—Case Reports—

A Case of Carcinosarcoma of the Esophagus Detected on Fluorodeoxyglucose Positron Emission Tomography

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Abstract

A 56-year-old woman who received surgery for left breast cancer 10 years previously underwent 18F-fluorodeoxyglucose positron-emission tomography (FDG-PET) for postoperative follow-up. FDG-PET revealed high uptake of tracer in the esophagogastric junction. A slightly elevated, lobular lesion was found in the lower third of the esophagus on upper gastrointestinal endoscopy. An endoscopic biopsy revealed squamous cell carcinoma. We performed thoracoscopic subtotal esophagectomy. Histopathological examination showed a polypoid spindle cell tumor arising from superficial squamous cell carcinoma. Immunohistochemically, the spindle cells were immunopositive for vimentin and AE1/AE3, and a carcinosarcoma of the esophagus was diagnosed. MIB-1 labeling indexes estimated by Ki-67 immunostaining showed that the proliferative rate of the sarcomatous component was markedly higher than that of the carcinomatous component. This is the rare reported case of esophageal carcinosarcoma that showed increased accumulation of tracer on FDG-PET.
(J Nippon Med Sch 2014; 81: 401–405)

Key words: esophagus, carcinosarcoma, Ki-67, MIB-1 labeling index, positron emission tomography

Introduction

Carcinosarcoma of the esophagus is a relatively rare malignant neoplasm, accounting for 0.5% to 2.4% of all esophageal malignant tumors[1,2]. Carcinosarcoma of the esophagus often presents as a bulky intraluminal polypoid lesion with distinct pathological features. Squamous cell carcinoma is the most common carcinomatous component. The accelerated intraluminal growth of esophageal carcinosarcoma has prompted considerable interest in its histological nature, morphological characteristics, and growth process. We encountered a rare case of esophageal carcinosarcoma that showed increased uptake of tracer on 18F-fluorodeoxyglucose positron emission tomography (FDG-PET).

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Case Report

A 56-year-old woman underwent a left radical mastectomy for advanced breast cancer at our hospital 10 years previously. After the operation, she received adjuvant chemotherapy. Radiation therapy was given for local recurrence 3 years previously. During subsequent follow-up, a general FDG-PET examination showed high FDG uptake in the esophagogastric junction, with a standardized uptake value (SUV) of 3.2 **(Fig. 1)**. Upper gastrointestinal endoscopy revealed a slightly elevated, lobular lesion in the lower thoracic esophagus **(Fig. 2a)**. An endoscopic biopsy of the esophageal lesion, unstained with iodine, yielded a diagnosis of squamous cell carcinoma. Barium esophagography disclosed a small lesion with irregular mucosa in the lower thoracic esophagus **(Fig. 2b)**. Chest and abdominal computed tomography showed no mass in the lower esophagus and no evidence of locoregional or distant metastases. Esophageal carcinoma, stage I

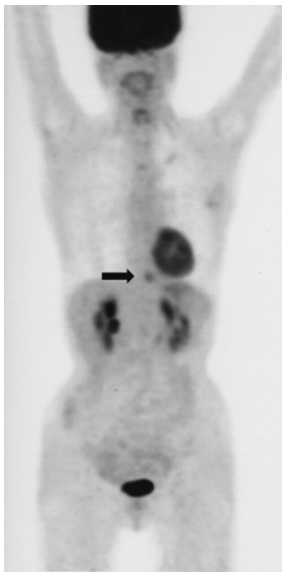

Fig. 1 Fluorodeoxyglucose positron emission tomography (FDG-PET) showing high accumulation of tracer in the esophagogastric junction.

