CASE REPORT

Choroid Plexus Metastasis of Colon Cancer

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This article presents an extremely rare case of solitary metastasis in the choroid plexus of the inferior horn of the right lateral ventricle three years after a colectomy for colon cancer. We discuss the current literature on this tumor together with the magnetic resonance (MR) imaging and computed tomography (CT) findings.

Keywords: *brain metastasis, choroid plexus, colon cancer, computed tomography (CT) scans, magnetic resonance (MR) imaging*

Introduction

Most intraventricular masses are primary tumors originating in the epithelium and mesenchymal tissue of the choroid plexus. Despite their rarity, differential diagnosis should usually consider metastases to the choroid plexus. In a large prospective autopsy series performed on patients who died of extracranial primary malignancies, choroid plexus was the site of metastasis in 2.6% of the cases (19 of 737 cases).¹ Most metastatic tumors demonstrated multifocal masses, with single mass lesions being quite rare in this series. We report a histologically confirmed case of colon cancer solitarily metastasizing to the choroid plexus of the inferior horn of the right lateral ventricle.

Case Report

A 48-year-old woman had been followed up for three years after a colectomy for colon cancer. She experienced gradually increasing headache, appetite loss and vomiting. As a result, she visited a clinic near her house. A chest X-ray film taken at the clinic showed a large mass in the left lower lobe. Lung metastasis from colon cancer was suspected. After two months, she was admitted to our hospital, complaining of periodic loss of consciousness and inability to walk. The neurological examination confirmed loss of consciousness (cons level II-20), and slight left paralysis. Noncontrast CT

Fig. 1. Noncontrast CT scans reveal a large, well-defined, high-density mass within the inferior horn of the right lateral ventricle with extensive surrounding brain edema and a prominent midline shift.

scans revealed a large, well-defined, high-density mass within the inferior horn of the right lateral ventricle with extensive surrounding brain edema and prominent midline shift (Fig. 1). The high-density area was suspected of reflecting calcification or hemorrhage. In other slices, no hydrocephalus was seen. MR images (0.5T unit system) demonstrated the mass as an iso-intensity area on T₁-weighted (TR/TE = 560/20 ms) images and a low-intensity

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Fig. 2. MR images (0.5T unit system) demonstrate the mass as an iso-intensity area on (a) T₁-weighted images (TR/TE = 560/20 ms) and a low-intensity area with many high-intensity spots on (b) T₂-weighted images (TR/TE = 3800/110 ms). The mass is cauliflower-like in form and is surrounded by CSF.

Fig. 3. The lesion is strongly enhanced and a punctiform area is demonstrated after administration of Gd-DTPA (0.1 mmol/kg, TR/TE = 560/20 ms).

area with many high-intensity spots on T₂-weighted images (TR/TE = 3800/110 ms). The low-intensity area on T₂-weighted images was suspected of reflecting mucin, calcification or hemosiderin. The mass exhibited a cauliflower-like form and was surrounded by cerebrospinal fluid (CSF; Fig. 2). The lesion was strongly enhanced and a punctiform area was demonstrated after administration of gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA; 0.1 mmol/kg, TR/TE = 560/20 ms; Fig. 3). A vertebral angiogram showed normal findings but a right carotid angiogram showed a round

Fig. 4. Histological examination of the tumor reveals adenocarcinoma.

tumor with staining supplied from the right anterior choroid artery. An operation was performed to reduce brain pressure. The complete tumor was removed via the right middle temporal sinus with an absorption machine. The tumor jointed to the choroid plexus was well defined and very hard. There was an inflow of many feeding arteries from the choroid plexus. Histological examination of the tumor demonstrated adenocarcinoma (Fig. 4). The patient was diagnosed with choroid plexus metastasis from colon cancer.

