

The Accuracy of Preoperative Imaging in The Detection of Gallbladder Carcinoma

Saeed Nadhim Younis (MBChB, DMRD, PhD)

Abstract

Introduction: Primary carcinoma of the gallbladder is an uncommon, aggressive malignancy that affects women more frequently than men. Older age groups are most often affected, and coexisting gallstones are present in the vast majority of cases. The symptoms at presentation are vague and are most often related to adjacent organ invasion, and the radiologic findings in early-stage cancers are subtle and may mimic those of acute or chronic cholecystitis and many gallbladder carcinomas are diagnosed in an advanced stage, therefore, despite advances in cross-sectional imaging, early-stage tumors are not often encountered.

Objectives: To determine the utility of ultrasound and multidetector CT imaging in the surgical management of gallbladder carcinoma. It provides a road map for surgical procedures to be taken.

Materials and Methods: The data from 40 patients with histologically proven adenocarcinoma of gallbladder from the period of March 2006 to December 2010 analyzed, in a prospective study done in Rizgari teaching Hospital and Soran Diagnostic center

Results: Preoperative detection rate of both ultrasound and CT scan was 60% and the diagnostic accordance rate before and after operation was low in early stages T 1 & 2 (23.5%) versus (86.9%) in advanced stages T 3 & 4. The female to male ratio was 4:1. The gallstone was closely related to gallbladder carcinoma and was seen in 90% of cases.

Conclusion: proper utilization of different imaging modalities is essential for early detection and treatment options of gallbladder carcinoma by using comprehensive imaging techniques like dual Phase multidetector CT coupled with 3D volume rendered reconstruction.

Department of Surgery/ College of Medicine, Hawler / Medical University/Arbeel/Iraq.

Introduction

Primary carcinoma of the gallbladder is an uncommon malignancy with a distinctive demographic and geographic distribution. In the United States, it is the most frequent malignant tumour of the bile ducts and the sixth most common gastrointestinal malignancy, following cancers of the colon, pancreas, stomach, liver, and esophagus. It is estimated that 7,000 new cases of extrahepatic biliary cancers (most of them are carcinomas of the gallbladder) are diagnosed annually [1].

Its prognosis is generally poor and only a radical surgical therapy allows a prolonged survival [2]. Despite the widespread use of modern imaging techniques, early diagnosis is rare because there are no specific signs and symptoms, and the radiologic findings in early-stage cancers are subtle and may mimic those of acute or chronic cholecystitis and many gallbladder carcinomas are diagnosed in an advanced stage [3].

The radiologic findings in advanced tumors reflect its behavior. Adjacent organ invasion, most commonly involving the liver, is



typically present at diagnosis, as is biliary obstruction. Periportal and peripancreatic lymphadenopathy, hematogenous metastases, and peritoneal metastases may also be seen. The vast majority of gallbladder carcinomas are adenocarcinomas [4]. The goal of this study is to highlight the contribution of the imaging in the management of gallbladder carcinoma

Materials and Methods

Between March 2006 and December 2010, forty patients with histologically proven gallbladder carcinoma were diagnosed in Rizgari teaching hospital and Soran Diagnostic center. Ultrasound and abdominal CT scan have been done in all patients.

All patients were asked to present fasting for six hours prior to the examination. The CT imaging studies were carried out before and after injection of a contrast enhancer, with early, portal and late phase imaging using Siemens emotion scanner and ultrasound machine used was Siemens G60 color duplex system.

The age of patients ranged from 42 to 76 years. The patients presented were having chronic upper abdominal pain, jaundice, or right hypochondrial mass.

The imaging criteria to diagnose gallbladder carcinoma were focal gallbladder wall thickening, polypoidal gallbladder mass greater than 10mm in size, and mass replacing the gallbladder with or without gallstones or presence of local hepatic invasion.

The radiological criteria for preoperative staging of the gallbladder carcinoma (tumor staging) included the following [5].

Stage T1: polypoid lesions without wall thickening

Stage T2: Nodular or sessile lesion with wall thickening and presence of a greasy plan that separates the tumor from the adjacent organs

Stage T3: lesion that doesn't respect the greasy plan that separates the tumor from a adjacent organ (less than 2cm at the level of the liver)

Stage T4: lesion invading two adjacent organ or more and invading the liver of more than 2 cm.

