

## CASE REPORT

# Intraventricular metastatic clear cell renal carcinoma

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## Abstract

**Background:** Intraventricular tumors represent a diagnostic problem, due to a wide range of differential diagnosis, with an important variability of tumoral histological types in adult and pediatric population. **Patient, Methods and Results:** Our case is represented by a patient, aged 48 years, without any history of significant personal pathology, accusing nausea, vomiting, and intensive headache. In the morning, he became confused, having hallucinations for a short period of time, and has accused drowsiness for several weeks. Imaging (CT and MRI) shows a neoformation in the third ventricle, accompanied by bilateral lateral ventricles dilatation, with predominantly annular enhancement. During surgery, through the middle third transcallosal interhemispheric approach, it was revealed a reddish, well-demarcated intraventricular mass, well vascularized and with a firm consistency. Final pathologic diagnosis was metastatic clear cell renal carcinoma. Initial postoperative evolution was good, and then neurological and respiratory condition worsened as a bronchopneumonia lead to patient's death in 12 days after surgery. **Conclusions:** Clear cell carcinoma metastasis located in the third ventricle should be taken into consideration for patients presenting a single intraventricular lesion even they have no documented primary malignancy.

**Keywords:** CT, MRI, intraventricular tumor, renal carcinoma, metastasis.

## Introduction

Intraventricular tumors represent 10% of all central nervous system tumors [1]. This neoplasia represents a diagnostic problem due to a wide range of differential diagnosis because of to an important variability of tumors' histological types in adult and pediatric population [2]. Although this neoplasia are easily observed on CT and MRI sections due to the high contrast between these masses of soft tissue and surrounding cerebrospinal liquid, accurate differential diagnosis of these tumors can be quite difficult to formulate [3].

Taken into consideration the histopathological features of the intraventricular tumors, the radiologic diagnosis can become easier.

Metastasis of renal cell carcinoma (RCC) in the choroid plexus of the third ventricle is a rare event in the literature but there is no report of such a histological type located only in third ventricle without implication of the choroid plexus [4].

We present a case of clear cell renal carcinoma

(CCRC) solitarily metastasizing to the third ventricle, which was histologically proved.

## Patient, Methods and Results

A 48-year-old male patient, having no history of significant personal pathology, came to our hospital accusing nausea, vomiting, and intensive headache. In the morning, he became confused, with hallucinations for a short period of time and has accused drowsiness for several weeks. During his hospitalization, intracranial hypertension syndrome worsened.

Computer tomography revealed a neoformation with a mixed solid and fluid structure, with hemorrhage in its mass, located deep at the level of mid-brain structures, paramedial in the left, 30/25/24 mm, with moderated perilesional edema and dilated lateral ventricles.

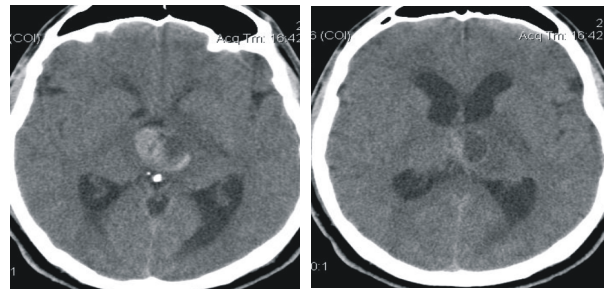
MRI showed an inhomogeneous hyperintense neoformation (T2 and FLAIR), with hyperintense T1 (bleeding) in its area, and predominantly annular enhancement. The tumor, located in the mid-brain and

third ventricle topography, determines its collapse and caudal-cranial compression of the left lateral ventricle, with hydrocephaly of the lateral ventricles, adjacent parenchymal edema and presence of a discrete trans-ependymal effusion.

During surgery, through the middle third transcallosal interhemispheric approach, it was revealed a reddish, well-demarcated, well vascularized, and firm consistency tumoral mass located in the third ventricle. Subtotal removal of the tumor was performed and resected tissue as send to the Pathology Department. Final pathological diagnosis was metastatic clear cell renal carcinoma (Figure 4).

