A Case of Encapsulating Peritoneal Sclerosis Complicated by Malignant Peritoneal Mesothelioma

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We report a case of peritoneal mesothelioma discovered in a patient during peritoneal dialysis. The patient was a 55-year-old woman who had no history of asbestos exposure. Owing to end-stage kidney failure, she had been undergoing peritoneal dialysis for over 8 years, and she had been diagnosed with encapsulating peritoneal sclerosis. She was admitted to the hospital for intestinal obstruction. Three months later, she noticed an enlarging mass in the epigastric region. Computed tomography showed a 10-cm mass originating in the abdominal wall that had invaded the liver. It was diagnosed as malignant mesothelioma via biopsy. Cases of sarcoma-like mass-forming peritoneal mesothelioma are rare, and there are no prior reports of encapsulating peritoneal sclerosis complicated by malignant peritoneal mesothelioma. Thus, this unique case of peritoneal mesothelioma can provide us with important knowledge about this rare entity.

Key words: peritoneal dialysis, encapsulating peritoneal sclerosis, peritoneal mesothelioma

INTRODUCTION

Malignant mesothelioma is a malignant primary neoplasm that has a high degree of invasiveness in the tunica vaginalis, pericardium, peritoneum, and pleura. The widespread use of asbestos as a building material in the past led to an increase in the worldwide incidence of malignant mesothelioma. Peritoneal mesothelioma related to asbestos exposure is as aggressive as pleural mesothelioma, but low-grade peritoneal mesothelioma, which is unrelated to asbestos exposure, is diagnosed in many women [1–3].

In recent years, there have been reports that vascular endothelial growth factor (VEGF) is involved in epithelial-mesenchymal transition [4, 5], and this transition may have been implicated in the peritoneal failure experienced by peritoneal dialysis patients. Encapsulating peritoneal sclerosis that occurs as part of the end-stage course of peritoneal failure in long-term peritoneal dialysis patients has a poor prognosis because it leads to death due to intestinal obstruction and infection. However, its mechanism of development remains unclear. There are no prior reports of encapsulating peritoneal sclerosis complicated by malignant peritoneal mesothelioma. Here, we report a case we experienced of a rapidly progressive mass-forming type of malignant peritoneal mesothelioma in a peritoneal dialysis patient.

CASE REPORT

The patient was a 55-year-old woman. She had no history of asbestos exposure. At the age of approximately 20 years, she was diagnosed with hypertension and idiopathic aldosteronism. At the age of 33 years, she was diagnosed with chronic heart and kidney failure and began receiving outpatient treatment. At the age of 41 years, the disease had progressed to end-stage kidney failure and she began undergoing peritoneal dialysis. Because she developed pleuroperitoneal communication as a complication after starting continuous ambulatory peritoneal dialysis, she underwent thoracoscopic surgery.

Eight years after starting peritoneal dialysis, the patient experienced repeated intestinal obstructions, and prednisolone administration was initiated for treating encapsulating peritoneal sclerosis. At the age of 50 years, because of reduced dialysis efficacy owing to decreased peritoneal function, she was placed on a course of once-per-week additional hemodialysis. At the age of 55 years, she required hemodialysis 3 times per week, and as a result, peritoneal dialysis was used only to exchange dialysate once per day for cleansing.

That same year the patient experienced abdominal tension. As ultrasonography did not reveal a lesion, she was placed on observation. Two months later, she was hospitalized for adhesive intestinal obstruction, but no mass was observed in the abdominal cavity. Five months later, a mass appeared in the epigastric region and rapidly enlarged. Bacteria were not detected in ascites. Computed tomography revealed a 10-cm mass originating in the abdominal wall with liver invasion (Fig. 1, 2). Biopsy results indicated malignant mesothelioma (Fig. 3).