Results

Mean age: 57 years (42-76years), more women involved than men (sex-ratio 4:1) and cholelithiasis was the main risk factor and was noticed in 90 % of cases.

Table (1): Number of patients according to the presentation

Clinical Data	Percentage of cases
Right upper abdominal pain	27 (67.5%)
Jaundice	5 (12.5%)
Upper abdominal mass	8 (20%)
Total	40

Table (2): Number of cases according to the imaging findings

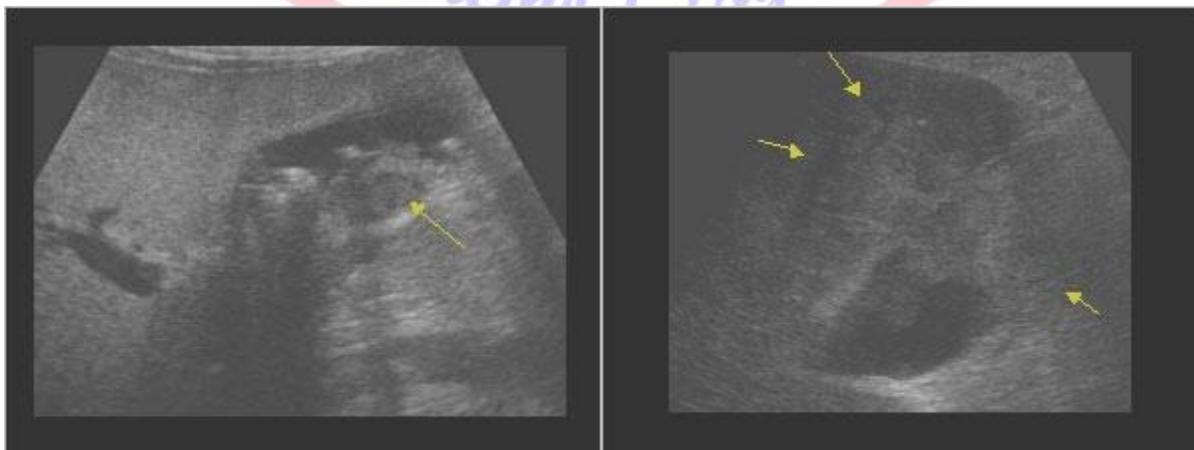
Imaging findings	Number of cases	%
Polypoidal mass greater than 10mm	9	22.5%
Focal gallbladder wall thickening (11-26mm, mean 18mm)	8	20%
Mass replacing gallbladder	14	35%
Contracted gallbladder with irregular and diffuse wall thickening	9	22.5%
Total	40	100%

Table (3): Number of cases diagnosed preoperatively and the accordance rate in respect to tumour staging

Tumor staging	Number of cases	Preoperative diagnosis	Accuracy Rate
T1	9	1	11.1%
T2	8	3	37.5%
T3	7	5	71.4%
T4	16	15	93.75%
Total	40	24	60%

Table (4): Number of infiltrative (local Metastases) with preoperative diagnosis

Surgical Findings	Preoperative CT Findings	Preoperative Ultrasound findings
Hepatic metastases	11	11
Bile duct dilation	2	6
Regional lymph nodes	6	2
Extension to duodenum and pancreas	1	1
Ascites	1	1
Total	20	20

**Figure (1):** Ultrasound: gallbladder mass with invasion to liver.

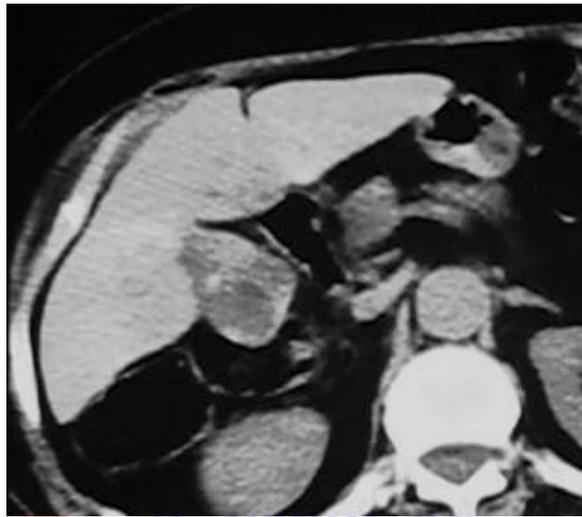


Figure (2): irregular gallbladder wall thickening and stones.