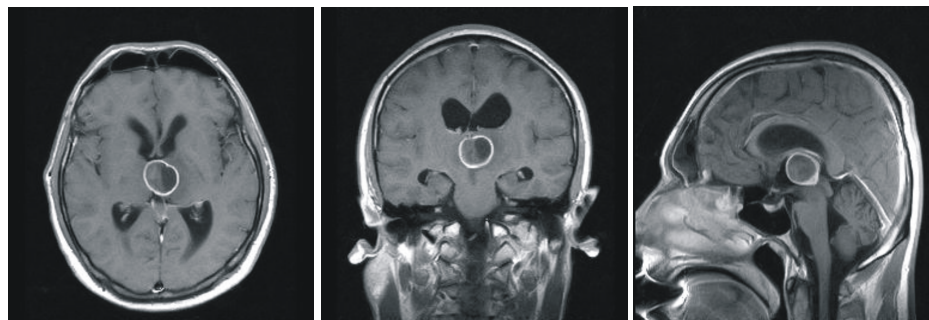
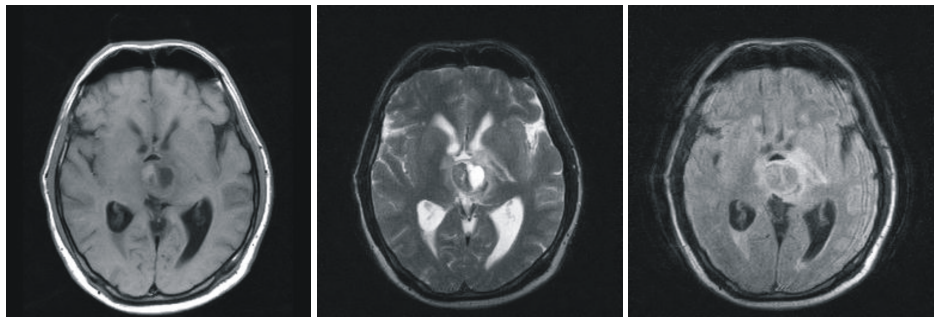
Initial postoperative evolution was good, and then neurological and respiratory condition worsened as a

bronchopneumonia leads to the patient's death in 12 days after surgery. No autopsy was carried out.

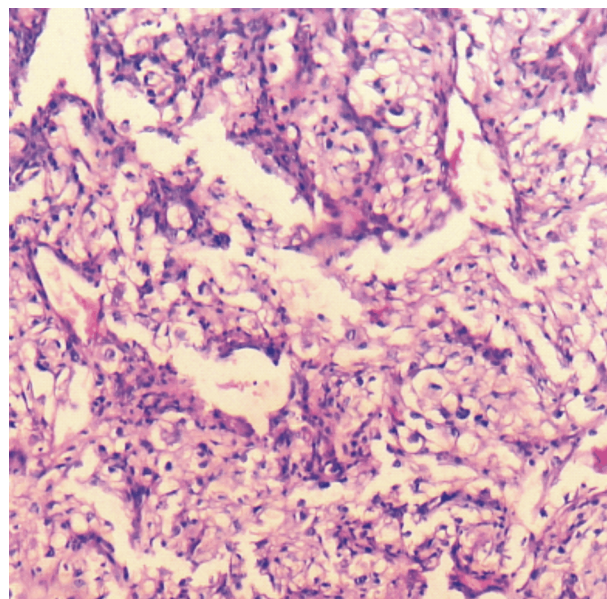


**Figure 1 – Unenhanced axial CT: heterogeneous mass with hyperdense and hypodense aspect located on the third ventricle topography associated with acute hydrocephaly.**

**Figure 2 – Magnetic resonance imaging (MRI) axial T1- and T2-weighted and fluid attenuation inversion recovery (FLAIR) of the mass lesion with bleeding area inside and adjacent parenchymal edema.**



**Figure 3 – Magnetic resonance imaging (MRI) axial, coronal and sagittal T1-weighted with Gadolinium shows a predominant ring enhancement and a left marked hypointensity with a non-obstructive hydrocephalus.**



