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Long-term survival after surgical resection of metachronous lung, brain and thyroid gland metastases from rectal cancer: A case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Brain and thyroid metastasis from rectal cancer are uncommon, and the prognosis is poor. We report a patient with rectal cancer who developed metachronous lung, brain and thyroid metastases. Each metastatic lesion was curatively resected resulting in prolonged survival.

CASE PRESENTATION: A 60-year-old male underwent rectal cancer resection, and the pathological diagnosis was tubular adenocarcinoma, pT2,pN1a,M0, pStageIIa. Ten years after rectal resection, a solitary tumor in the left lung was detected. The tumor was resected thoracoscopically and the pathological diagnosis was metastatic tumor. Three years after the pulmonary resection, a solitary brain tumor was detected. The tumor was removed surgically, and the pathology was metastatic tumor. Two years after brain resection, a thyroid mass was detected. A partial thyroidectomy was performed and the pathology with immunohistochemical staining confirmed the thyroid lesion as a metastasis from the previous rectal cancer. Four years after thyroid resection (19 years after the initial rectal resection), he died from multiple lung and bone metastases.

CLINICAL DISCUSSION: Colorectal metastases to the brain and thyroid gland are uncommon and are usually found with other distant metastases. Overall survival has been reported to be extremely poor. In this patient, lung, brain, and thyroid metastases were solitary and metachronous, and each lesion was curatively resected. Surgical treatment might contribute to prolonged survival.

CONCLUSION: The treatment strategy of each patient should be individualized and depends on the timing of metastasis development. Selected patients with complete resection of metachronous metastases may have prolonged survival.

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1. Introduction

Distant metastases are poor prognostic factors in the treatment of patients with colorectal cancer, and metastases to organs other than the liver and lung are associated with a generally much worse prognosis. Chemotherapy or radiotherapy may be limited treatment for most patients with the disease, and the benefits of surgery may be reduced.

We report a patient with rectal cancer who developed metachronous solitary lung, brain, and thyroid metastases. Each

metastasis was resected completely, and the patient survived 19 years after the initial resection.

This work is reported in accordance with the SCARE criteria [1].

2. Presentation of case

A 60-year-old male consulted his family doctor for complaint of hematochezia. He was diagnosed with rectal cancer on colonoscopy and referred to our hospital for further treatment. He had no medical or surgical history. He had no family history of cancer. He underwent high anterior resection for rectal cancer, and the pathological diagnosis was tubular adenocarcinoma, pT2,pN1a,M0, pStageIIa. No adjuvant chemotherapy was administered. Ten years after resection, a solitary 28 mm lesion in the left lung apex was detected on computed tomography (CT) scan. The lesion was resected by video-assisted thoracoscopic surgery by a consultant thoracic surgeon. The pathological diagnosis was a metastatic tumor to the lung, histologically similar to the previous rectal lesion.

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; PET, positron emission tomography.

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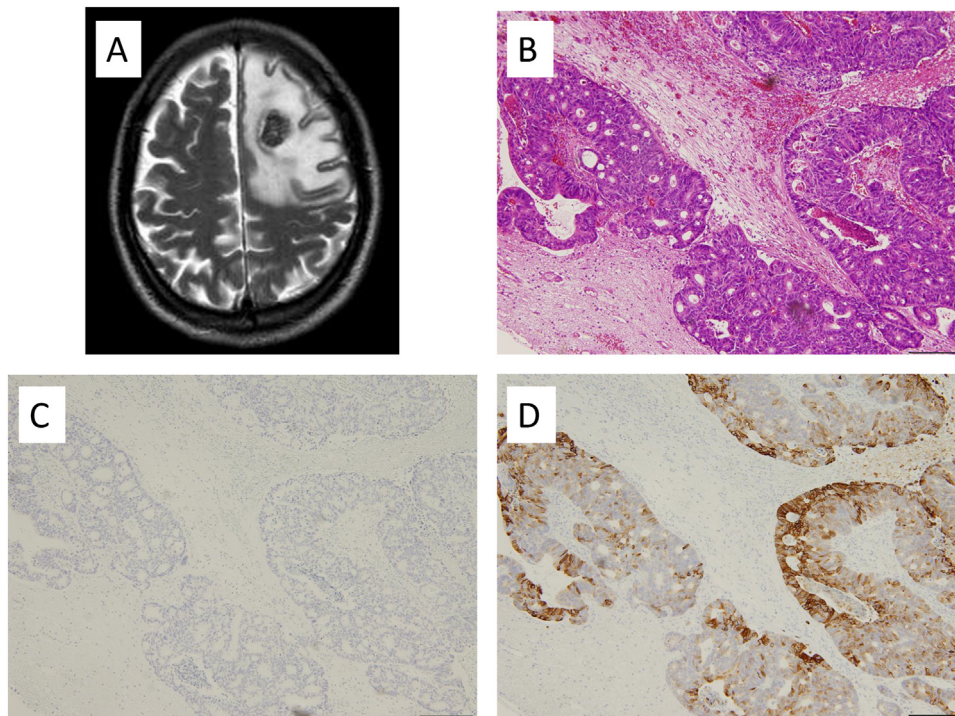


