

CT findings of primary gallbladder carcinoma

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- Objective** : *To assess the CT appearances that favor the diagnosis of primary gallbladder carcinoma, including both primary features of tumor and associated findings.*
- Setting** : *Division of Diagnostic imaging, Department of Radiology, Faculty of Medicine, Chulalongkorn University*
- Design** : *Retrospective study*
- Patients** : *CT appearances of primary features of tumor and associated findings in eight patients with histologically proven gallbladder carcinoma were reviewed and correlated with pathologic findings. There were 4 female and 4 male patients with an age range of 36 to 68 years.*
- Method** : *CT findings of primary features consisted of (A) an intraluminal mass within the gallbladder, (B) focal or diffuse gallbladder wall thickening, and (C) a mass replacing the gallbladder fossa. The associated findings were cholelithiasis, porcelain gallbladder, dilatation of the biliary tree, nodal involvement, invasion of the adjacent structures, and distant metastasis.*
- Results** : *The common primary features of gallbladder carcinoma on CT consisted of two patterns : an intraluminal mass within the gallbladder (4 cases) and focal or diffuse wall thickening (4 cases). Associated findings were biliary duct dilatation (5 cases), nodal involvement (retroportal, right celiac, and SMA nodes, 4 cases), direct spread to adjacent structures (3 cases), distant metastasis (1 case), cholelithiasis (1 case), and porcelain gallbladder (1 case). The liver was the most commonly involved adjacent structure. Choledochal cyst was also found in one case.*

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Conclusion : *CT scan is a noninvasive modality that can demonstrate both primary features of tumor and associated findings in patients with gallbladder carcinoma. Careful evaluation of all CT appearances is very helpful in the correct differentiation of gallbladder carcinoma from overlapping benign disease.*

Key words : *Gallbladder, Carcinoma, CT.*

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- วัตถุประสงค์** : เพื่อศึกษาลักษณะภาพเอกซเรย์คอมพิวเตอร์ในการวินิจฉัยมะเร็งถุงน้ำดี ทั้งลักษณะปฐมภูมิของก้อนมะเร็งและลักษณะร่วม
- สถานที่ทำการศึกษา** : สาขารังสีวิทยาวินิจฉัย ภาควิชารังสีวิทยา คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
- รูปแบบการวิจัย** : การศึกษาย้อนหลัง
- ผู้ป่วยที่ทำการศึกษา** : การศึกษานี้ได้ศึกษาภาพเอกซเรย์คอมพิวเตอร์ของผู้ป่วย 8 รายที่เป็นมะเร็งถุงน้ำดีจากการตรวจทางพยาธิวิทยา และเปรียบเทียบกับพยาธิสภาพ ประกอบด้วย ผู้หญิง 4 ราย ผู้ชาย 4 ราย อายุระหว่าง 38 ถึง 68 ปี
- วิธีการศึกษา** : ศึกษาภาพเอกซเรย์คอมพิวเตอร์ของลักษณะปฐมภูมิของก้อนมะเร็งซึ่งแบ่งเป็น 3 ลักษณะ คือ (ก) ก้อนมะเร็งภายในถุงน้ำดี (ข) มีการหนาตัวของผนังของถุงน้ำดีทั้งแบบหนาทั่ว ๆ ไป หรือ หนาเฉพาะที่ (ค) ก้อนในแอ่งของถุงน้ำดีโดยที่ไม่พบถุงน้ำดี และลักษณะร่วมดังนี้ นิ่วในถุงน้ำดี การมีหินปูนเกาะที่ผนังของถุงน้ำดี การพองโตของท่อน้ำดี ต่อม้ำเหลืองโต การลุกลามไปข้างเคียง และ การลุกลามไปที่อวัยวะอื่น ๆ
- ผลการศึกษา** : ลักษณะภาพปฐมภูมิของมะเร็งถุงน้ำดีที่พบมากที่สุดคือ ลักษณะก้อนภายในถุงน้ำดี และ การมีความหนาตัวของผนังของถุงน้ำดีอย่างละ 4 ราย ลักษณะร่วมนั้นพบว่าท่อน้ำดีพองโต 5 ราย ลุกลามไปต่อม้ำเหลืองข้างเคียง 4 ราย ซึ่งได้แก่ ต่อม้ำเหลืองบริเวณหลังต่อหลอดเลือดดำปอร์ตอล บริเวณหลอดเลือดแดงซีลีแอคและบริเวณหลอดเลือดแดงซูพีเรียมีเซนเตอริก ลุกลามไปอวัยวะข้างเคียง 3 ราย ลุกลามไปอวัยวะอื่น ๆ 1 ราย นิ่วในถุงน้ำดี 1 ราย และมีหินปูนเกาะที่ผนังของถุงน้ำดี 1 ราย พบว่าตับเป็นอวัยวะข้างเคียงที่ลุกลามไปมากที่สุด และพบโคลิโดเคิลซิสต์ (choledochal cyst) 1 ราย
- วิจารณ์และสรุป** : เอกซเรย์คอมพิวเตอร์เป็นการตรวจที่ปลอดภัยสามารถได้รายละเอียดของมะเร็งถุงน้ำดีทั้งลักษณะปฐมภูมิของก้อนมะเร็งและลักษณะร่วมการศึกษา ลักษณะภาพทางเอกซเรย์คอมพิวเตอร์อย่างละเอียดจะช่วยแยกมะเร็งถุงน้ำดีจากโรคอื่น ๆ ที่ไม่ใช่มะเร็งของถุงน้ำดีได้อย่างถูกต้อง

