytoma, Central neurocytoma, Subependymoma, Ependymoma, Subependymal giant cell astrocytoma

**Final Diagnosis:** Central neurocytoma

**References:**


Figure 1

Description: Axial unenhanced CT showing small, well-circumscribed, intraventricular mass located in the left lateral ventricle, affiliated with monoventricular dilatation. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Axial contrast-enhanced CT shows a moderately enhancing, small, well-circumscribed, intraventricular mass located in the left lateral ventricle, affiliated with monoventricular dilatation. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Sagittal unenhanced CT showing small, well-circumscribed, intraventricular mass located in the left lateral ventricle, affiliated with monoventricular dilatation. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
**Description:** Sagittal contrast-enhanced CT shows a moderately enhancing, small, well-circumscribed, intraventricular mass located in the left lateral ventricle, affiliated with monoventricular dilatation. **Origin:** Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Figure 2

Description: Sagittal T1 sequence shows an isointense mass and the ipsilateral ventricle is clearly enlarged. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Axial contrast-enhanced T1 3D sequence shows an isointense mass and slight enhancement. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Axial T2 slice shows small isointense mass and monoventricular dilation. Increased T2 signal intensity is seen in the adjacent periventricular white matter. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Sagittal FIESTA (balanced steady-state gradient echo sequence) slice shows small isointense mass and monoventricular dilation. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Axial T2 gradient image shows a small hypointense area within the intraventricular mass, compatible with calcification. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: B1000 and ADC images show restricted diffusion in the left intraventricular mass. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Figure 3

**a**

Description: The patient presented with small blue rounded cell appearance with negativity to glial cell immunohistochemistry (GFAP) and positive markers for neuronal differentiation (NeuN).

Origin: Lira Terradez Mas. Department of Pathology, Hospital Clínico Universitario de Valencia, Valencia, Spain.

**b**

Description: The patient presented with small blue rounded cell appearance with negativity to glial cell immunohistochemistry (GFAP) and positive markers for neuronal differentiation (NeuN).

Origin: Lira Terradez Mas. Department of Pathology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: The patient presented with small blue rounded cell appearance with negativity to glial cell immunohistochemistry (GFAP) and positive markers for neuronal differentiation (NeuN). Origin: Lira Terradez Mas. Department of Pathology, Hospital Clínico Universitario de Valencia, Valencia, Spain.