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Case Report

Liver metastasis from adenoid cystic carcinoma of the submandibular gland: a case report

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Abstract: Background: Adenoid cystic carcinoma (ACC) is a rare malignancy of epithelial origin. It involves a variety of histologic types and often has distant metastasis. ACC metastasis to the liver is rare and usually involves spread to other organs. Case presentation: We report a case of liver metastasis from a submandibular gland adenoid cystic carcinoma 11 years after resection of tumor. The patient was admitted to our hospital due to a liver-occupying lesion found by abdominal B-ultrasound, CT and MRI. A metastasis was found only in the liver, and after discussion the patient was treated with surgery. This tumor was histologically consistent with the diagnostic criteria of ACC. The patient was followed up 24 months after surgery, and showed no recurrence in the liver parenchyma at the site of operation or other organs. Conclusions: ACC is a very rare tumor and its pathogenesis is not completely clear. There are few articles about the imaging findings of ACC in the liver, and so it was difficult for us to make a correct diagnosis in clinical practice. The diagnosis of ACC mainly relies on pathologic examination, so we summarize the correlation between imaging and pathology.

Keywords: Adenoid cystic carcinoma, metastasis, magnetic resonance imaging, computed tomography, pathology

Background

Adenoid cystic carcinoma (ACC) is a rare malignancy of epithelial origin, and originates most commonly in the salivary glands, trachea, and bronchus [1]. Therefore, the occurrence of ACC is in tissues with mucinous glands.

It involves a variety of histologic types, and most of the cells are small, with minimal cytoplasm. The cells are arranged in nests or sheets that are fenestrated by round or oval spaces, creating the characteristic cribriform design [2]. Occasionally, the tumors have predominant solid cellular growth with a basaloid or anaplastic appearance that has few, if any fenestrations [2]. The solid variant of ACC often demonstrates small areas of necrosis. Tubular structures with minimal stratification of epithelial lining are often mixed with classic cribriform and solid areas. Therefore, according to the tumor cell arrangement, it can be divided into tubular type, sieve pore type, and parenchymal type, and the sieve pore type is the most common type [3]. Some scholars believe that the prognosis of parenchymal type is relatively poor because of its highly invasive nature [3]. The histologic type of the tumor determines the growth pattern and prognosis. ACC tends to occur in women and is most commonly seen in women aged 40-60 [4, 5]. According to Spiro [6], distant metastasis rate of ACC is 43%, often to lung, liver, and bone tissue, while lymphatic metastasis is very rare. However, reports on liver metastasis in the literature are extremely rare and lack relevant imaging data. There are only 2 cases with primary hepatic ACC reported to date. As the patient had a history of ACC of the submandibular gland, we considered the liver mass to be metastatic.

Case presentation

A 69-year-old female was admitted to our hospital due to a liver occupying lesion found by abdominal B-ultrasound. She visited local hospital due to cold, but on examination revealed a lesion. Also the abdominal B-ultrasound revealed hepatic abnormalities, with a mass of 5.6× 7.0 cm in the lateral lobe of the left liver, accom-

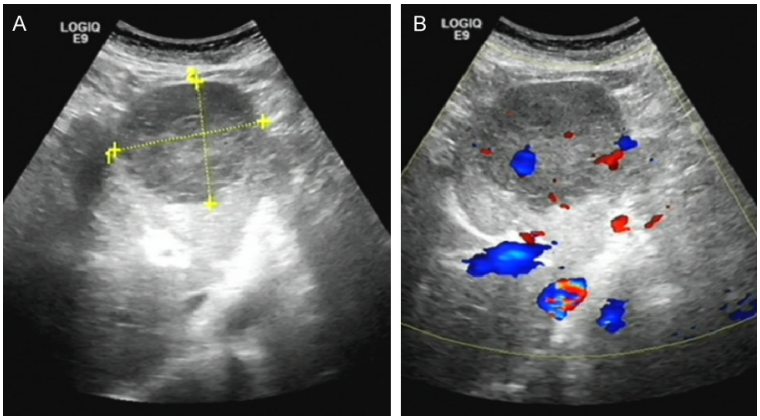

Figure 1. US revealed a hypoechoic mass in the left liver (A) with increased blood flow (B).