Despite being the most common biliary tract malignancy, gallbladder carcinoma is relatively rare. ^(1,2) It is encountered in less than 1.4 % of all biliary tract operations, and accounts for approximately 3 % of all malignancies. ⁽³⁾ In Thailand, the incidence of gallbladder carcinoma appears to be rare as elsewhere. Only 2 cases of gallbladder carcinoma have been found in a pathological survey of 1884 malignancies. ⁽⁴⁾

Unfortunately, this neoplasm is characterized by early spreading and a rapid clinical course, accompanied by lack of specific signs and symptoms. ^(5,6) As a result, it is often diagnosed at a late stage when the prognosis is extremely poor. ⁽⁷⁾ Median survival after diagnosis is only 6 months. The overall 5-year survival rates have usually been reported to be less than 5 %. ^(8,9) To improve survival of patients with this cancer, early detection and accurate preoperative diagnosis are essential. ^(2,10)

In the 1980's, the development of noninvasive modalities such as computed tomography (CT) and ultrasonography increased accuracy and sensitivity in detecting gallbladder carcinoma. For CT, the advantage is based on the display of full cross-sectional anatomy. ⁽⁷⁾ CT was also useful for characterizing and defining the extent of disease. ^(11,12)

In this study, our aims were to assess the CT appearances that favor the diagnosis of gallbladder carcinoma, including both primary features of tumor and associated findings.

Materials and Methods

From April 1995 to August 2000, there are approximately 60 patients admitted in the King Chulalongkorn Memorial Hospital with clinically

suspected gallbladder cancer. Only eight patients obtained CT scans with subsequent histologically proven primary gallbladder carcinoma. We reviewed CT scans of these patients, retrospectively. The diagnosis was established by laparotomy in all patients.

The scanners used were the Sytec 4000 or the Siemens Somatom plus 4. All patients received initial nonenhanced scans, followed by post contrast scans using a 100-ml bolus injection of contrast material. Contiguous 8-mm or 10-mm axial sections were obtained. In 4 cases, 3-mm or 5-mm thin slices were added at problematic regions.

The findings which were assessed on CT scans included both primary features of gallbladder tumor and associated findings. Primary features were classified into three types : (A) an intraluminal mass within the gallbladder, (B) focal or diffuse gallbladder wall thickening ; defined as more than 3 mm in thickness of gallbladder wall, and (C) a mass replacing the gallbladder fossa.

Associated findings which we analyzed were the presence or absence of these signs : cholelithiasis, porcelain gallbladder, dilatation of the biliary tree, nodal involvement, invasion of the adjacent structures, and distant metastasis.

The CT criteria for a positive node were a soft tissue mass with an anteroposterior dimension of 10 mm or greater and ringlike or heterogeneous contrast enhancement. The names of regional nodes were reported according to the previous studies : cystic, pericholedochal, posterior superior pancreaticoduodenal, retroportal, right celiac, hepatic, superior mesenteric, and interaortocaval. ^(11,13) Involvement of interaortocaval nodes represented distant metastasis.

