

Imaging and Screening of Cancer of the Gallbladder and Bile Ducts



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KEYWORDS

• Gallbladder cancer • Cholangiocarcinoma • Sclerosing cholangitis • CT • MR imaging

KEY POINTS

- Gallbladder cancer (GBC), may appear as a mass replacing the gallbladder, irregular gallbladder wall thickening, or a polypoid lesion in the gallbladder.
- The diagnosis of a biliary stricture as benign or malignant may be difficult and requires imaging and endoscopy-related tests.
- In staging perihilar cholangiocarcinoma (CCA), a combination of PET-computed tomography scans and MR imaging may be required.
- Invasion of bilateral secondary biliary radicals or hepatic vessels usually precludes surgical resection of perihilar CCA.
- Intrahepatic CCA is increasingly identified in cirrhotic patients, and may have atypical computed tomography or MR imaging appearances in this cohort.

BILIARY CANCER SCREENING

Biliary cancers include gallbladder cancer (GBC) and cholangiocarcinoma (CCA). These tumors are associated with a poor prognosis, and much literature has been devoted to early detection of these cancers. Some gallbladder polyps at low risk of GCA may be screened with ultrasound imaging. Bile duct strictures that may be CCA, particularly in patients with primary sclerosing cholangitis (PSC) may need to be investigated, sometimes repeatedly. The imaging features of biliary tumors are well-established. This review discusses the current state of screening and diagnosis of GBC and CCA.

GALLBLADDER CANCER

GBC has a high incidence in Chile and India. In the United States, this cancer is uncommon but is

more prevalent in Hispanic and American Indian populations. As with most gallbladder diseases, GBC is more common in females than males (3:1 ratio). Risk factors for GBC include gallstones, which are seen in 60% to 90% of GBC cases.¹ Stones larger than 2 cm are associated with a greater risk of GBC.² Porcelain gallbladder used to be thought of as a strong risk factor for GBC; however, current literature does not support this notion.^{3,4} Anomalous pancreaticobiliary junction is also a recognized risk factor for GBC, particularly in young Asian females without gallstones.¹ GBC occurs in 10% to 15% of Asian patients with this anomaly.² Patients with PSC have a 2% incidence of GBC.⁵ Hence, patients with PSC without gallbladder disease may benefit from annual right upper quadrant ultrasound screening.⁵⁻⁸

Unlike the case with colon cancer, GBC is not thought to undergo an adenoma–carcinoma sequence. It is more likely that, over several years,

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dysplasia progresses to cancer.^{2,9} The sites of GBC are the gallbladder fundus (60%), body (30%), and neck (10%). More than 90% of GBC are adenocarcinomas.² Squamous cell, small cell, neuroendocrine-type, melanoma, and lymphoma account for the remainder of GBC. The staging of GBC is given in **Table 1**.^{2,10} The overall prognosis of GBC is poor with a 5-year survival^{11,12} rate of 10% for advanced cancer (T3 or T4).

Screening for Gallbladder Cancer

We consider the role of screening for cancer in those with increased risk of this disease.

Gallstones

Gallstones are present in about 60% to 90% of patients with GBC,¹³ and a history of gallstones seems to be one of the strongest risk factors for the development of GBC.¹ However, the incidence of GBC in patients with gallstones is only 0.5% to 3.0%.¹⁴ The risk is greater with larger gallstones, particularly larger than 3 cm (relative risk is 10:1)¹⁰ and with a longer duration of gallstone disease. At present, screening for GBC in patients with gallstones is not recommended.

Porcelain gallbladder

This entity is an uncommon manifestation of chronic cholecystitis with calcification of the

gallbladder wall. More than 95% of patients with porcelain gallbladder have gallstones. Earlier studies reported a high incidence of GBC in patients with porcelain gallbladder ($\leq 60\%$).¹⁵ More recent studies indicate that the increase in GBC risk is minimal with an incidence of 2% to 3%.^{3,4,16} (**Fig. 1**). A metaanalysis of the association between porcelain gallbladder and GBC concluded that there was no need for cholecystectomy in porcelain gallbladder, unless there were other indications for surgery. There were no recommendations for screening these patients for GBC.¹⁶

Gallbladder polyps

Gallbladder polyps are seen in up to 12% of cholecystectomy specimens and in about 5% to 7% of right upper quadrant sonography studies.^{11,17,18} Most small gallbladder polyps are asymptomatic, benign lesions that do not progress to GBC. A metaanalysis of 12 studies, reporting on more than 5000 polyps, estimated that only 0.6% of all gallbladder polyps were malignant.¹⁹ Thus, it is important to stratify the risk of cancer in gallbladder polyps. Polyps larger than 10 mm have a higher risk (45%–65% likelihood) of malignancy.^{18,19} Other factors that increase the risk of cancer include patient age greater than 50 years,¹⁸ presence of gallstones, solitary sessile polyps, and presence of PSC.^{2,18–20}

Table 1
TNM staging of gallbladder cancer

T staging	
T0	No evidence of primary tumor
T1	Tumor invades lamina propria or muscular layer
T1a	Tumor invades lamina propria
T1b	Tumor invades muscular layer
T2	Tumor invades perimuscular connective tissue; no extension beyond serosa or into liver
T3	Tumor perforates the serosa and/or directly invades liver and/or one other adjacent organ, for example, stomach, duodenum, colon, pancreas, omentum, or extrahepatic bile ducts
T4	Tumor invades main portal vein or hepatic artery or invades 2 or more extrahepatic organs
N staging	
N0	No regional lymph node metastasis
N1	Metastases to nodes along cystic duct, common bile duct, hepatic artery, and/or portal vein
N2	Metastases to periaortic, pericaaval, superior mesenteric artery, or celiac artery lymph nodes
M staging	
M0	No distant metastasis
M1	Distant metastasis

Stage I is T1, N0, M0. Stage II is T2, N0, M0. Stage IIIA is T3, N0, M0. Stage IIIB is T1-3, N1, M0. Stage IVA is T4, N0, M0. Stage IVB is any T, N2, M0 or any T, any N, M1.

Data from Reid KM, Ramos-De la Medina A, Donohue JH. Diagnosis and surgical management of gallbladder cancer: a review. *J Gastrointest Surg* 2007;11(5):671–81; and Misra S, Chaturvedi A, Misra NC, et al. Carcinoma of the gallbladder. *Lancet Oncol* 2003;4(3):167–76.

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