

# Death by Subdural Hematoma with Metastatic Carcinoma of Unknown Origin: An Autopsy Case Report

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Dural metastasis associated with chronic subdural hematoma is very rare in patients with malignant neoplasms; it may be difficult to distinguish malignant neoplasms from chronic subdural hematoma. Chronic subdural hematoma is usually a late manifestation of malignant tumors, which contributes to the severity of the prognosis. The scans obtained by using magnetic resonance imaging or computed tomography may be misleading when a subdural hematoma masks the underlying tumor. Herein, we report a case of a subdural hematoma with dural metastasis of unknown origin in a 45-year-old woman; however, the neoplasm was not detected until autopsy.

**Key Words** : Chronic subdural hematoma, Metastasis, Adenocarcinoma, Autopsy

## Introduction

Intracranial metastasis, involving the dura mater from neoplasm located outside the central nervous system, is not uncommon; the incidence rate ranges from 3 to 13%.<sup>1)</sup> Dural metastasis, associated with chronic subdural hematoma, is particularly rare and occurs in 0.5~4% of intracranial metastatic tumor.<sup>1)</sup>

As chronic subdural hematoma may mask a metastatic tumor to dura, an accurate diagnosis is difficult, if other evidence of intracranial metastasis is not revealed. Here, we present an autopsy case about subdural hematoma with multiple metastatic carcinoma of unknown origin.

### Case Report

A 45-year-old female went to hospital with complaints of headache and vomiting. Two months ago, she had been hit by a lump of metal,  $5.0 \times 5.0 \times 3.5$  cm in size, which fell from about 75 cm above the ground at her work. About a month later from the incident, she started to have some headaches and its severity had been worsening gradually, but she didn't go to the hospital. On admission, laboratory tests revealed leukocyte  $16.61 \times 10^3/\mu\text{l}$  (normal:  $3.0\sim 9.3 \times 10^3/\mu\text{l}$ ), platelet  $95 \times 10^3/\mu\text{l}$  (normal  $140\sim 360 \times 10^3/\mu\text{l}$ ), prothrombin time 20.0 seconds (normal:  $9.8\sim 13.5$  seconds), partial thrombin time 26.9

seconds (normal: 21.0~32.4 seconds). Computed tomography (CT) of the head showed a subacute subdural hematoma in left frontotemporoparietal convexity with mild midline herniation. A simple burr hole drainage was performed.

Four days after the surgery, her mental status was stupor and her vital signs were indicated as below; blood pressure 170/90 mmHg, pulse rate 69/minute, respiratory rate 22/minute, and temperature  $37.6^\circ\text{C}$ . She was moved to the intensive care unit, She suffered from anemia, coagulopathy and fever, and received conservative therapies. Three days later, her mental status became semicoma, and after a cardiac arrest, she died. An autopsy was performed.

Her height was 158 cm and body weight was 46 kg.

