

## Angiographic Findings in Two Carcinoid Tumors of the Gallbladder

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**Abstract.** Angiography was performed in 2 patients with carcinoid tumors of the gallbladder. In the first case, proper hepatic angiography revealed an obstruction and irregular neovascularization of the cystic artery and an encasement of the right hepatic artery. In the second case, celiac angiography revealed a dilatation and fine neovascularization of the cystic artery. In both cases, moderate hypervascular metastatic lesions were demonstrated in the liver. Although hypervascular metastases might suggest the diagnosis of metastasis from carcinoid tumor, the specific diagnosis of carcinoid tumor of the gallbladder must rely on the pathologic evidence.

**Key words:** Carcinoid tumor, gallbladder – Angiography, carcinoid gallbladder tumor.

Carcinoid tumors are derived from Kulchitsky's cells or their precursors and may occur anywhere that these cells are found. The predominance of carcinoids in the alimentary tract is well-known, but carcinoid tumor of the gallbladder is extremely rare. Godwin, in his series of 2,837 cases of carcinoid tumors, reported only 1 case of carcinoid tumor of the gallbladder [1], and only 15 cases have been reported in the literature. To our knowledge, no angiographic examinations of carcinoid tumor of the gallbladder were reported. We have recently encountered 2 patients with carcinoid tumor of the gallbladder. Angiographic findings are discussed along with a review of the literature.

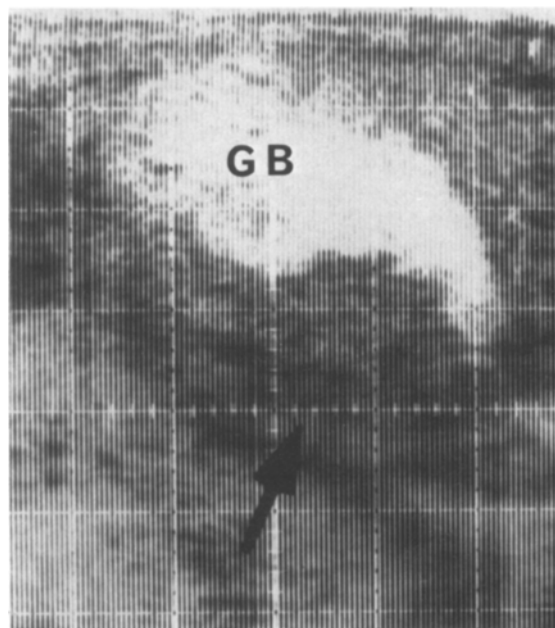
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### Case Reports