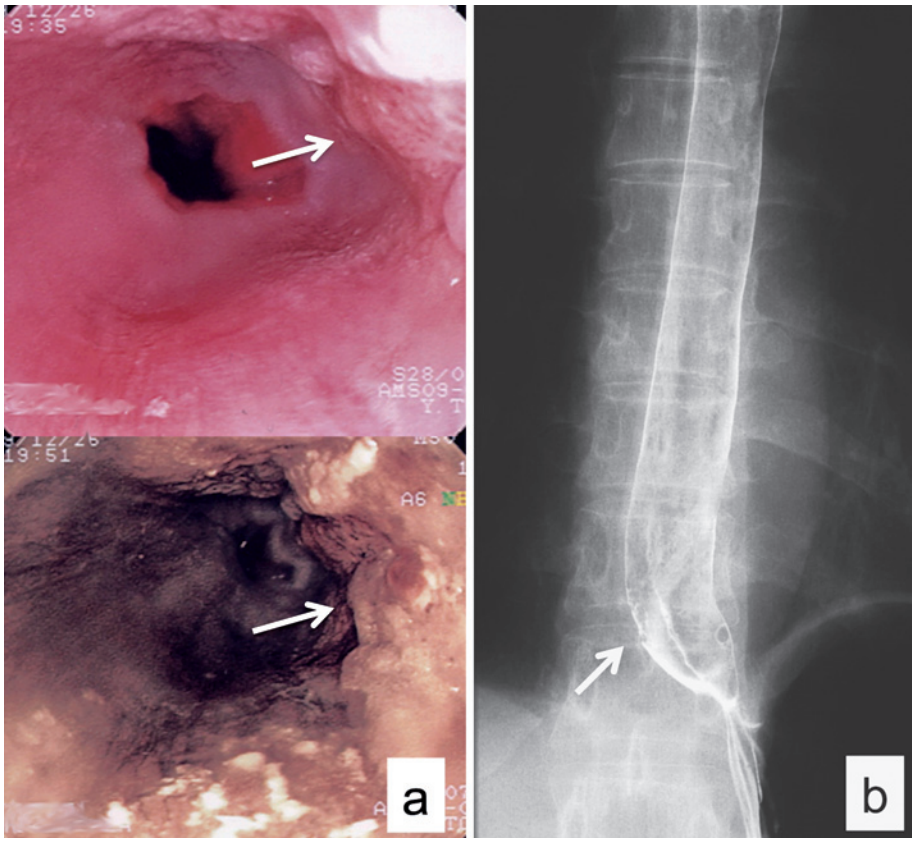

Fig. 2 Upper gastrointestinal endoscopy shows a slightly elevated, lobular lesion in the lower thoracic esophagus **(arrows)** (a). Barium esophagography reveals a small lesion with irregular mucosa in the lower thoracic esophagus **(arrow)** (b).

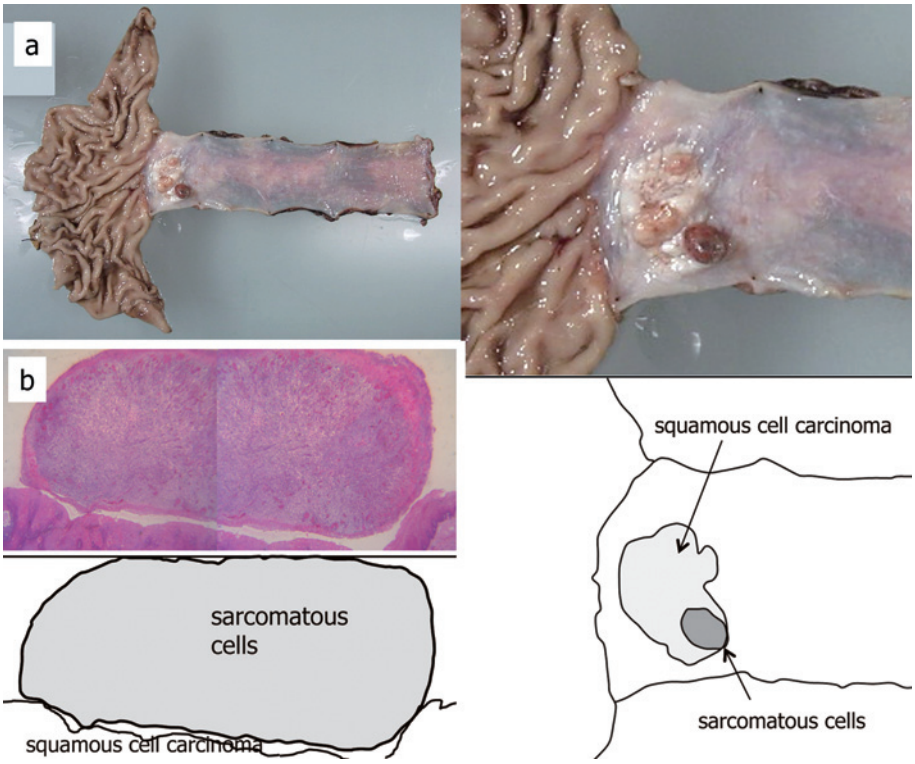

Fig. 3 The gross appearance and schema of the resected specimen (a). The hematoxylin and eosin staining and schema show the areas of carcinomatous and sarcomatous components (b).