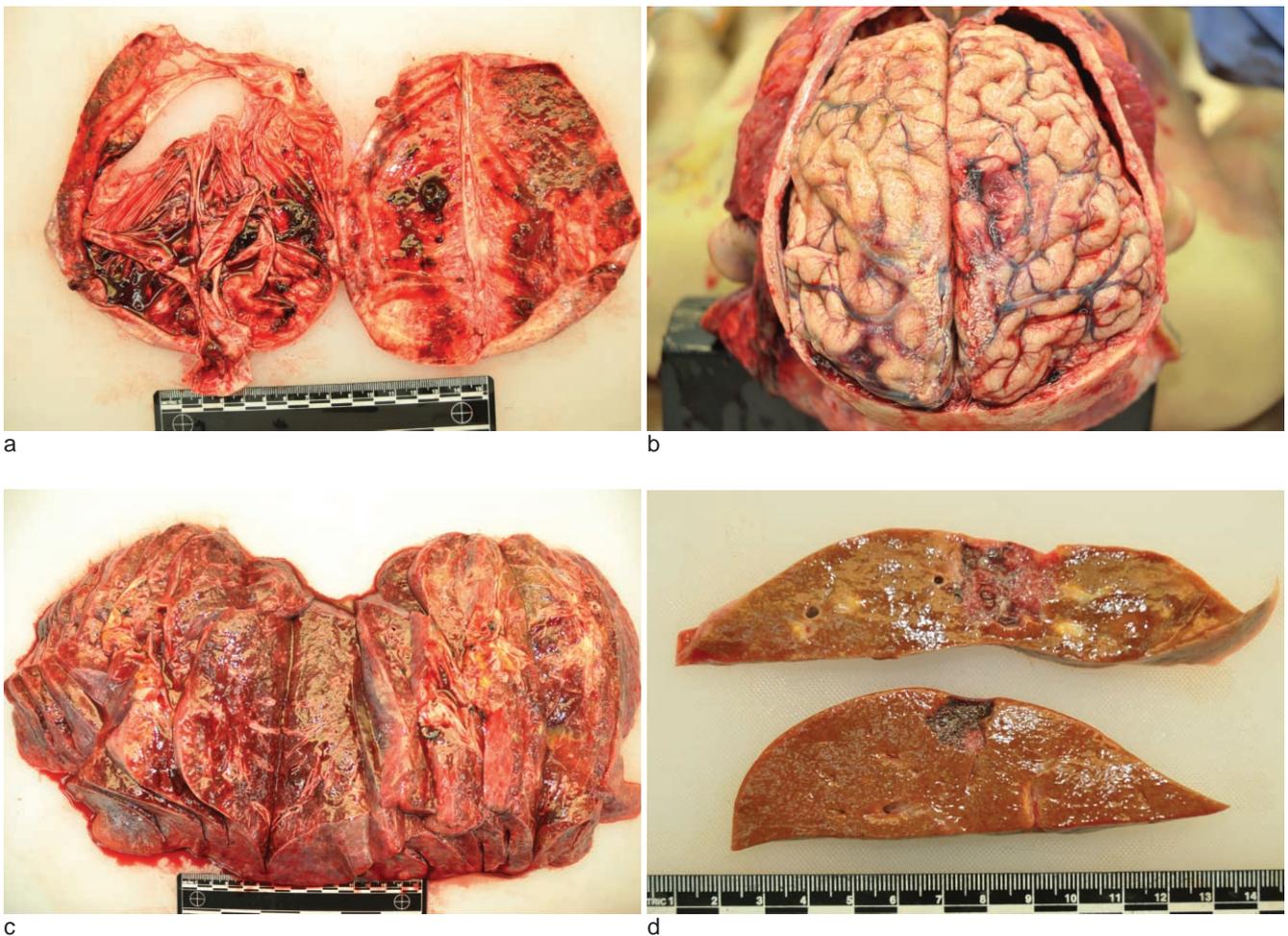


Fig. 1. There was a small amount of mixed fresh and chronic hemorrhages in the subdural spaces of both sides (a). The underlying hemisphere was slightly edematous (b). Both lungs showed diffuse pneumonia patterns with occasional tiny nodules in all the lobes (c). The liver showed two hemorrhagic nodules.  $3.0 \times 2.0$  cm in size in right lobe and  $1.5 \times 1.5$  cm size in left lobe (d).

There was no injury on external examination, except for a burr hole drainage site. On internal examination, there was a small amount of mixed fresh and chronic hemorrhages in the subdural spaces of both sides (Fig. 1a). The underlying hemisphere was slightly edematous (Fig. 1b). Both lungs showed diffuse pneumonia patterns with occasional tiny nodules in all the lobes (Fig. 1c). The liver showed two hemorrhagic nodules,  $3.0 \times 2.0$  cm in size in right lobe and  $1.5 \times 1.5$  cm in size in left lobe (Fig. 1d). Left ovary showed a hemorrhagic unilocular cyst, measuring  $2.5 \times 2.0$  cm in size. No other abnormalities were found in the stomach, colon, uterus, and right ovary.