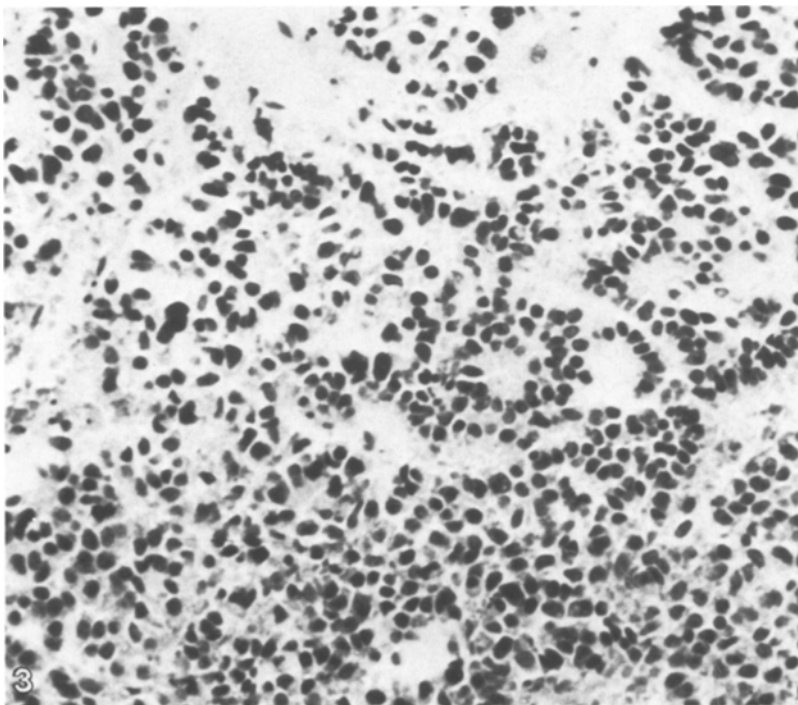
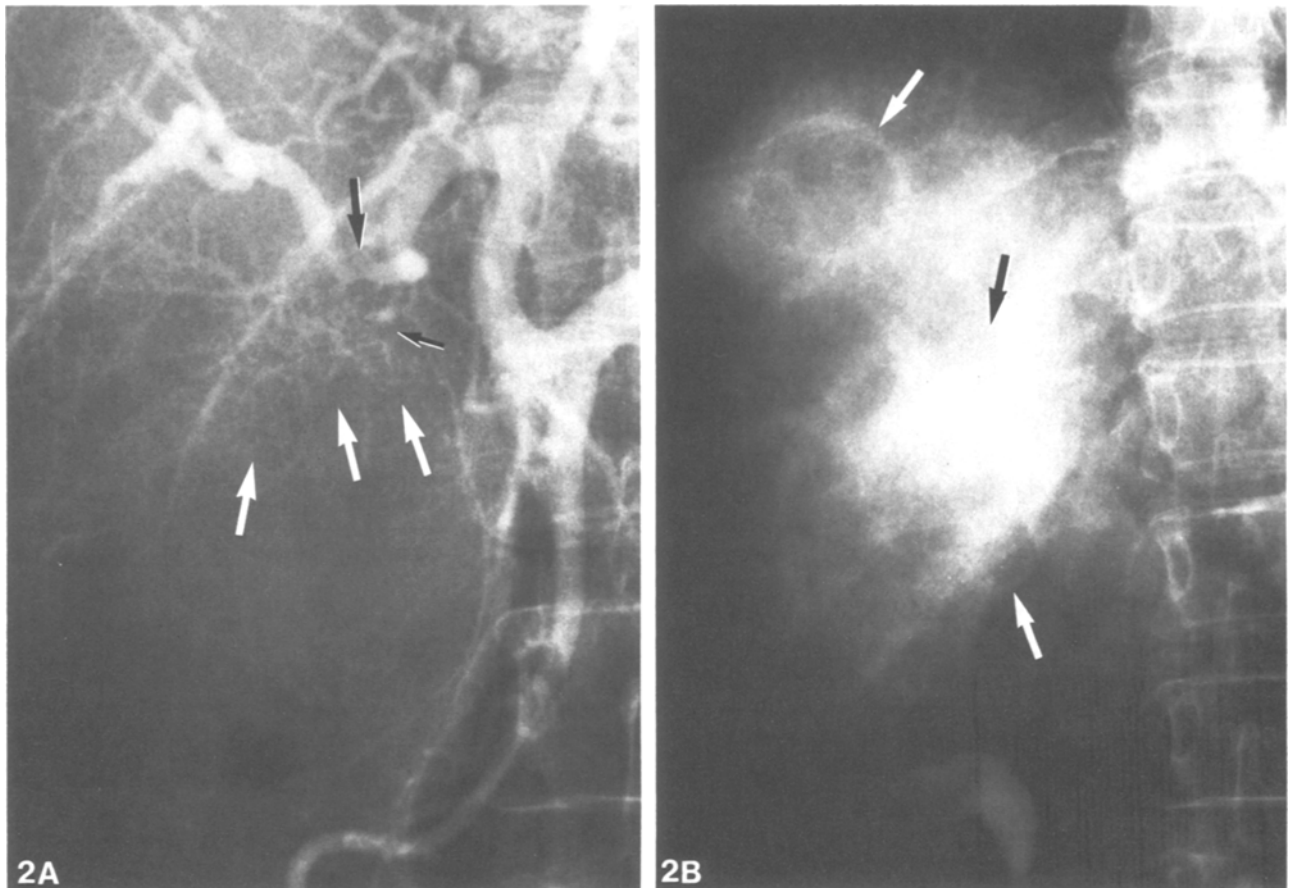
#### Case 1

A 60-year-old woman was admitted because of a 2-week history of upper abdominal discomfort and fullness. The carcinoid syndrome was not noted. Physical examination on admission revealed hepatomegaly. Laboratory data were normal except for elevated erythrocyte sedimentation rate, alkaline phosphatase level, and lactate dehydrogenase levels. The patient contracted jaundice during her hospital course. Liver scintigraphy showed multiple defects. Ultrasound examination showed a gallstone and a papillary solid mass in the gallbladder (Fig. 1), and multiple metastatic lesions in the liver.