Fig. 1. Magnetic resonance imaging (MRI) of brain tumor (A), and pathologic image of the metastatic brain tumor. T2-weighted image of head MRI shows a low intensity lesion in the right parietal lobe (A). Microscopic image of the metastatic brain tumor is shown (B: $\times 100$, H&E). Immunohistochemical examination shows the brain tumor to be negative for CK7 (C: $\times 100$), positive for CK20 (D: $\times 100$).

Three years after the pulmonary resection, he presented with amnesia and dysgraphia. A solitary 3 cm lesion in the right parietal lobe of the brain was detected on magnetic resonance imaging scan (Fig. 1-A). The brain tumor was removed surgically by a consultant brain surgeon, and pathological examination with immunohistochemical staining confirmed that the origin of the metastatic lesion was the rectal cancer (Fig. 1-B, C, D).

Two years after the brain resection, serum carcinoembryonic antigen level was increasing, and a thyroid mass lesion, 5 cm in size, was detected on CT and positron emission tomography (PET)-CT (Fig. 2). Fine needle aspiration cytology (FNAC) was suspicious for metastatic rectal cancer (Fig. 3). A partial thyroidectomy was performed by a consultant otolaryngologist and pathological examination with immunohistochemical staining confirmed that the lesion originated as a metastasis from the rectal cancer (Fig. 4).

Four years after thyroid resection (19 years after the initial rectal resection), he died from multiple lung and bone metastases, despite he underwent systemic chemotherapy (FOLFOX/bevacizumab, FOLFIRI/bevacizumab, irinotecan/Panitumumab).

3. Discussion

The brain is an uncommon site for metastatic lesions from primary colorectal cancer. The incidence of brain metastases in patients with colorectal cancer has been reported to be from 0.3 % to 6 % in different series, and most patients with brain metastases had concomitant metastases to other organs [2]. The median survival of patients with brain metastases from colorectal cancer has been reported to be less than 6 months [3–7]. Aggressive local treatment (surgery or radiosurgery in addition to whole brain radiotherapy) for a small number of brain lesions improves outcomes [8,9]. Mean overall survival of patients from whom solitary brain metastases were surgically removed has been reported to be 30–40 weeks [5,10–13]. Previous reports showed that an increased interval between primary tumor diagnosis and appearance of brain

metastases was associated with significantly increased survival [11,14]. Factors associated with prolonged survival include: age <65 years, presence of a solitary central nervous system lesion, absence of systemic disease, and lack of memory loss at presentation [5,11]. The presented patient is consistent with some of these factors and survived cancer free for two years after the brain resection. Neurological symptoms (amnesia and dysgraphia) led to neuroimaging. Attention should be paid to seemingly minor neurological abnormalities, especially patients with previous metastatic lesions.

Colorectal cancer with metastases to the thyroid gland are rare. Lieve et al. reported 6 patients with thyroid metastases (0.1 %) of 5862 patients with colorectal cancer from a single institution [15]. The reason why metastasis to the thyroid gland from colorectal cancer is uncommon is believed to be related to two factors [16]. One primarily mechanical explanation is that the extremely abundant supply of arterial blood to the thyroid and its fast flow rate, make adhesion and implantation of tumor cells in the thyroid tissue difficult. Second, a chemical explanation suggests that the high oxygen saturation and high iodine content of thyroid tissue inhibits the growth of tumor cells.

In review articles of thyroid metastases from colorectal cancer, ages range from 34 to 85, and two-thirds were female [17–19]. Metastases to the thyroid were diagnosed from 0 months (synchronous) to 7 years after colorectal resection. The outcomes of patients with thyroid metastases were extremely poor, with most patients dying within months of diagnosis. The lung was the next most frequent metastatic site. Most of the patients have had lung and/or liver metastases, favoring a hematogenous metastatic route. FNAC/biopsy and PET scan are useful to diagnose thyroid metastasis [20].