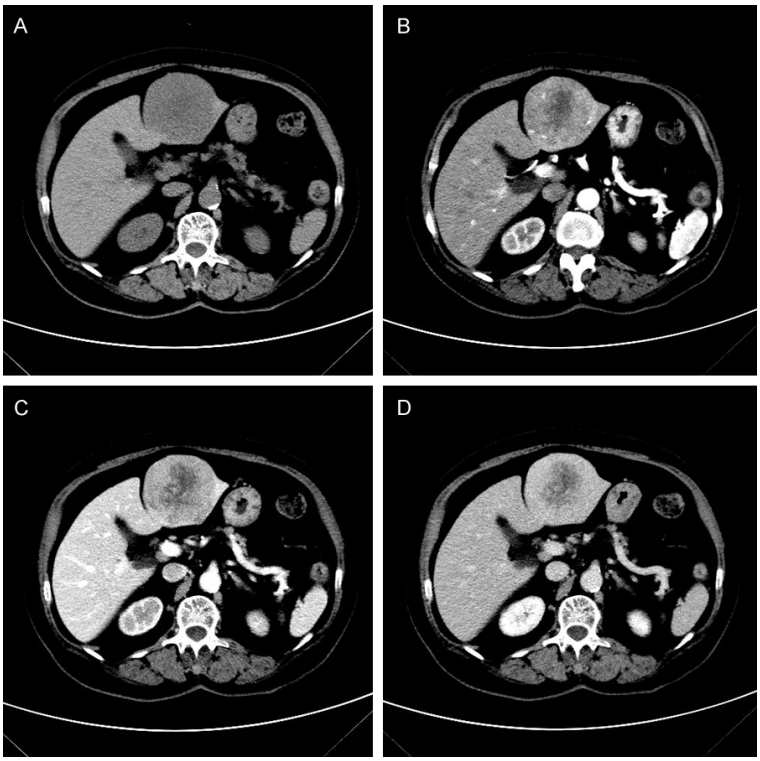

Figure 2. CT image (A) showed a well-delimited, low-density focal lesion in segment III. Enhanced CT (B-D) showed a focal lesion in segment III featuring progressive enhancement.

panied by hypoechoic signals (**Figure 1A**) and increased blood flow (**Figure 1B**). She had no obvious abdominal pain, abdominal distention, nausea, or vomiting. Physical examination revealed that the liver was not involved at the right costal margin. The patient had no history of hepatitis B. Liver enzymes such as alanine transaminase (ALT), aspartate aminotransferase (AST), and gamma-glutamyl transferase (GGT) were within normal range. Serum AFP, CEA and CA199 levels were within normal ranges.

Computerized tomography examination revealed a circular, low-density lesion of 6.5×7.2 cm in segment 3 of the liver with a clear boundary (**Figure 2A**). The lesion protruded out of the liver capsule, but did not involve the liver capsule. The solid part of the lesion was slightly enhanced in the arterial phase (**Figure 2B**) and a hyperechoic enhancement was observed during the portal (**Figure 2C**) and delayed phases (**Figure 2D**). Triphasic contrast enhanced spiral Computed tomography (CT) scan showed no enhancement of necrotic lesions (**Figure 2A-C**).

Transverse T2-weighted TSE image showed a high signal focal lesion of 7.2×6.5 cm on segment 3 of the liver with a clear boundary on Magnetic resonance imaging (MRI) (**Figure 3A**). Transverse 3D T1-weighted fat saturation image showed a low signal lesion (**Figure 3B**). Contrast-enhanced MRI showed a progressive enhancement of the lesion. The lesion showed a slight enhancement during the arterial phase (**Figure 3C**), and further enhancement during the portal (**Figure 3D**) and delayed phases (**Figure 3E**). Dynamic scanning showed no enhancement in the necrotic area in the center of the lesion (**Figure 3C-E**). The lesion demonstrated no obvious uptake signs at the hepatobiliary specific phase (**Figure 3F**). MRI scan showed malignancy of the lesion.