Microscopically, metastatic adenocarcinoma was detected in the dura mater, lung, liver, and pancreas.

Emboli of adenocarcinoma were detected in the vessels of dura mater with venous congestion and hemorrhage. Disseminated tumor emboli in the small intracerebral vessels were shown (Fig. 2). Immunohistochemical (IHC) stainings for the tumor cells were done. In result, it showed focal positive for CK7, CK20, p53, and positive for SMAD4 and CEA. Others, such as CDX2, CD56, synaptophysin, NSE, TTF1, GCDFP15, WT1, vimentin, ER, PR showed all negative. These mean that the primary site of tumor cannot be determined. However, on the basis of IHC findings, it suggests that the primary tumor may be adenocarcinoma originated from the uterine cervix. But, macroscopically there was no mass like lesion in that organ.

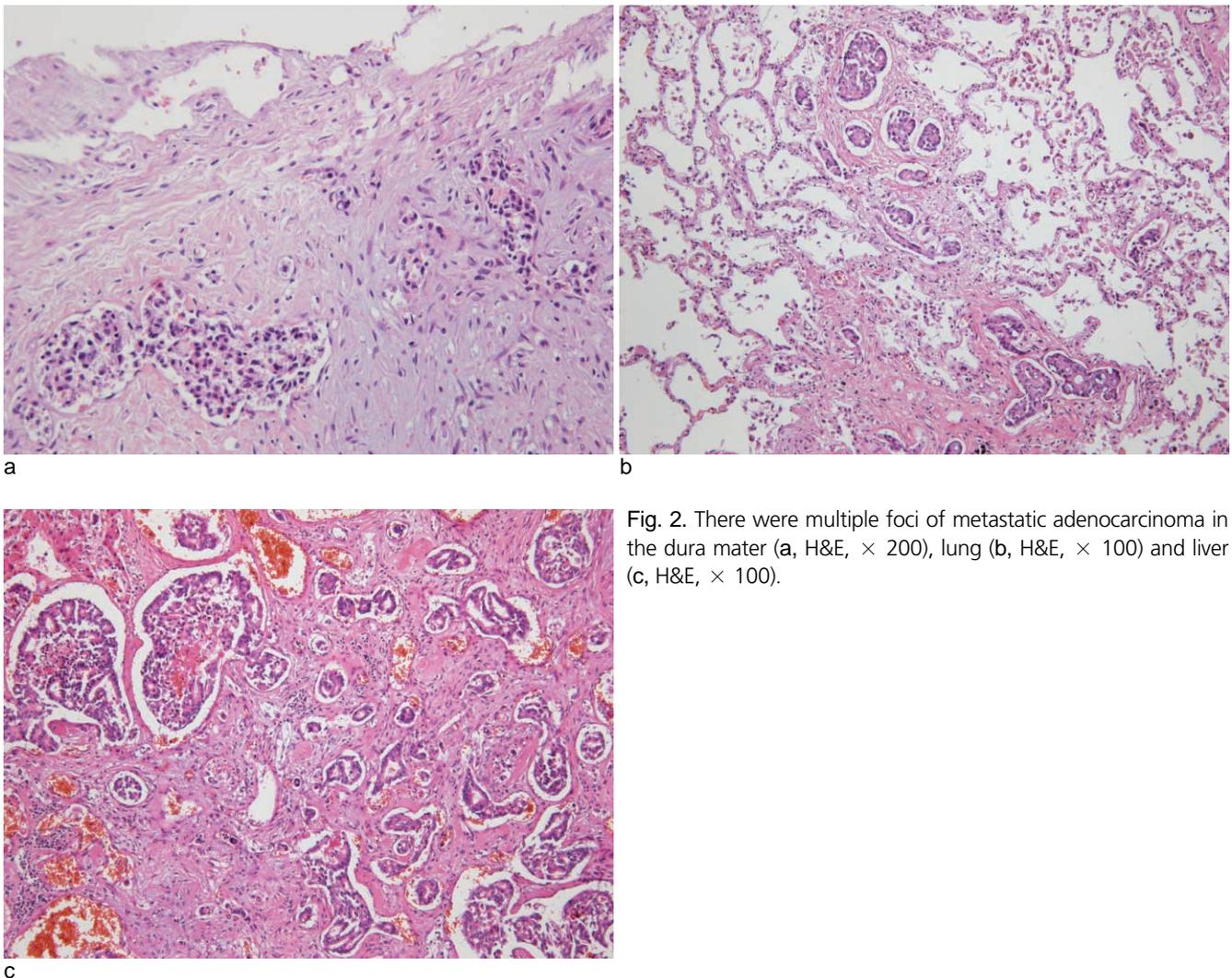


Fig. 2. There were multiple foci of metastatic adenocarcinoma in the dura mater (a, H&E,  $\times 200$ ), lung (b, H&E,  $\times 100$ ) and liver (c, H&E,  $\times 100$ ).

## Discussion

Dural metastasis is found at autopsy in 8~9% of patients with primary extraneural malignancy and it represents the only site of intracranial involvement in about half of these cases.<sup>2,3)</sup> The main primary tumors of dural metastases were prostate (19.5%), breast (16.5%), lung (11%), and stomach carcinomas (7.5%). Many other carcinomas and hematologic malignancies may disseminate to the dura. However, in 19 cases in the literature, the primary cancer remains of unknown origin, despite an extensive search.<sup>4)</sup> Mode of tumor spread to the dura varies according to histologic type of the primary tumor, which mainly consists of direct extension from skull metastasis and heterogeneous spread. It is associated with direct extension from skull metastasis in the lung, prostate, breast carcinoma and Ewing sarcoma. In the case of heterogeneous spread, it is especially related to pulmonary lymphatic and intravascular involvement.<sup>5)</sup>

A characteristic complication of dural metastases, occurring in 15~40% of cases, is chronic or rarely acute subdural hematoma.<sup>4)</sup> Subdural hematoma secondary to dural metastasis is quite rare or even occurs coincidentally and not in a causative way.<sup>5,6)</sup> The first case of the spontaneous subdural hematoma associated with dural metastasis was reported in 1904 and only about 70 cases had been reported in the literature.<sup>1)</sup>