Angiography was performed to evaluate the lesions of the gallbladder and liver. Celiac angiography (Fig. 2A) revealed an obstruction and irregular fine neovascularization in the su-

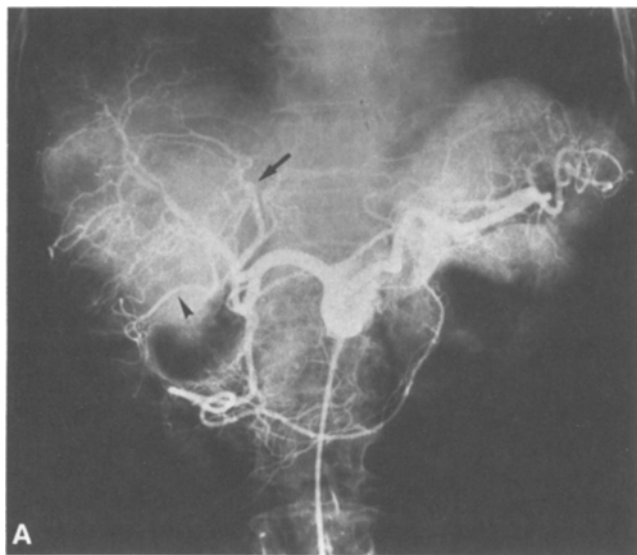


**Fig. 1.** Right oblique subcostal sonogram showing a polypoid solid mass (arrow) in the gallbladder (GB)

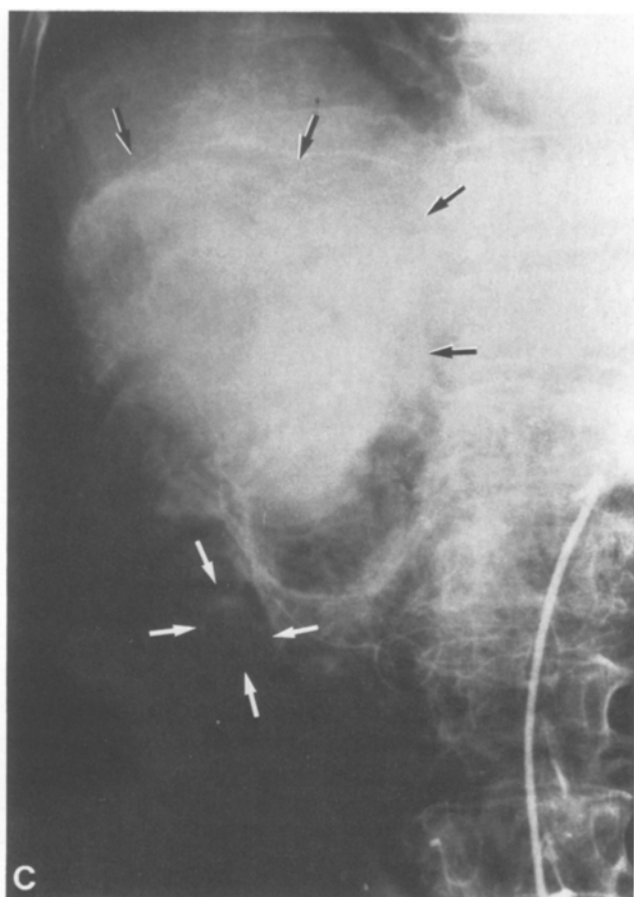
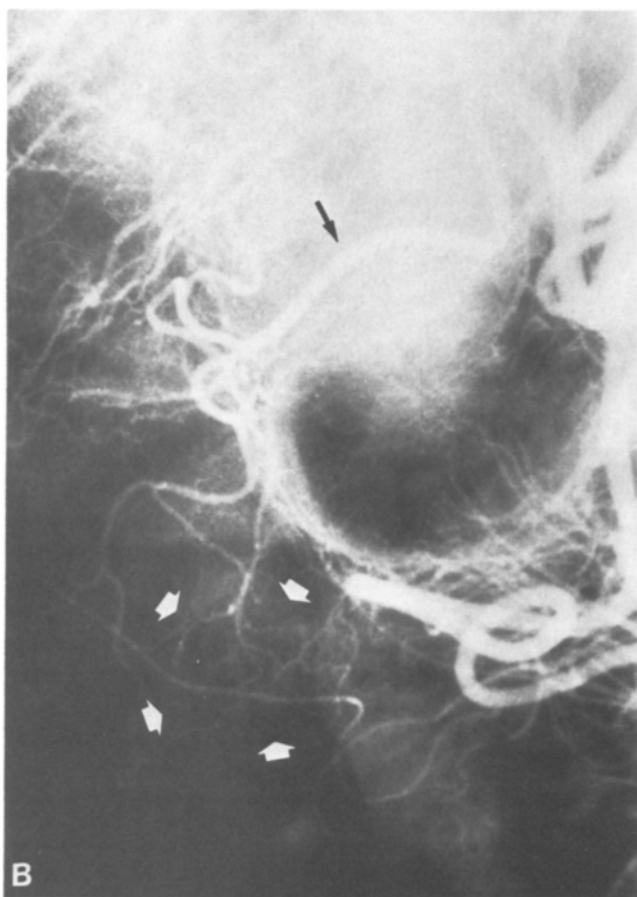