Pathologic findings

Preoperative clinical diagnosis was cholangiocarcinoma and so surgery was scheduled. During the operation, the left lobe of the liver

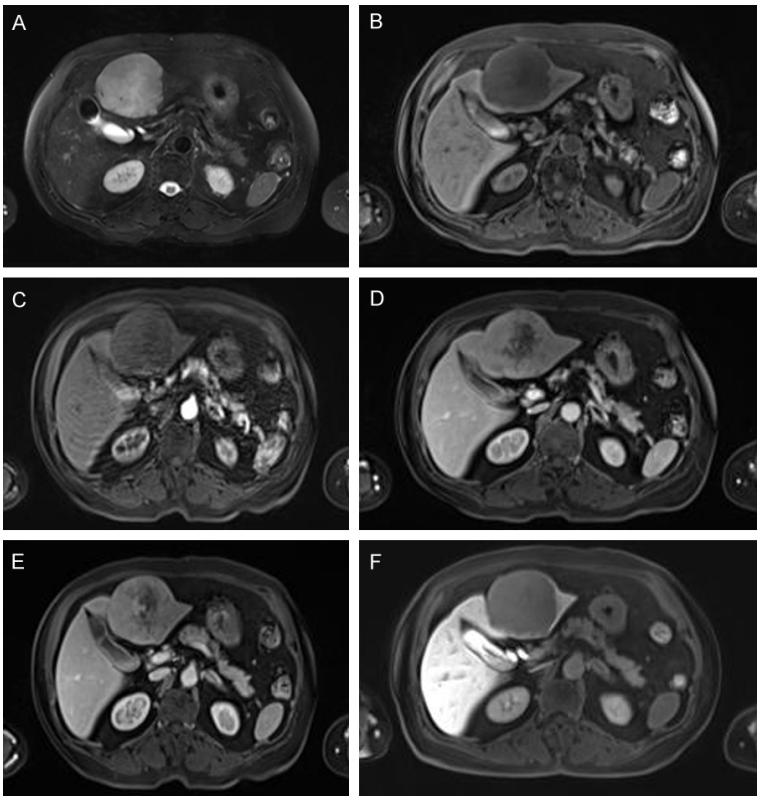

Figure 3. Transverse T2-weighted TSE image (A) showed a well-delimited, high signal focal lesion in segment III. Transverse 3D T1-weighted fat saturation image showed a low signal lesion (B). Contrast-enhanced MR imaging showed progressive enhancement of the lesion. The lesion revealed slight enhancement in the arterial phase (C), and further enhancement in the portal phase (D) and delayed phase (E). Dynamic scanning showed no enhanced necrotic area at the center of the lesion (C-E). The lesion has no obvious uptake signs at the hepatobiliary specific phase (F).

Figure 4. Gross appearance of the tumor.

with adjacent capsule and diaphragm were resected. The resected liver tissue measured 12.0×8.5×8.5×5.0 cm and sectioning of the mass was of 9.0×7.0×7.0 cm (**Figure 4**). The mass was in close proximity to the capsule, and did not invade the blood vessels and nerves.

Hematoxylin and eosin staining confirmed the mass as a cribriform ACC (**Figure 5**). Microscopically, the tumors were mainly cribriform with few tubular and no solid structures (**Figure 5**). The tumor is clearly demarcated from the adjacent liver parenchyma (**Figure 5A**). The cribriform region is filled with mucous and eosinophilic material (**Figure 5B**, **5C**), and tubules are seen in this tumor (**Figure 5D**). Immunohistochemically, the luminal cells are positive for CK7 and CD117, and the tumor cells are tan in color (**Figure 6A**, **6B**). CK-P is diffusely positive in the luminal and abluminal cells (**Figure 6C**). P63 staining labels the abluminal cells but not the luminal cells (**Figure 6D**).