In the presented patient, metastases to the thyroid gland were diagnosed 15 years after the primary colon surgery, and PET-CT and FNAC contributed to establishing the diagnosis. Lung, brain, and thyroid metastases occurred metachronously, and each lesion was

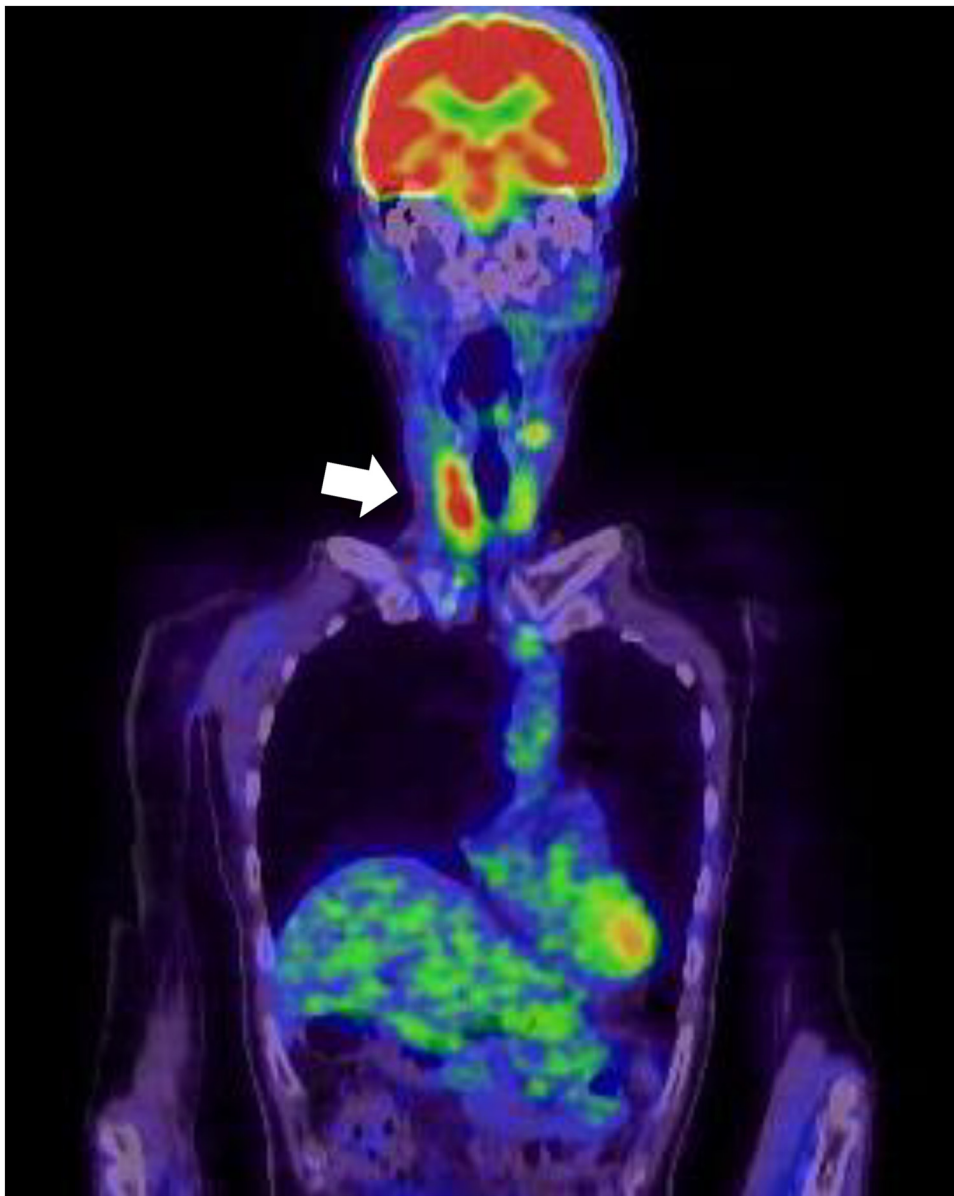


Fig. 2. Positron emission tomography- computed tomography (PET-CT) of the thyroid tumor. PET scan shows abnormal uptake of fluoro-2 deoxy-D-glucose in the right lobe of the thyroid gland.