Results

Among eight patients in this study, there were four females and four males. The average age of patients was 55.8 years, with an age range from 38 to 65 years. The majority of cases presented with nonspecific right upper quadrant or epigastric pain. Less frequent symptoms included weight loss, anorexia, and jaundice. Only one patient presented with a palpable mass in the right upper quadrant. Final histologic diagnoses were adenocarcinoma in seven cases (87.5 %) and squamous cell carcinoma in one case (12.5 %).

The CT appearance of primary features and associated findings of gallbladder carcinoma are summarized in Table 1 and 2, respectively. The details of patient data are summarized in Table 3.

Primary features

An intraluminal mass (type A) was found in four patients (50 %); the tumor size varied from 1.5 to 4 cm. The tumor masses were located at the gallbladder fundus in three patients (case 1,3 and 5) and at the neck in one patient (case 4) (Fig.1).

Table 1. Primary features of gallbladder carcinoma on CT.

CT appearance	No. of case
Type A : an intraluminal mass within the gallbladder	4 (case 1,3,4,5)
Type B : focal or diffuse gallbladder wall thickening	4 (case 2,6,7,8)
Type C : a mass replacing the gallbladder fossa	0

Gallbladder wall thickening (type B) was demonstrated in four patients (50 %). There was diffuse gallbladder wall thickening in two cases (case 2 and 8). One of these (case 2) had a small-sized gallbladder with diffused, smooth wall thickening, and was misinterpreted as cholecystitis on preoperative diagnosis (Fig.2). Focal wall thickening was found in the two remaining cases (case 6 and 7). CT appearances of these patients revealed some areas of normal thin gallbladder wall (Fig.3).

A mass replacing the gallbladder fossa (type C) was not reported in our series.

Associated findings

- Cholelithiasis and porcelain gallbladder

Two small calcified gallstones, each about 0.8 cm in diameter, were found in a female patient (case 4) (Fig.4). Thick calcified wall of the gallbladder was found in one patient who's disease was unresectable case (case 8)(Fig.5).

- Dilatation of the biliary tree

Bile duct dilatation was the most common associated finding on CT in this study, seen in 5 patients (case 1,2,4,6 and 7, 62 %). CT appearances revealed both intra-and extra-hepatic bile duct dilatation. The causes of dilatation of the biliary tree were compression either by the tumor mass itself or by enlarged lymph nodes.(Fig.6).

- Nodal involvement

Positive nodes corresponding with the aforementioned CT criteria were reported in 4 cases (case 2,3,5 and 7)(50 %). There was enlargement of the retroportal nodes in 4 cases (Fig.7), a right celiac node and matted superior mesenteric nodes in 1 case (Fig.8,9).

Table 2. Associated findings of gallbladder carcinoma on CT.

Associated findings	No. of case
Cholelithiasis	1 (case 4)
Porcelain gallbladder	1 (case 8)
Dilatation of the biliary tree	5 (case 1,2,4,6,7)
Nodal involvement	4 (case 2,3,5,7)
Invasion of the adjacent structures	3 (case 3,6,8)
Distant metastasis	1 (case 7)
Others : choledochal cyst	1 (case 1)

- Invasion of the adjacent structures

Spreading to the adjacent structures was demonstrated in 3 cases (case 3,6 and 8). Local invasion into the liver was seen in 2 patients (Fig.10). The other involved structures were the second part of duodenum, transverse colon, head of pancreas, and Gerota's fascia of the right kidney (Fig.3,11).

- Distant metastasis

There was one patient who had a low density nodule in the superoposterior segment (segment 7) of the right hepatic lobe (case 7)(Fig.12). The primary tumor of this case was located in the gallbladder fossa, with no direct spread to adjacent hepatic parenchyma. The pathologic confirmation revealed no serosal invasion of the gallbladder.

- Choledochal cyst

In our series, we found an associated

choledochal cyst in a 62-year-old female patient with type A primary feature (case 1). CT scan showed extrahepatic duct cysts with a 4x5.5 cm choledochoceles. Dilatation of the intrahepatic bile ducts was also demonstrated, but with proportional gradual tapering at the periphery (Fig.13). Thus, the cause of intrahepatic bile duct dilatation in this patient was probably due to proximal obstruction rather than intrahepatic duct cysts. According to the Todani Modification of Alonso-Lej classification,⁽¹⁴⁾ these appearances should be categorized into choledochal cyst type I and III.