**Fig. 2.** **A** Arterial phase of celiac angiography: serratation and obstruction of the superficial branch of the cystic artery (*small black arrow*) and fine neovascularization (*white arrows*) are demonstrated. Right hepatic artery is stenosed (*large black arrow*). **B** Ringlike tumor stains (*arrows*) with moderate hypervascularity are seen in the right lobe of the liver

**Fig. 3.** Carcinoid tumor of the gallbladder. Many rosettes are seen in the medullary tumor. A mild pleomorphism with hyperchromasia is seen (hematoxylin and eosin stain)

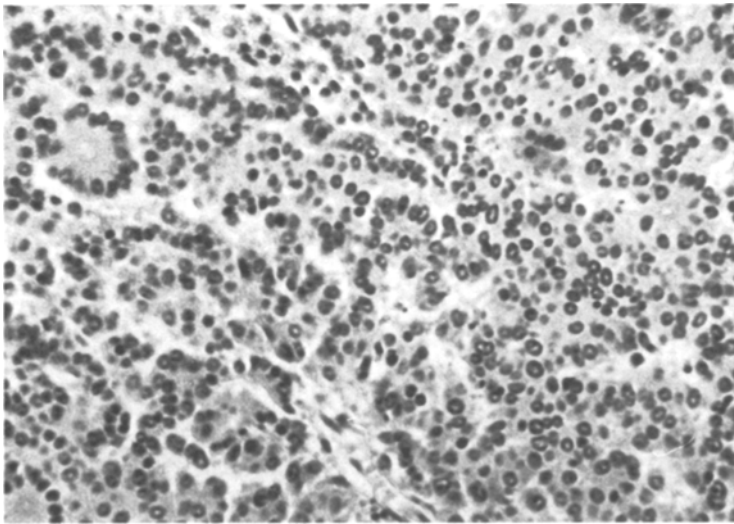


**Fig. 4.** **A** Arterial phase of celiac angiography: medial branch of the left hepatic artery (*arrow*) is dilated with stretching and displacement. Cystic artery is dilated (*arrowhead*). **B** Magnified view of the gallbladder: cystic artery (*black arrow*) is dilated. Fine neovascularization (*white arrows*) is seen at the fundic portion of the gallbladder. **C** Capillary phase of celiac angiography. Moderate hypervascular metastatic lesions (*arrow*) are seen in the liver. A faint tumor stain is seen at the fundic portion of the gallbladder (*white arrows*)



perforial branch of the cystic artery. The right hepatic artery was stenosed. Fine neovascularization was also seen in the gallbladder fossa. In the capillary phase, ringlike tumor stains with moderate hypervascularity were seen in the right lobe of the liver (Fig. 2B). Stain of the gallbladder was not clearly identified due to superimposition of hepatic metastases. In the portovenous phase, the right portal branch was stenosed. The angio-

graphic diagnosis was gallbladder cancer with metastases in the liver. A course of chemotherapy was completed, but the patient's condition deteriorated continuously and she died 3 months after admission. An autopsy disclosed a polypoid tumor 2 × 3 × 3.5 cm in the gallbladder. The tumor directly invaded into the liver. Many metastatic lesions, 1 of them ruptured, were also found in the liver. Histologic examination revealed



