CASE REPORT

Complete resection of a huge pancreatic undifferentiated carcinoma with osteoclast-like giant cells

Tomohiro Yazawa¹ · Akira Watanabe¹ · Kenichiro Araki¹ · Atsuki Segawa² · Keitaro Hirai¹ · Norio Kubo¹ · Takamichi Igarashi¹ · Mariko Tsukagoshi¹ · Norihiro Ishii¹ · Kouki Hoshino¹ · Hiroyuki Kuwano¹ · Ken Shirabe¹

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Abstract Pancreatic undifferentiated carcinoma with osteoclast-like giant cells (PUC-OGC) is a rare neoplasm. We report a case of rapidly advancing PUC-OGC. A 54-year-old man had elevated tumor marker levels. Abdominal computed tomography showed a cystic mass in the body and tail of the pancreas, which infiltrated adjacent organs. The tumor exhibited rapid growth (doubling time: 39 days) but no metastases. We diagnosed PUC-OGC clinically and excised the pancreatic body and tail along with the spleen, left kidney, adrenal gland, and transverse colon. Pathological diagnosis showed histology consistent with PUC-OGC and a negative margin without nodal involvement despite the tumor being 28 cm in maximum diameter and having invaded the left kidney. The patient survived a year with a recurrence of liver metastasis after the initial surgery due to the partial hepatectomy and chemotherapy. Complete resection might be a good strategy to cure PUC-OGC in this case.

Keywords Undifferentiated carcinoma of pancreas · Anaplastic carcinoma of pancreas · Resection

Introduction

Anaplastic carcinoma of the pancreas is rarely observed and accounts for less than 10% of all types of pancreatic carcinomas [1, 2]. Pancreatic undifferentiated carcinoma with osteoclast-like giant cells (PUC-OGC) is a variant of anaplastic carcinoma. The incidence of this tumor has been reported to be less than 1% of all malignant neoplasms of the pancreas worldwide [3]. Its prognosis is poor, with most patients surviving less than a year as a result of late diagnoses and tumor aggressiveness [3].

We present a case of rapidly advancing PUC-OGC that was treated with radical excision of the pancreatic body and tail along with the spleen, left kidney, adrenal gland, and transverse colon.

Case report

A 54-year-old man, who had no chief complaints, was noted to have elevated tumor marker levels during a routine health check-up. At admission, tumor marker levels were confirmed to be elevated: carcinoembryonic antigen (CEA), 158.9 ng/ml; carbohydrate antigen 19-9 (CA19-9), 14134 U/ml; and s-pancreas-1 antigen (SPAN-1), 6164 U/ml. Abdominal computed tomography (CT) imaging showed a cystic mass with hemorrhage and necrosis in the body and tail of the pancreas (maximum diameter 20 cm), which infiltrated the spleen, left kidney, and adrenal gland (Fig. 1). The tumor enlarged rapidly (doubling time: 39 days, see Fig. 1b, c), although there were no enlarged lymph nodes or distant metastases. We diagnosed PUC-OGC clinically because of the radiographic characteristics, which were the marginal hypervascularity and central cystic mass with necrosis and hemorrhage of tumor, and

✉ Tomohiro Yazawa
tomohiro.yazawa@gmail.com

¹ Department of Integrative Center of General Surgery, Gunma University Hospital, 3-39-15, Showa-machi, Maebashi, Gunma 371-8511, Japan

² Department of Diagnostic Pathology, Gunma University Graduate School of Medicine, Maebashi, Gunma 371-8511, Japan

Fig. 1 Computed tomography shows a cystic mass located on the body and tail of the pancreas, infiltrating the spleen, left kidney, and adrenal gland, in transverse (**a**) and coronal sections (**b**). The mass proliferated rapidly over 21 days [maximum diameter 20.3 cm (**b**) to 23 cm (**c**); doubling time 39 days]

then excised the pancreatic body and tail with spleen, left kidney, adrenal gland, and transverse colon (tumor weight 4400 g).

Pathological diagnosis confirmed the histology of PUC-OGC, and the intratumoral component mainly consisted of hemorrhage and necrosis (Fig. 2a–c). The resected specimen had a negative margin, and had no lymphatic permeation or vascular invasion without nodal involvement, despite the tumor having a maximum diameter of 28 cm and invasion of the left kidney. The Ki-67 labeling index (Ki-67 LI) was 16% in hotspots of the components of ductal adenocarcinoma (Fig. 2d).