Subdural hematomas due to dural metastases are quite distinct from spontaneous hematomas related to coagulation disorders in cancer patients.<sup>4)</sup> Dural metastases have several radiological findings and one of them is typically a thickening of the dura matter.<sup>4)</sup>

Possible mechanisms of such subdural hematomas include dural venous obstruction, hemorrhagic effusion due to dural metastases or angiodysplastic response of the dura to the invasion by carcinomatous cells.<sup>7)</sup>

Since subdural hematoma due to dural metastasis shows worse prognosis, compared with classic

subdural hematoma without dural metastasis or any malignancy, preoperative differential diagnosis is crucial in the surgical management. Therefore, dural metastasis should be considered in patients with malignant neoplasm and chronic subdural hematoma, even though there is no evidence of skull lesion or intracranial mass.<sup>1)</sup>

In this case, no tumor was revealed in CT scan, and only subdural hematoma was found. The clinician didn't know that the patient had metastatic neoplasm in the dura mater, liver, pancreas and lung. In autopsy, there was no mass lesion in the uterus, colon, and other organs. To find the origin of cancer, we examined whole body and did many immunohistochemical stainings for metastatic carcinoma. But the origin of tumor remains unknown.

The thing we should think about in this patient is that subdural hematoma is considered to be related with metastatic carcinoma, but she also had traumatic history 2 months before she died. The traumatic event could lead to subdural hematoma, but metastatic carcinoma may be the most important cause of subdural hematoma in this case.

Dural metastasis is usually a late manifestation of the malignant neoplasm, which contributes to the severity of the prognosis, so metastasis to the dura mater should be kept in mind because its diagnosis is difficult. Therefore, here we present a case of a female, who died of subdural hematoma with metastatic adenocarcinoma, but there was no detection before an autopsy was performed.

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