According to the latest definition of the World Health Organization (WHO), ACC is a slow-growing and a relentless salivary gland malignancy that consists of epithelial and myoepithelial neoplastic cells forming various patterns, including the tubular, cribriform and solid forms [7]. In our case, the tumor was mainly cribriform with few tubular structures and no solid structures. Therefore, this tumor is histologically consistent with the diagnostic criteria of ACC. The results of immunohistochemistry further support our diagnosis.

Clinical course

The patient was followed up 24 months after surgery, and showed no recurrence in the liver parenchyma at the site of operation.

Discussion and conclusions

In 1859, Theodor Billroth was the first to describe ACC as cylindromas in his histologic studies. ACC is a rare tumor that mainly occurs in the salivary glands [8]. ACC accounts for 10%

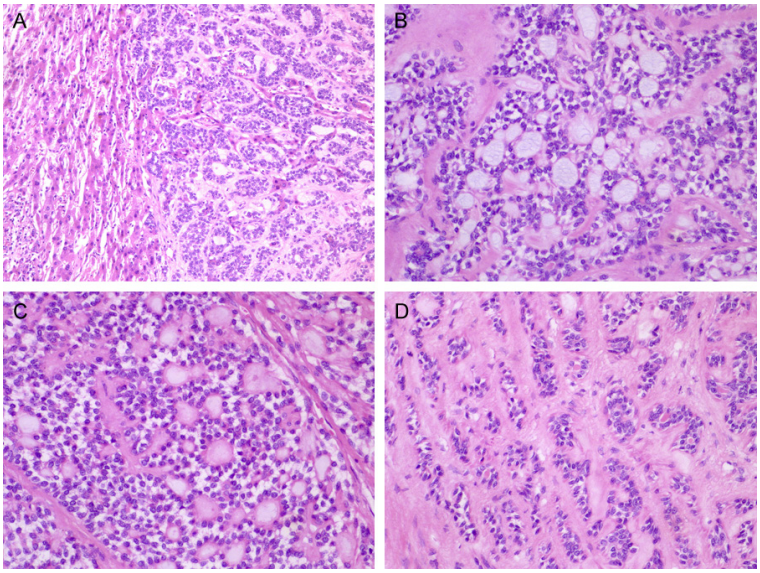

Figure 5. Microscopic appearance of adenoid cystic carcinoma. The tumor is clearly demarcated from the adjacent liver parenchyma (A, 100×). The cribriform region is filled with mucous (B, 200×) and eosinophilic material (C, 200×). Some tubular structures are seen within the tumor (D, 200×).

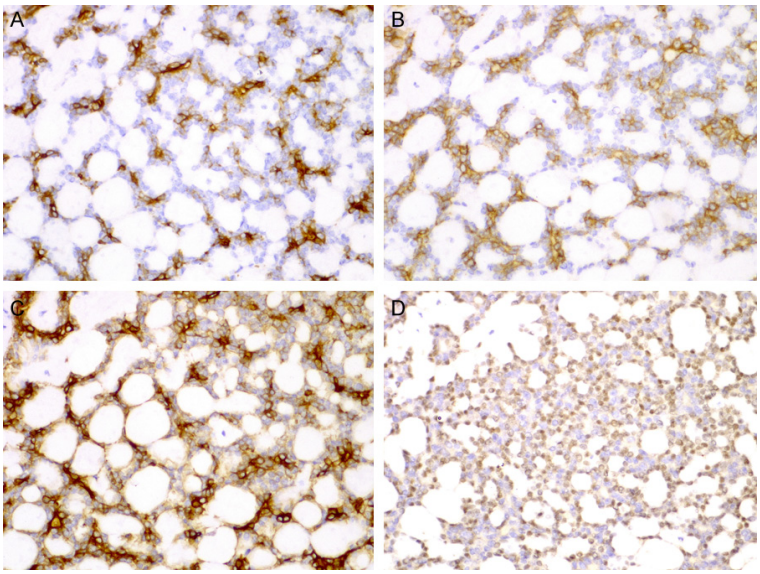

Figure 6. Immunohistochemical staining results of primary hepatic adenoid cystic carcinoma. CK7 w labels luminal cells but not abluminal cells (A, 200×). CD117 was found diffusely in the tumor cells and staining labels luminal cells, which are tan (B, 200×). CK-P was diffusely positive in the luminal and abluminal cells (C, 200×). P63 staining labeled the abluminal cells but not the luminal cells (D, 200×).