Three months later, the patient's tumor marker levels reduced to normal (CEA 1.4 ng/ml; CA19-9 34 U/ml; SPAN-1 17.5 U/ml) with oral adjuvant chemotherapy (S-1). However, he had a relapse of liver metastasis, then undergone partial hepatectomy 4 months after the operation. The metastatic tumor had the components of both PUC-OGC and ductal adenocarcinoma. He survived a year after the initial surgery with chemotherapy, such as FOR-FIRINOX and gemcitabine/nab-paclitaxel.

Discussion

Giant cell tumors of the pancreas are very rare, and they present as one of the two variants. The first variant is undifferentiated carcinoma (UC) with a pleomorphic/sarcomatoid growth pattern and multinucleated giant tumor cells [1, 2]. The second, PUC-OGC, was first reported by Rosai [4] in 1968 as a variant of UC, which exhibits conspicuous giant cells that resemble osteoclasts. PUC-OGC is characterized by a well-delineated tumor, which frequently contains bleeding areas and central necrotic foci. Nodal involvement is uncommon and metastases are slow; however, most tumors invade adjacent structures [3, 5]. Only a few cases have been reported to have an early diagnosis with a tumor diameter less than 3 cm [6, 7].

Anaplastic (undifferentiated) pancreatic cancer generally indicates a poor prognosis, worse than pancreatic ductal adenocarcinoma [8, 9]. The median survival is 11 months, decreasing to 6.5 months in cases of non-operable tumors [3, 5, 10]. However, the interval between diagnosis and death may vary significantly (from 4 months to 10 years) [11, 12]. Kobayashi et al. reported that some unfavorable prognostic factors include older age at the time of diagnosis, male sex, smaller tumor size, presence of lymph node metastases, and concomitant components of ductal adenocarcinoma [11].

In our patient, the tumor's greatest dimension was 28 cm, the largest size that has ever been reported, and it had a very rapid tumor growth rate. However, Ki-67 LI did not indicate a higher level as compared with ordinary

Fig. 2 Pathological findings. The maximum diameter of the tumor is 28 cm (a), and the intratumoral components are mainly composed of hemorrhage and necrosis (b). Microscopically, the tumor consisted of slightly atypical or small round cells, spindle cells, osteoclast-like giant cells (arrow), and ductal adenocarcinoma (c). Ki-67 was assessed immunohistochemically, and its labeling index was 16% in hotspots of ductal adenocarcinoma (d)

ductal adenocarcinoma of the pancreas [13], and its intratumoral components mainly consisted of hemorrhage and necrosis. Based on these observations, his rapid tumor expansion could have been chiefly caused by intratumoral bleeding. As described above, larger tumor size could be a favorable factor for postoperative survival [11], and this may be because the size is due to hemorrhage, not actual growth.

We were able to perform a composite resection of multiple organs followed by a negative margin and a decrease in tumor marker levels to normal 3 months later. We were able to perform a complete resection because the tumor had expansive growth within a capsule and invaded to adjacent organs, so we could remove it cleanly despite its huge size. This suggests that radical resection might be a good strategy to effectively treat PUC-OGC in this case.

The role of adjuvant treatment, either chemotherapy or radiotherapy, has not yet been clearly established, partly owing to the rarity of this pathological entity. It has been reported that the use of chemotherapeutic agents, such as cisplatin, paclitaxel, and gemcitabine, contribute to a favorable outcome, given the epithelial origin of the tumor [6, 14, 15]. Radiotherapy has been used in some cases on the basis of radiosensitivity of giant cell tumors of the bones [10] or as a way of destroying any remnant cancer cells in the tumor bed after positive margin excision [16], sometimes with satisfactory results [17]. However, there are no conclusions about its safety owing to the limited experience in the treatment of such neoplasms [18]. Therefore, it is important for radical cure of PUC-OGC to perform a composite resection including multiple organs to

achieve a negative margin. Moreover, if the tumor is relapsed, the chemotherapy, such as FOLFIRINOX and gemcitabine/nab-paclitaxel based on pancreatic cancer therapy, may lead to patient's favorable prognosis in light of this case.

In summary, these findings suggest that complete resection may effectively cure PUC-OGC, regardless of the tumor size, if there are no involved lymph nodes or distant metastases.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interests.

Research involving human participants and/or animals For this type of study formal consent is not required.

Informed consent Informed consent was obtained from the patient including this report.

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