Discussion

Metastatic tumors in the choroid plexus, especially solitary ones, are clinically quite rare. Only seventeen histologically confirmed cases have been reported (Table).²⁻¹³ The ages of the reported cases

Table. Summary of 18 cases of single metastasis to the choroid plexus

Author (year)	age/sex	primary lesion	location	CT finding Pre/post contrast	MRI T ₁ WI/T ₂ WI/Gd
Kendall (1983) ²	?/F	breast (adeno)	rt trigone	high/homogeneous CE	
"	?/F	skin (melanoma)	fourth ventricle		
"	?	? (adeno)	fourth ventricle		
Kart (1986) ³	61/M	lung (s.c.c)	lt trigone	iso/homogeneous CE	
Shigemori (1987) ⁴	58/M	kidney (r.c.c)	body of rt LA	high/homogeneous CE	
Tanimoto (1991) ⁵	64/M	lung (large)	rt trigone	iso/homogeneous CE	
Mizuno (1992) ⁶	59/M	kidney (r.c.c)	body of lt LA	high/homogeneous CE	
Nakabayashi (1994) ⁷	64/M	stomach (adeno)	body of lt LA	iso- to high-/homo CE	iso in low/iso in high/homo
Suetake (1994) ⁸	78/M	kidney (r.c.c)	body of lt LA	high/homogeneous CE	
Kohno (1996) ⁹	45/M	colon (adeno)	lt trigone	iso/heterogeneous CE	low/high/hetero
"	66/M	kidney (r.c.c)	rt trigone	high/homogeneous CE	low/high/homo
"	66/M	lung (adeno)	rt inferior horn	iso/homogeneous CE	low/high/homo
Matumura (1997) ¹⁰	68/M	kidney (r.c.c)	body of rt LA		
Raila (1998) ¹¹	47/F	kidney (r.c.c)	rt trigone		iso/iso/homo
Iwatsuki (1999) ¹²	75/F	kidney (r.c.c)	lt trigone	high/	slightly low/high/homo
Motoyama (2000) ¹³	70/F	kidney (r.c.c)	lt trigone		low/high/homo CE
Our case (2002)	48/F	colon (adeno)	rt inferior horn	high/	iso/low/hetero CE

LA: lateral ventricle adeno: adrnocarcinoma r.c.c: renal cell carcinoma

ranged from 45 to 78 years with a mean age of 62.8 years. All metastatic lesions were located in the lateral ventricle except for only two cases located in the fourth ventricle. The primary lesions were located in the kidney in eight cases (renal cell carcinoma), in the lung in three cases (adenocarcinoma, large cell carcinoma, and poorly differentiated carcinoma), in the digestive organ in two cases (gastric adenocarcinoma, colon adenocarcinoma) and in the breast, skin and unknown origin in one case each (adenocarcinoma, melanoma and adenocarcinoma, respectively). Therefore, our paper presents only the second reported case of metastasis from colon cancer.

Previous imaging reports revealed only limited information about this tumor. The tumor was revealed as being either isodense or hyperdense on precontrast CT scans and homogeneously enhanced on postcontrast CT scans, except for the one case⁹ that was heterogeneously enhanced in the metastasis from colon cancer, as in our case. The high-density area on noncontrast CT in our case was suspected of reflecting calcification, suggesting typical metastasis from colon cancer, which was confirmed histologically. Although only eight reports^{7,9,11-13} exist of MR images in the literature, these reports—echoing the characteristics of other tumors—reveal the tumors to be low intensity on T₁-weighted images, isointensity or high intensity

on T₂-weighted images, and strongly and uniformly enhanced by Gd-DTPA. The CT and MR findings in our patient were similar to the reported cases, but we also observed two different points of punctiform enhancement on MR imaging that may reflect abundant tumor vessels as well as a low-intensity area on T₂-weighted images that is often observed in metastatic brain tumors from adenocarcinoma,¹⁴ especially colon cancer. A.C. David et al. believed the hypointense appearance on T₂-weighted images of adenocarcinoma metastasized to the brain is explained not by the presence of mucin, blood products, iron or calcification, but by the relaxation parameters of the tissue from which the metastasis arose. Two mechanisms of metastasis to the choroid plexus can be considered: hematogenous metastasis through the choroidal artery and dissemination through the CSF. In the present case of single metastasis, hematogenous metastasis through lung metastasis was suggested.