Discussion

Primary carcinoma of the gallbladder is relatively rare but highly lethal disease.^(6,8) The peak incidence of this malignancy is in the sixth or seventh decade of life.^(2,15) In our series, the mean age at diagnosis was 55.8 years, with the youngest being a 38-year-old female patient. It has been reported in Taiwan that primary gallbladder carcinoma occurred at a slightly younger age in females.⁽¹⁾ Gallbladder cancer occurs more often in women, with a female-to-male ratio about 1.6-5.5:1.^(1,3,16) This female predominance was not shown in our series, which revealed equal incidence in both men and women. It was unable to represent true sex distribution of gallbladder carcinoma because there were only eight patients in this study. The most common histologic type of gallbladder cancer is adenocarcinoma,^(2,6,17,18) as shown in our studies (87.5 %) as well.

Primary gallbladder carcinoma is often difficult to diagnose in its early stage. Although the patients have subserosal lesions of the gallbladder, they remain asymptomatic.⁽⁹⁾ Moreover, when the

Table 3. Patients' data.

No.	Sex	Age	Symptom (yr)	CT appearance		Histologic type
				Primary features	Associated findings	
1.	F	62	Epigastric pain	Type A : A 1.8x3 cm broad-based,irregular intraluminal mass at GB fundus	- Lt. hepatic lobe atrophy - Nodular Rt. hepatic lobe - Dilated IHD - Dilated CBD - A 4x5.5 cm cholechocele	Adenocarcinoma
2.	F	64	RUQ pain	Type B : Diffuse, smooth GB wall thickening, small-sized GB	- A 3 cm retroportal node - Dilated IHD - Three hepatic cysts:1 cm x 2 lesions and a 5x6 cm	Adenocarcinoma
3.	F	65	Anorexia, + Wt. loss	Type A : A 1.5 cm intraluminal mass at GB fundus	- Local invasion into adjacent hepatic parenchyma - A retroportal node - A right celiac node - Matted SMA nodes	Adenocarcinoma
4.	F	38	Epigastric pain	Type A : Dilated GB with a 4 cm polypoid mass at GB neck, no wall thickening	- Mild IHD dilatation in both hepatic lobes - Dilated GB - Two 0.8 cm gallstones	Adenocarcinoma
5.	M	51	RUQ pain + Jaundice	Type A : A 3 cm polypoid mass at GB fundus, minimal focal wall thickening at adjacent region (<3mm in thickness)	- A retroportal node	Adenocarcinoma
6.	M	49	Jaundice	Type B: Focal GB wall thickening at fundus and neck, enlarged GB	- Invasion into duodenum (2nd part) and hepatic flexure of transverse colon - Dilated IHD	Squamous cell carcinoma
7.	M	57	RUQ pain + Jaundice	Type B: Focal GB wall thickening at fundus and neck	- A retroportal node - A low density nodule at segment 7 of the liver - Dilated IHD	Adenocarcinoma
8.	M	59	RUQ mass + Wt. Loss	Type B : Diffuse, thickened GB wall with severe local extension	- Porcelain GB wall - Invasion into adjacent liver, duodenum, head of pancreas, transverse colon, and Gerota's fascia of Rt. kidney	Adenocarcinoma

(GB = Gallbladder)

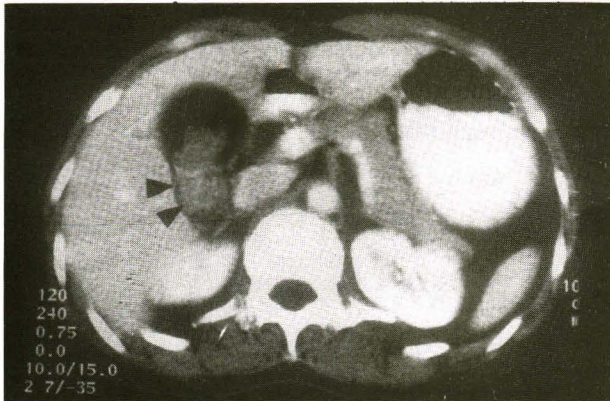


Figure 1. Primary feature type A. A 4-cm intraluminal polypoid mass (arrowheads) locates at the neck of dilated gallbladder. There is no gallbladder wall thickening.