Six months after first noticing symptoms, the patient was hospitalized and underwent chemotherapy. Initial chemotherapy consisted of 40 mg cisplatin and

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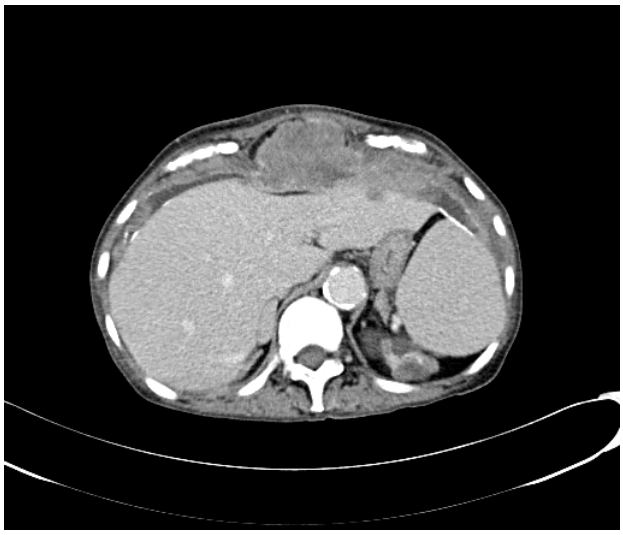

Fig. 1 Computed tomography (CT) scan of the abdomen. Contrast CT image shows the tumor with a liver invasion to uplift from the abdominal wall of the left hepatic lobe. It was a marginal irregular tumor with weak contrast effect in the 10 × 4 cm.

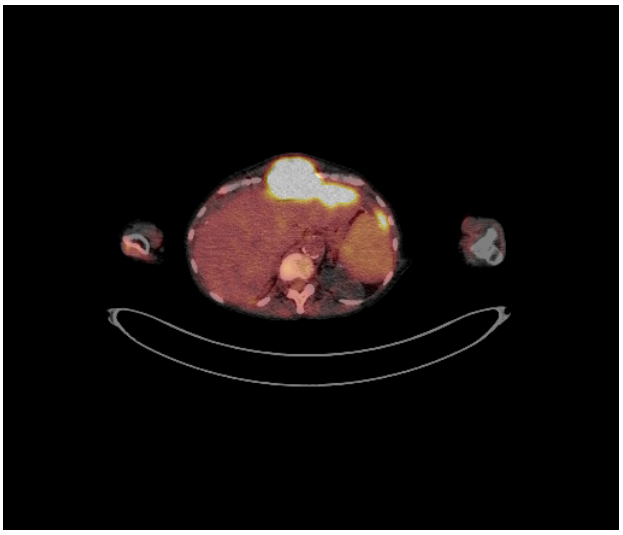

Fig. 2 Positron emission tomography (PET) scan of whole body. We performed PET/CT at the time of 1 hour and 2 hours after the administration of the fluoro-deoxy-glucose (FDG). Blood glucose level was 111 mg/dl. Strong accumulation of FDG was observed in the tumor of the liver surface from the anterior abdominal wall.