**Figure 4 – Metastatic clear cell renal carcinoma: proliferation of anaplastic epithelial cells with clear cytoplasm, with hyperchromatic, irregular nuclei, arranged in sheets separated by fine conjunctive septa containing capillaries (HE stain,  $\times 200$ ).**

## Discussion

Intracerebral ventricles are lined by ependymal cells and a subependymal plate composes of glial cells. These two cellular types represent the main source of intraventricular tumoral proliferation such as ependymomas, subependymomas, and subependymal giant cell astrocytomas. Other sources are epithelium and mesenchymal tissues of choroid plexus, which is the most highly vascular portions of the ventricular system and produces CSF. Accordingly, the tumors originating in this structure are papillomas and carcinomas of the choroid plexus [3].

Apart from these entities, which are the most common intraventricular tumors, the differential diagnosis of an intraventricular mass should include other rare benign and malignant tumors [5–15]. On the other hand, in the third ventricle can develop various cysts: colloid cyst [16], cysticercosis cysts [17, 18], neuroepithelial cyst [19]. Intraventricular metastatic dissemination of a carcinoma is a rare occurrence (0.9–4.6% of all brain metastases) [20].

Metastasis can be found primarily in the lateral ventricle, followed by the third ventricle and the fourth ventricle [21]. The most common source of intraventricular metastasis in adults is renal, lung, and colonic carcinomas [20], and only rarely a thyroid carcinoma [22] or a

melanoma [23]. Children have more commonly metastatic intraventricular tumors from neuroblastomas, Wilms' tumor and retinoblastomas [20].

Intraventricular tumors are easy to visualize on cross-sectional imaging studies because they stand out in comparison to the density or signal intensity of CSF. Metastasis represents 2% of all intraventricular masses. Lung carcinoma and renal cell carcinoma are the most common primary tumors to spread to the ventricles, where the choroid plexus, the most highly vascular part of the ventricle system, is the favored site. A differential diagnosis for ventricular tumors has to be based on the location and the age of the patient [24].

The CT examination of intraventricular metastasis shows isodense or hyperdense masses with strong punctate, nodular or ring enhancement. Intraventricular metastases on non-contrast enhanced CT may be hyperdense, hypodense or isodense relative to the normal brain parenchyma depending on their cell type. They usually show typically marked enhancement on contrast administration based on their vascularity. Calcification is unusual. Hydrocephalus is usually not present unless the tumor blocks the normal cerebrospinal fluid pathway. MR imaging is superior to CT because of its multiplanar capabilities and detection of small lesions [3, 25]. The MRI examination reveals iso-/hypointense T1 and hyperintense T2 tumors, with various aspects of enhancement (uniform, punctate, ring) [26, 27]. Some metastases with intrinsically short T1, such as those of melanoma, may be hyperintense on T1. Dynamic susceptibility contrast-enhanced MR may show elevated relative cerebral blood volume (rCBV) in hypervascular metastases such as renal carcinoma or melanoma [28].

Microscopically, metastatic tumors when properly differentiated exhibit histological features similar to those in their primary sites. Even though magnetic resonance spectroscopy is a promising method for brain tumors, in the case of a metastatic tumors it cannot be used to identify the origin of the primary tumors [27] as this remain to be evaluated by microscopic exam.

## ✉ Conclusions

The differential diagnosis of an intraventricular mass, in terms of imaging, is quite difficult using standard CT and MRI. However, combining clinical findings, conventional CT and MRI with new information brought by magnetic resonance spectroscopy and magnetic resonance perfusion may increase diagnostic accuracy. As there is such a great variability in the histological types of intraventricular masses, the physician have to pay attention to the demographic, clinical, and imaging findings of a patient admitted with a lesion located in the third ventricle. Clear cell carcinoma metastasis located in the third ventricle is rare, but it should be taken into consideration for patients presenting a single intraventricular lesion even they have no documented primary malignancy.

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*Received: November 16<sup>th</sup>, 2012*

*Accepted: April 8<sup>th</sup>, 2013*