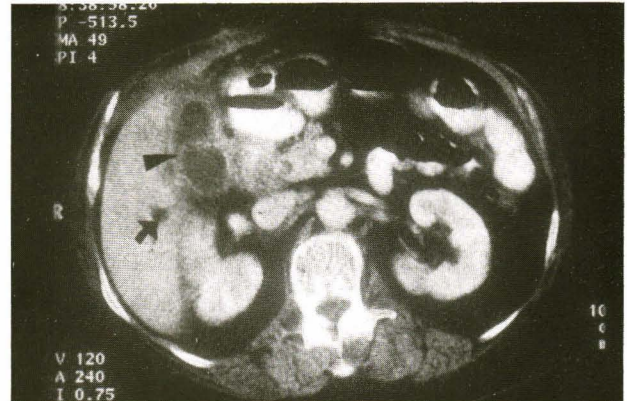


Figure 2. Primary feature type B (diffuse wall thickening). The gallbladder is small in size with diffuse, smooth wall thickening (arrowhead). A small cyst in the right hepatic lobe is demonstrated (arrow).



Figure 3A. Primary feature type B (focal wall thickening) CT image of a 49-year-old man shows apparent wall thickening at the gallbladder fundus (arrowheads). Enlarged gallbladder is also evident.

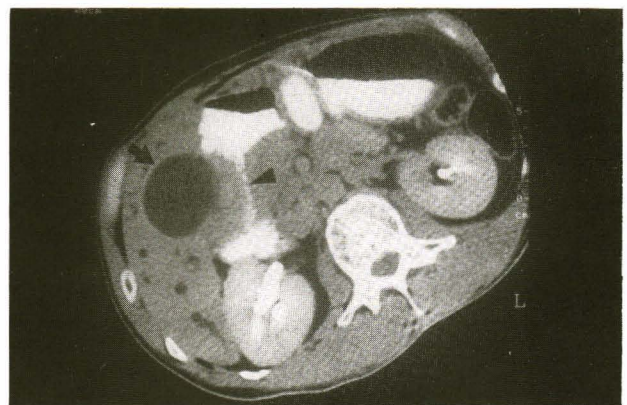


Figure 3B. The same patient as figure 3A. CT scan at the more inferior level demonstrates normal thin wall in some areas of the gallbladder. Focal thickening at the gallbladder neck with direct extension into the adjacent duodenum is noted (arrowhead)

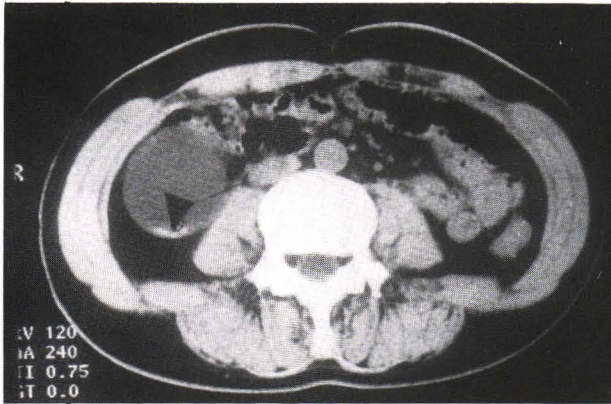


Figure 4. Non-enhanced CT scan of a 38-year-old woman reveals two small gallstones (arrowhead) within the dilated gallbladder.

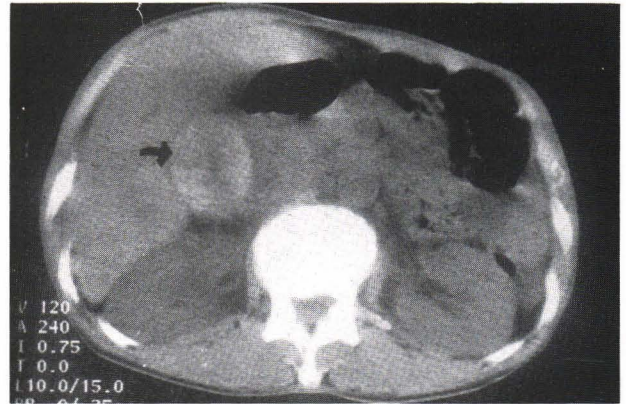


Figure 5. Porcelain gallbladder. Pre-contrast CT scan demonstrates thick, calcified wall of the gallbladder (arrow).