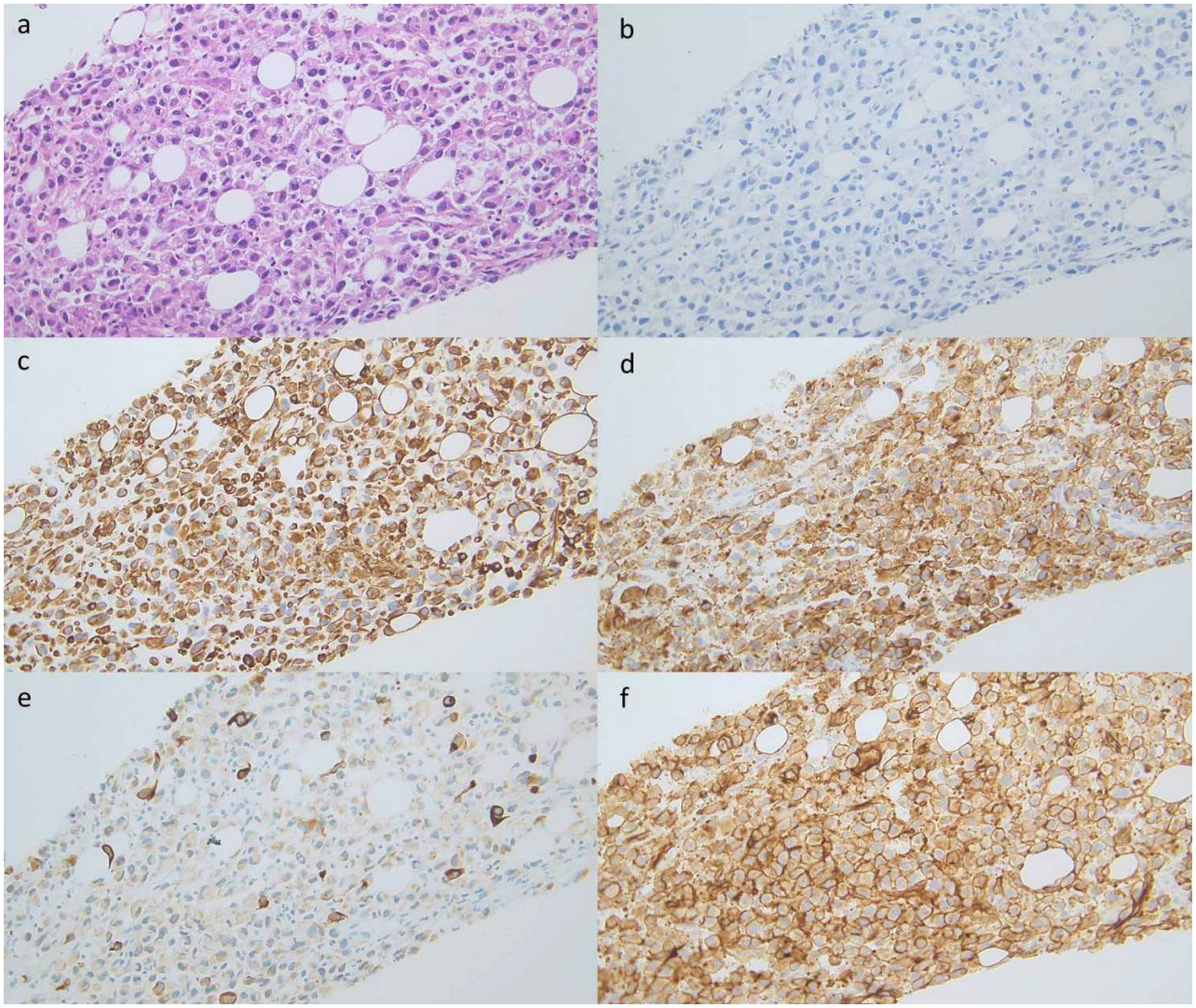

Fig. 3 Pathological specimen: (a) hematoxylin-eosin stain, and immunohistochemical analysis: (b) calretinin, (c) vimentin, (d) D2-40, (e) cytokeratin AE1/AE3, (f) CD146. Tumor cells are necrotic and tend to be large-nucleus atypical cells that proliferate. Mesothelioma shows a pattern reminiscent of the pleomorphic type.

1000 mg gemcitabine. Although she was discharged on day 6, she was re-admitted for worsening back pain. Administration of 2 mg fentanyl for pain alleviated the symptoms, but she subsequently experienced systemic worsening of her condition accompanied by dysphagia, so she was switched to 150 mg intravenous oxycodone.

She was diagnosed with an infection as she presented with fever and a high white blood (WBC) count of 58000/μL on day 1 of her illness, and she started receiving empiric therapy of 2.25 g piperacillin/tazobactam. This prevented administration of her second course of chemotherapy. On day 7, her WBC count increased further and she developed marked pleural effusion.