(T1bN0M0) was diagnosed according to the Japanese Classification of Esophageal Cancer, 10th Edition[3]. We performed a thoracoscopic subtotal esophagectomy with mediastinal lymph node dissection, with the patient in the prone position. Reconstruction was done with a gastric tube through the posterior mediastinal route, with the patient in the supine position. Esophagogastrostomy was performed at the left side of the neck. The resected specimen contained two lesions in the esophagus. The larger lesion, measuring 24×17 mm, was a plateau-type, elevated, light brown, lobular tumor. The small one, measuring 7×6 mm, was a polypoid, dark brown, nodular lesion with a stalk **(Fig. 3)**. Histologically, the plateau-type, elevated lesion was diagnosed as a well-differentiated squamous cell carcinoma associated with extensive superficial spread (pT1b), while the polypoid mass was composed of spindle-shaped sarcomatous cells arising from the superficial spread of the squamous cell carcinoma. Squamous cell carcinoma was found at the base of the stalk of the polypoid lesion. The spindle sarcomatous cells were suggested to have originated from the region of superficial spread of the squamous cell carcinoma. Immunohistochemically, the spindle cells were immunopositive for vimentin and AE1/AE3. Tumor proliferative activity was assessed on the basis of Ki-67 expression in the sarcomatous and carcinomatous components. MIB-1 labeling indexes were calculated as the ratio of the number of Ki-67-positive cells to the total number of cells. The MIB-1 labeling index of the sarcomatous component (nearly 100%) was significantly higher than that of the carcinomatous component (approximately 30%) **(Fig. 4)**. There was lymphatic invasion and venous invasion. Metastases of carcinomatous cells were found in two lymph nodes of the cardia. The patient had an uneventful postoperative course. She refused adjuvant chemotherapy and has remained free of disease for 22 months.

Discussion

Esophageal sarcomas are rare and most commonly occur as polypoid intraluminal masses.