**Fig. 5.** Carcinoid tumor of the gallbladder. Histologically, the tumor shows a medullary and cordlike pattern of rather uniform cell size with frequent rosette formation (hematoxylin and eosin stain)

a carcinoid tumor of the gallbladder (Fig. 3). Glimerius-stained sections showed that many tumor cells had argyrophilic granules.

### Case 2

A 64-year-old woman was admitted because of a 2-month history of appetite loss, vomiting, and general malaise. The carcinoid syndrome was not noted. Physical examination on admission was not remarkable. Laboratory data were normal except for elevated erythrocyte sedimentation rate and a high value of carcinoembryonal antigen. Upper GI series and endoscopic examination showed no abnormality. Computed tomography showed a large low-density mass in the left medial segment of the liver and a localized thickening of the gallbladder wall. Endoscopic retrograde cholangiography showed gallstones and a round 2.5 × 2.5 cm defect at the fundic portion of the gallbladder.

Angiography was performed to evaluate the lesion of the gallbladder and liver. Celiac angiography (Fig. 4A) showed a fine neovascularization in the medial branch of the left hepatic artery which was dilated, stretched, and displaced. The same finding was seen in the anterior branch of the right hepatic artery. The cystic artery was dilated with fine neovascularization at the fundic portion of the gallbladder (Fig. 4B). Encasement was not discernible. In the capillary phase, a faint tumor stain was seen at the fundic portion of the gallbladder. Moderate hypervascular metastatic lesions were seen in the liver (Fig. 4C). In the portovenous phase, a portal branch in the left medial segment was displaced. Angiographic diagnosis was a gallbladder cancer with metastases in the liver.

Cholecystectomy and right anterior and left medial segmentectomy were performed. The resected gallbladder revealed an ulcerated polypoid tumor 2.0 × 2.5 × 2.5 cm. Histologic examination revealed a carcinoid tumor of the gallbladder (Fig. 5). Tumor cells showed argyrophilic granules on Glimerius-stained sections.

### Discussion

Carcinoid tumor of the gallbladder is extremely rare. Fifteen cases have appeared in the literature since Joel reported the first case in 1929 [2]. We

reviewed these 15 cases and found that the average age of patients was 61.5 years. The female to male ratio was 2:1. A gallstone was present in 7 of 15 cases. Tumor size was variable: the smallest was 3 mm. Metastatic lesions in the liver were found in 7 of 15 cases. The carcinoid syndrome was reported in only 1 case. The prognosis was poor, especially with liver metastases.

Some of the characteristic angiographic findings are well-known in carcinoid tumor of the small intestine [3–5]. Localized kinking and obstruction of the small arteries within the distal mesenteric arcades, stellate pattern of the distal small arteries, irregularity of vasa recti, poor to moderate contrast accumulation, and venous stasis and occlusion have been described. However, abundant neovascularization has been noted in carcinoid tumor of the stomach, rectum, and lung. In addition to the findings of the primary lesion, hypervascular metastatic lesions in the liver are also well-known in cases of carcinoid tumor [6, 7].

We could find no reports of angiographic examination of the carcinoid tumor of the gallbladder in the literature. In our case 1, the obstruction and irregular neovascularization of the cystic artery and the encasement of the right hepatic artery were seen. In case 2, the dilatation of the cystic artery, fine neovascularization at the fundic portion of the gallbladder, and faint tumor stain were seen. These findings in the arterial phase were not specific and not different from those seen in gallbladder cancer. The tumor stain was faint and not hypervascular as is seen with other carcinoids in the stomach, rectum, and lung.

The accurate differentiation of these cases from gallbladder cancer was impossible even retrospectively, although moderate hypervascular lesions in

the liver might suggest metastases from carcinoid tumor. The specific diagnosis of the carcinoid tumor of the gallbladder must rely on pathologic evidence.

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