A cytology examination via thoracentesis performed on day 8 indicated a small number of atypical cells, but no malignant cells were observed. The characteristics indicated exudative pleural effusion, and as we suspected heart failure owing to progression of the mesothelioma and weight loss, we adjusted the body fluid volume used for hemodialysis. On day 11, hypotension made it difficult to perform hemodialysis. The patient opted for palliative care, and 3 days later, her level of consciousness deteriorated. On day 17, she went into cardiac arrest and died. A pathological autopsy was performed at the request of family members. The results of the autopsy indicated malignant mesothelioma. Tumor had invaded the epicardium and the diaphragm. The intraperitoneal tumor cells other than liver were not. In the lungs, a large number of nodules were observed with a lymphatic disease. The cause of death was respiratory failure due to metastatic lung tumors and lung congestion.

DISCUSSION

Peritoneal mesothelioma accounts for 10% of all mesotheliomas in Japan and approximately 20% of all mesotheliomas in the United States [6]. Worldwide, while pleural mesothelioma is diagnosed in an extremely high number of men, peritoneal mesothelioma is diagnosed in an extremely high number of women. There is a clear connection between mesothelioma onset and asbestos. Although exposure to high concentrations of asbestos is seen in many cases of peritoneal mesothelioma, the exposure rate is not as high as in cases of pleural mesothelioma [1–3]. In general, peritoneal mesothelioma related to asbestos exposure is highly aggressive, but low-grade peritoneal mesothelioma is often seen in women where asbestos is not involved. The present patient had no history of asbestos exposure, and low-grade illness was initially identified. However, the lesion rapidly enlarged, and she was eventually diagnosed with a malignant tumor originating from peritoneal mesothelium cells.

The epigastric protruding mass in this case was 8 × 6 cm and it extended toward the surface of the sternum. It was identified as a sarcoma-like malignant peritoneal mesothelioma that involved the epicardium and diaphragm. Pathologically, many tumors are necrotic, and tumor cells tend to be large-nucleus atypical cells that proliferate. On immunohistochemical analysis, the positive findings for AE1/AE3, D2-40, and WT1, and the negative findings for calretinin, CEA, and TTF-1 were consistent with malignant peritoneal mesothelioma [7]. The tumor formed tubercles in the liver because of direct invasion in the diaphragm and local invasion in the peritoneum, and it formed a large number of tubercles in both lungs owing to vascular invasion in the epicardium and lymphangiopathy. There are very few cases of sarcoma-like peritoneal mesothelioma, as it is typically epithelial [3]. In the present case, because there were no tumor cells in any abdominal organs other than the liver, we believed it was a sarcoma-like mass-forming mesothelioma. Therefore, the symptoms of intestinal obstruction and pain were markedly worse than the ascites.

Wide areas of the peritoneum were sclerotic, and the abdominal organs were firmly adherent to the intestinal tract, forming a single mass. There was no marked hardening of the retroperitoneum. Histologically, the peritoneum underwent fibrotic changes including thickening because of hyalinization and calcification, which led us to suspect encapsulating peritoneal sclerosis. We observed necrosis in the tumor and organs due to circulatory collapse caused by hypotension prior to the patient's death. In particular, the fact that necrosis was observed over a larger area in the abdominal organs as compared to the thoracic organs was probably because the peritoneal sclerosis was not only an obstruction but also affected circulatory dynamics. The peritoneal mesothelioma was localized in the abdominal cavity and did not present with diffuse spreading as is often seen in pleural mesothelioma. Peritoneal sclerosis is the main feature of encapsulating peritoneal sclerosis, and neoplasm seeding was not indicated.

According to previous studies, the glycosylphosphatidylinositol-anchored cell-surface protein known as mesothelin is highly expressed in mesothelioma and is thought to contribute to tumor cell proliferation and adhesion [8]. It is believed that secreted mesothelin can be used as a marker because it has been reported that its blood levels increase as kidney function decreases [5]. Experimentally, it is known that decreased peritoneal function in peritoneal dialysis contributes to the promotion of the epithelial-mesenchymal transition of the mesothelium due to VEGF [4]. As it is known that malignant mesothelial cells express VEGF receptors, increased understanding of this mechanism may provide clues that allow us to elucidate the relationship between peritoneal failure and malignant mesothelioma.

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