Figure (3): Hepatic metastases.



Figure (5): extensions to the pancreas and regional lymph node.

Discussion

Epidemiology and clinical Features:

The clinical features of gallbladder carcinoma include right upper quadrant pain, anorexia, weight loss and jaundice. Often the patient clinical features cannot be distinguished from cholecystitis. [6] In the present study 27 patients (67.5%) presented with right upper abdominal pain, 5 patients (12.5%) with jaundice and 8 (20%) with upper abdominal mass.

The presence of gallstones in association with gallbladder carcinoma been variously reported to be in range of 80-90%, 73-98%, and 65-95% [7, 8, 9], in the present study the gallstones were identified in 90%

Other less frequent association with gallbladder carcinoma are porcelain gallbladder 25%, inflammatory bowel disease and familial polyposis were not observed in the current study [10, 11].

Imaging Features:

Radiology plays an important role in early diagnosis of primary gallbladder carcinoma, ultrasound, CT scan, MRI, and the other methods have their merits in evaluating the disease, and should be used in combination with clinical practice [12].

The cross-sectional imaging patterns of gallbladder carcinoma have been described as a mass replacing the gallbladder in 40%–65% of cases, focal or diffuse gallbladder wall thickening in 20%–30%, and an intraluminal polypoid mass in 15%–25% [13] the current study showed 35%, 42.5% and 22.5% respectively which is almost in accord with previous studies.

When the size of gallbladder polyp is less than 10mm, the likelihood of malignancy is extremely rare. No cases of cancer were detected in a study of 38 patients with less than 10mm gallbladder polyps who were followed for 5 years [14]. However polyps larger than 10mm may be associated with malignancy particularly if they are solitary

and found in older than 60 age [15].

In our patients the smallest lesion proved to be adeno carcinoma measured 1.8X1.5 cm in size in 48 years old patient.

In our group 24/40 (60%) were diagnosed as having primary carcinoma of gallbladder preoperatively. Among these patients 20/23 (86.9%) were at stage T 3 and 4 while 4/17 (23.5%) were at stage T I and 2. Ultrasound and CT scan failed to find more patients with early primary gallbladder carcinoma in this study and this is in agreement with the result of others [16]. Dynamic CT scanning could show the gallbladder wall thickness at early cancer invasion particularly in patients with gallstones and gallbladder wall atrophy and it is more sensitive than ultrasonography in diagnosing early changes of the gallbladder, hence combined dynamic CT scan and ultrasound can show clearly the local anatomy of gallbladder and bile ducts as well as the liver and adjacent organs [17]

The early diagnosis of gallbladder carcinoma can affect the operative results and the life quality of the patients. Operative procedures also depend on the different pathological staging. Laparoscopic cholecystectomy may inadvertently be performed in cases of gallbladder carcinoma when tumor is unsuspected. Iatrogenic dissemination of gallbladder carcinoma in the peritoneal cavity and port sites has been described in the surgical and radiologic literature, with 45 cases reported to date [18]. Many authors advocate re-exploration for those patients in whom a T2 or T3 carcinoma was incidentally found at cholecystectomy and excision of port sites for those patients who underwent laparoscopic cholecystectomy [19].

Conclusion

The cross-sectional imaging patterns of gallbladder carcinoma have been described as a mass replacing the gallbladder, focal or diffuse gallbladder wall thickening, and an intraluminal polypoid mass .Wall thickening

is the most diagnostically challenging of the three patterns because it mimics the appearance of more common acute and chronic inflammatory conditions of the gallbladder. Subtle areas of wall thickening may reflect early carcinomas. However, they are difficult to detect, since they may cause only mild elevation of the mucosa when viewed sonographically. Pronounced wall thickening (ie, >1.0 cm) demonstrated by ultrasound or CT, with associated mural irregularity or marked asymmetry should raise concerns for malignancy.

Recommendations:

The following should be stressed in clinical practice for early diagnosis.