When CT and MR findings show an intraventricular tumor, consideration should also be given to tumors such as meningioma, malignant lymphoma, hemangioma, astrocytoma, ependymoma, subependymoma, choroid plexus papilloma or carcinoma, neurocytoma, PNET (primitive neuroectodermal tumor), glioblastoma, oligodendroglioma, teratoma and metastasis. Of these intraventricular tumors, meningioma is the most

difficult to differentiate from our case, as our patient was a middle-aged woman, had experienced calcification, demonstrated a well-enhanced tumor and had no hydrocephalus. In a patient with a previous extracranial malignancy, however, a metastatic choroid plexus tumor should be considered.

References

- Schreiber D, Bernstein K, Schneider J. Metastases of the central nervous system. A third communication. Metastases in the pituitary gland, pineal gland, and chroid plexus. *Zentralbl Allg Pathol* 1982; 126:64-73.
- Kendall B, Reider-grosswasser I, Valentine A. Diagnosis of masses presenting within the ventricles on computed tomography. *Neuroradiol* 1983; 25:11-22.
- Kart BH, Reddy SC, Rao GR, Proveda H. Choroid plexus metastasis CT appearance. *J Comput Assist Tomogr* 1986; 10:537-540.
- Shigemori M, Shimamoto H, Nogichi S, Yositate Y, Sugita Y, Kuramoto S. Choroid metastasis of renal cell carcinoma. *Progress in CT* 1987; 9: 603-606.
- Tanimoto M, Tatsumi S, Tominaga S, et al. Choroid plexus metastasis of lung carcinoma. Case report. *Neurol Med Chir (Tokyo)* 1991; 31:152-155.
- Mizuno M, Asakura K, Nakajima S, et al. Renal cell carcinoma metastasizing to choid plexus of lateral ventricle: a case report. *Neurological Surgery (Tokyo)* 1992; 20:469-474.
- Nakabayashi H, Murata K, Sakaguchi M, Nakajima K, Katsuyama J. Choroid plexus metastasis from gastric cancer. *Neurol Med Chir (Tokyo)* 1994; 34:183-186.
- Suetake K, Shinya T, Takeda M. A choroid plexus metastasis of a renal cell carcinoma: a case report. *Jpn J Neurosurg* 1994; 3:436-441.
- Kohno M, Matsutani M, Sasaki T, Takakura K. Solitary metastasis to the choroid plexus of the lateral ventricle. *J Neurooncol* 1996; 27:47-52.
- Matsumura H, Yoshimine T, Yamamoto S, et al. Single solitarily metastasis of the slowly progressive type of renal cell carcinoma to the choroid plexus. *Neurol Med Chir (Tokyo)* 1997; 37:916-919.
- Raila FA, Bottoms WT Jr, Fratkin JD. Solitary choroid plexus metastasis from a renal cell carcinoma. *South Med J* 1998; 91:1159-1162.
- Iwatsuki K, Sato M, Taguti J, et al. Choroid plexus metastasis of renal cell carcinoma causing intraventricular hemorrhage: a case report. *Neurological Surgery (Tokyo)* 1999; 27(4):359-363.
- Motoyama Y, Nabeshima S, Yamazoe N, Isaka F, Higuchi K, Satou T. A case of choroid plexus metastasis with intracerebral hemorrhage from renal cell carcinoma. *Jpn J Neurosurg* 2000; 9: 753-757.
- David A, Michel E, Joel B. Metastatic adenocarcinoma to the brain: MR with pathologic correlation. *AJNR* 1994; 15:155-159.