of all salivary gland tumors and 21.9% of all salivary gland malignant tumors [9]. ACC is characterized by slow growth and the local recurrence rate is highly variable, with a 5-year survival rate of less than 50% and a 10-year survival rate of less than 20% [10, 11]. In our patient, there was no local neoplasm recurrence found 11 years after the resection of the submandibular gland ACC.

Distant metastasis of ACC is most commonly seen in the lungs, followed by bone, liver, and brain [12-14]. ACC metastasis to the liver is rare and usually involves spread to other organs [12]. In this report, the metastasis was found only in the liver, and the patient was treated by surgery after discussion. This tumor had the typical morphologic features and immunohistochemical profile of ACC. The pathologic data of the patient were obtained by two experienced pathologists. Scholars [15] have reported that patients with distant metastases initially present with perineural invasion. But our patient showed no invasion into the peripheral blood vessels and nerves on histologic examination. Lymph node metastasis from ACC is rarely reported. In our case report, the patient had no retroperitoneal lymphadenopathy.

Liver metastasis is rare and lacks relevant imaging data. In this report, the patient's imaging findings and pathologic types were described in detail. There were no symptoms of abdominal pain when the patient went to the hospital for treatment. CT and MRI imaging of this patient showed mild enhancement in the arterial stage, further enhancement in the portal stage and delayed stage, and no enhancement in the center of the lesion. During the arterial phase of CT and MRI, the lesion was seen to be supplied by the left hepatic artery. Prior to pathologic examination, the imaging findings suggested that the lesion was a malignant space-occupying lesion, but it was difficult to determine its identity. However, ACC of the

liver can be mainly differentiated from hepatocellular carcinoma (HCC), hemangioma, hepatapostema and cholangiocarcinoma. The imaging manifestations of HCC are markedly enhanced in the arterial phase, and rapidly diminished in portal and delayed phases, with typical "fast in and out" changes. The pseudocapsule can be seen in the portal phase, and AFP is elevated in most HCC patients. The imaging features of hepatic hemangioma show mild enhancement in the arterial phase, and further enhancement in portal phase and delayed phase, with the characteristics of "slowly coming into and slowly going out". The imaging appearance of the liver abscess involves marked enhancement of the cyst wall with garland-like appearance. ACC is enhanced in a similar way to cholangiocarcinoma, and the enhancement of ACC is more obvious.

Clinical manifestations and imaging findings revealed that ACC secondary masses in the liver were diverse, and showed no obvious features. They were difficult to diagnose by imaging. Thus, we should conduct a detailed inquiry into the patient's clinical history, and exclude the presence of other liver lesions.

ACC is a very rare tumor and its pathogenesis is not completely clear. There were few articles about the imaging findings and pathologic typing of ACC from the liver, and so it is difficult for us to make a correct diagnosis in clinical practice. Therefore, more articles on imaging and pathology of hepatic ACC are needed to provide better guidelines regarding the clinical diagnosis and treatment of ACC of the liver.

Acknowledgements

The reporting of patient information has been done in accordance to our institution's policies.

The patient has given written informed consent to use his medical history including pathological and imaging data in the manuscript.

Disclosure of conflict of interest

None.

Abbreviations

ACC, Adenoid cystic carcinoma; ALT, Alanine transaminase; AST, Aspartate aminotransferase; GGT, Gamma-glutamyl transferase; CT, Computed tomography; MRI, Magnetic resonance imaging; WHO, World health organization; HCC, Hepatocellular carcinoma.

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