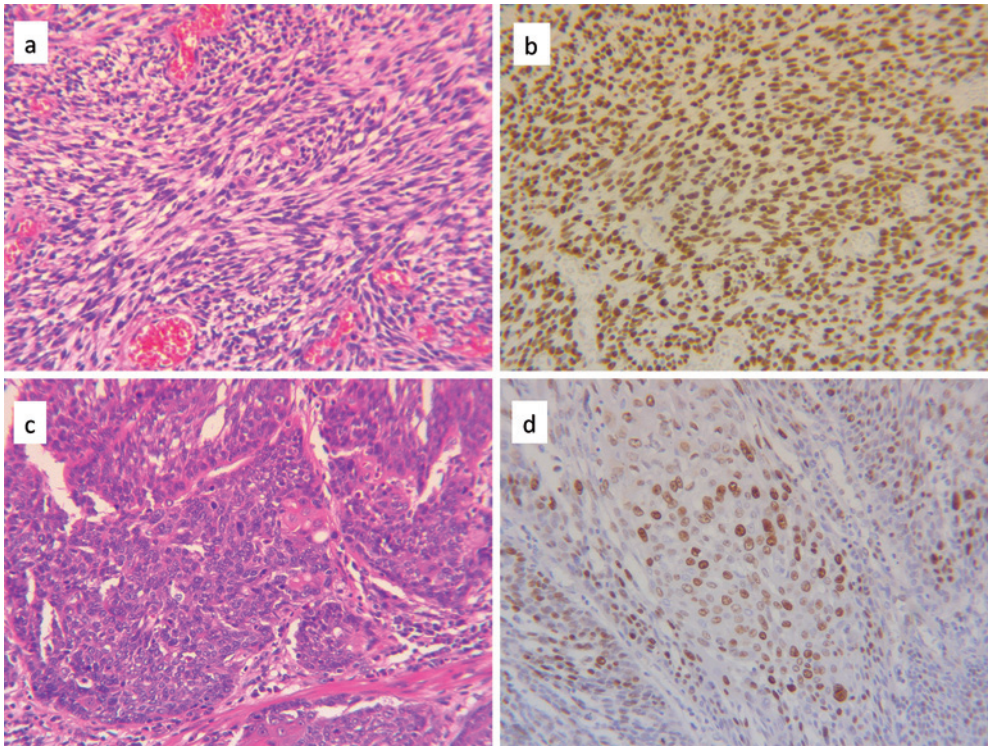

Fig. 4 Histopathological findings of the polypoid mass showing sarcomatous cells (hematoxylin and eosin stain, ×200) (a). MIB-1 labeling index of the sarcomatous component, estimated by Ki-67 staining, shows a high proliferative rate (nearly 100%) (b). Histopathological findings of the carcinomatous component on hematoxylin and eosin staining (c). MIB-1 labeling index of carcinomatous component on Ki-67 staining (approximately 30%) (d).

The Japanese Society for Esophageal Disease defines carcinosarcoma as a neoplasm composed of epithelial carcinomatous and mesenchymal sarcomatous components[4,5]. Histogenesis of the sarcomatous component has remained controversial and confusing. Iyomasa et al.[1] proposed the unique concept that spindle-shaped cells in the sarcomatous component arise from the intraepithelial spread of squamous cell carcinoma. This epithelial origin of the spindle-cell component is strongly supported by several reports[6,7]. In our patient, the polypoid sarcomatous component was confirmed to arise from the area of superficial spread of carcinomatous components.

Clinically, carcinosarcoma of the esophagus is characterized by rapid growth. We previously studied the chronological growth of carcinosarcoma by serial esophagography. The doubling time was estimated to be 2.2 months on a semilogarithmic linear curve[8]. Uchiyama et al.[6] reported that the doubling time of the carcinosarcoma was 55 days on esophagography, whereas another study estimated that the doubling time of ordinary esophageal squamous cell carcinoma was 5 months[9]. Deregulated proliferation is one of the hallmarks of cancer, and a high tumor proliferative rate is associated with an aggressive biologic behavior and a poor response to therapy. A unique feature our case was that the MIB-1 labeling indexes differed between the carcinomatous and sarcomatous components in the same resected specimens.

Staging evaluations of esophageal cancer include computed tomography and endoscopic ultrasonography. Staging plays an important role in deciding treatment options. Recently, FDG-PET has been accepted to be a metabolic imaging modality for staging and is now used for tumor detection, evaluation of malignant potential, and monitoring of therapeutic response in patients with esophageal cancer[10,11]. Fukunaga et al.[12] reported that the SUVs of carcinosarcoma (12.5 ± 5.1, mean ± standard deviation) were significantly higher than those of

well, moderately, or poorly differentiated squamous cell carcinoma (6.6±3.1, 6.9±2.6, and 6.2±2.5, respectively). The reason why carcinosarcoma shows increased FDG uptake on PET remains unclear. Increased vascularity, cellularity, and degeneration are thought to cause the higher FDG uptake, and high accumulation of FDG in esophageal cancer may result from the potential of cancer cells to transport glucose[12]. In our patient, the increased FDG uptake in a small polypoid configuration may have been attributed to the marked increase in the MIB-1 labeling index in the sarcomatous component.

Despite the rapid growth of carcinosarcoma of the esophagus, many studies have reported good outcomes. Iyomasa et al.[1] reported that the rate of curative resection was higher in patients with esophageal carcinosarcoma than in those with esophageal squamous cell carcinoma, whereas the rates of recurrence and lymph node metastasis were similar. In most cases, radical esophagectomy with lymph node dissection was the procedure of choice for esophageal carcinosarcoma, while long-term outcomes appear to be similar to those of esophageal squamous cell carcinoma. We performed thoracoscopic esophagectomy with lymph node dissection, with the patient in the prone position. Thoracoscopic tumor resection is advantageous because it is less invasive than open surgery and is associated with a shorter hospital stay and less surgical wound pain[13]. Recently, definitive chemoradiotherapy has been used to treat patients with unresected carcinosarcoma, but long-term outcomes remain controversial[14,15]. There is still no evidence suggesting that chemoradiotherapy is effective.

Conflict of Interest: None of the authors have any conflicts of interest to disclose.

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(Received, May 20, 2014)
(Accepted, June 28, 2014)