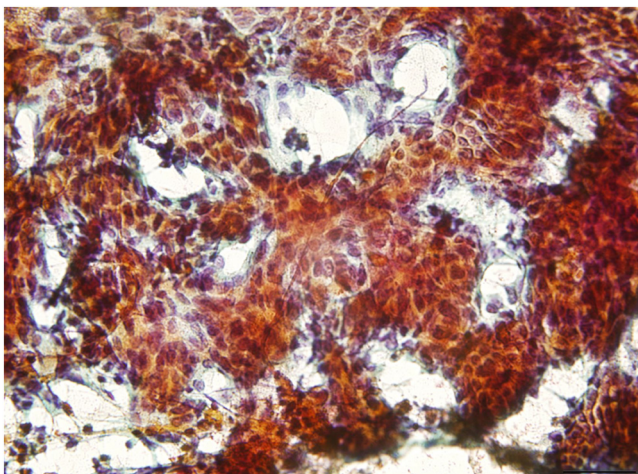


Fig. 3. Fine needle aspiration cytology (FNAC) of thyroid tumor. ($\times 100$, H&E).

completely resected. Surgical treatment might contribute to longer survival in the presented patient. Although both brain and thyroid metastases from colorectal cancer are associated with a worse prognosis, selected patients whose metachronous metastases were resected completely may have prolonged survival. Metachronous solitary lesion and long intervals between primary cancer resection and appearance of each metastasis may be factors for patient who will benefit from surgical resection.

4. Conclusion

Treatment of patients with metachronous metastases from colorectal cancer should be individualized and depends on the timing of diagnosing the metastasis. Selected patients may benefit from resection of metachronous brain or thyroid metastases from colorectal carcinoma. It is important not to miss the best timing of surgical resection for metastatic lesions during the follow up of patients with colorectal cancer.

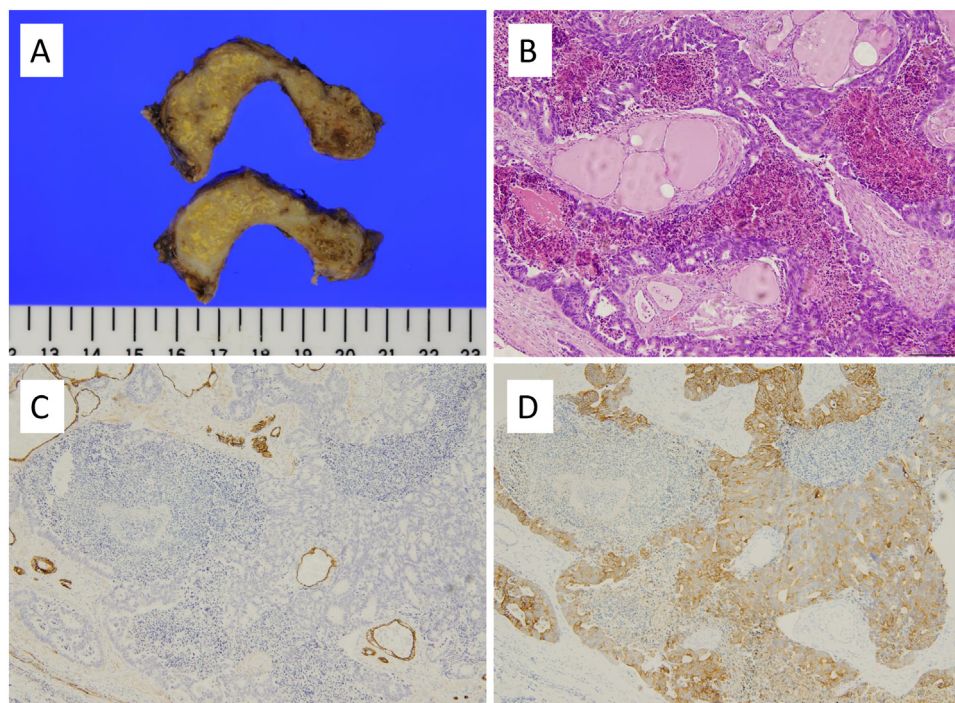


Fig. 4. Pathologic image of the metastatic thyroid tumor. A macroscopic image of the thyroid tumor is shown (A). Microscopic image of the metastatic thyroid tumor is shown (B:×100, H&E). Immunohistochemical examination shows the thyroid lesion to be negative for CK7 (C:×100), positive for CK20 (D:×100).

Declaration of Competing Interest

All authors have no conflict of interest to report.

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Ethical approval

This is a case report and it didn't require ethical approval from ethics committee according to our institution.

Consent

Written informed consent was obtained from the patient family for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Rifu K and Koinuma K; conception of study, acquisition, analysis and interpretation of data.
 Sadatomo A and Naoi D: analysis of data
 Nishino H, Horie H and Sata N: management of the patient
 Rifu K; Drafting the article
 Koinuma K and Lefor KT; revising the article

Registration of research studies

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