- 1- The aged: especially the elderly women with gallstones.
- 2- Gallbladder full of stones and atrophic wall.
- 3- Irregular gallbladder wall or irregular wall thickness.
- 4- Polypoidal mass greater than 10 mm size with thick and wide base.
- 5- Diseased gallbladder with biliary dilatation.
- 6- Dual phase multidetector CT with 3D reconstruction is a comprehensive imaging technique for staging of gallbladder carcinoma and determine the road map before surgery.

References

- [1] Robert JW, Daugherty SF, primary carcinoma of gallbladder, Surgical Clinics of North America, 1986; 66- 743-749.
- [2] Gore RM, Shetland RP. Biliary tract neoplasms: diagnosis and staging. Cancer Imaging. 2007 Oct 1; 7 Spec No A: S15-23. Review. PMID: 17921093.
- [3] Huang CP, Chiou YY, Chou YH, Chiang JH, Chang CY. Imaging findings in mucin-producing carcinoma of the gallbladder. J Formos Med Assoc. 2006May; 105(5):427-30.
- [4] Henson DE, Albores-Saavedra J, Corle D. Carcinoma of the gallbladder: histologic

types, stage of disease, grade, and

survival rates. Cancer 1992; 70:1493-1497

[5] Kalra N, Suri S, Gupta R, Natarajan SK, Khandelwal N, Wig JD, Joshi K. MDCT in the staging of gallbladder carcinoma. AJR Am J Roentgenol. 2006 Mar; 186(3):758-62.

[6] Fultz PJ, Skucas J, Weiss SL, comparative imaging of gallbladder cancer, J Clinical Gastroenterology, 1988; 6: 683-693

[7] Yum HY, Fink AH sonographic findings in primary gallbladder carcinoma, Radiology, 1980; 134: 693-696.

[8] Kane RA, Jacobs R, Katz J, Costello P, Porcelain gallbladder: ultrasound and CT appearance, Radiology, 1984; 152:37-141.

[9] Lane J, Buck JL, Zeman RK, primary carcinoma of the gallbladder; a pictorial essay, Radiographics, 1989, 9: 209-227.

[10] Kim YH. Carcinoma of the gallbladder associated with clonorchiasis: clinicopathologic and CT evaluation. Abdom Imaging 2003; 28:83-6.

[11] Zeman RK, Burrell M, gallbladder and bile duct imaging: a clinical and radiological approach. New York NY: Churchill Livingstone, 1987;292-307

[12] Miller G, Schwartz LH, D'Angelica M. The use of imaging in the diagnosis and staging of hepatobiliary malignancies. Surg Oncol Clin N Am. 2007 Apr; 16(2):343-68.

[13] Angela D. Levy, Linda A. Murakata, Charles A. Rohrmann, Jr, Gallbladder Carcinoma: Radiologic-Pathologic Correlation, Radiographics; 2001 march ,21: 295-314.

[14] Collett JA, Allan RB, Chisholm RJ, Wilson IR, Burt MJ, Chapman BA. Gall bladder polyps: prospective study. J Ultrasound Med. 1998; 17:207-211.

[15] Chijiwa K, Tanaka M. Polypoid lesion of the gallbladder: indications of carcinoma and outcome after surgery for malignant polypoid lesions. Int Surg. 1994; 79:106-109.

[16] Jing-Sen Shi, Jian-Sheng Wang, Gang Liu, et al, early diagnosis of primary gallbladder carcinoma, hepatobiliary and



pancreatic diseases international,2002,
Volume1 No2, 273-275

[17] Yoshimitsu K, Honda H, Shinozaki K,
et al. Helical CT of the local spread of
carcinoma of the gallbladder: evaluation
according to the TNM system in patients who
underwent surgical resection. AJR 2002;
179:423-8.

[18] Reid KM, Ramos-De la Medina A,
Donohue JH. Diagnosis and surgical
management of gallbladder cancer: a review.
J Gastrointest Surg. 2007 May; 11(5):671-81.

[19] Fong Y, Heffernan N, Blumgart LH.
Gallbladder carcinoma discovered during
laparoscopic cholecystectomy: aggressive
resection is beneficial. Cancer 1998; 83:
423-427.