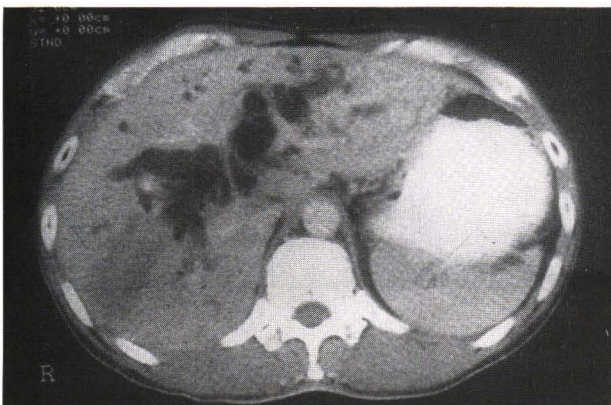


Figure 6. Dilatation of the biliary tree is observed. The cause of obstruction in this case is due to the tumor mass at the gallbladder neck.

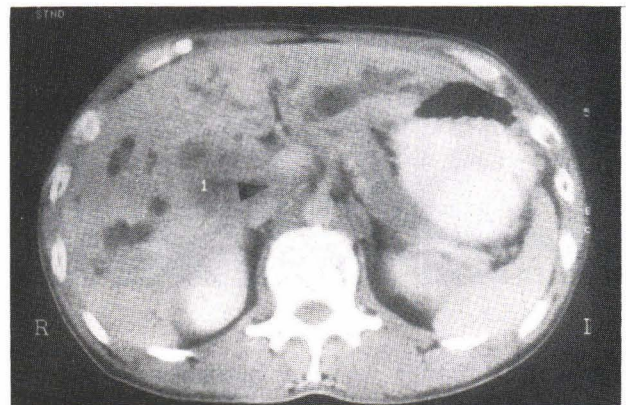


Figure 7. Post-contrast CT scan reveals an enlarged retroportal node (arrowhead), which were located at the posterior aspect of the portal vein and anterior aspect of the inferior vena cava.

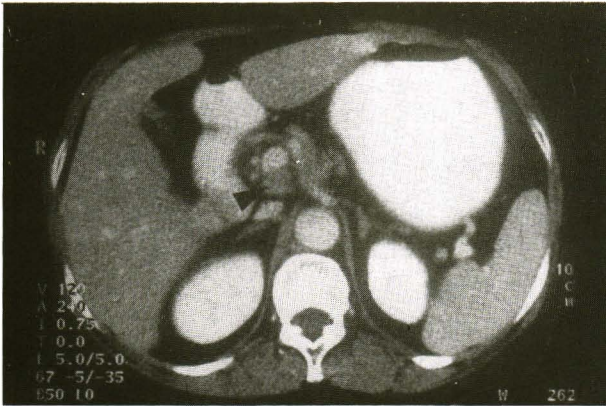


Figure 8. A right celiac node (arrowhead) which were situated on the right side of the celiac artery is shown.

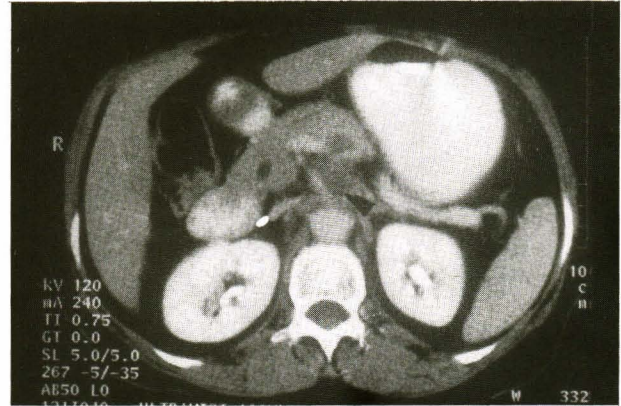


Figure 9. Matted superior mesenteric nodes are evident (arrowhead).

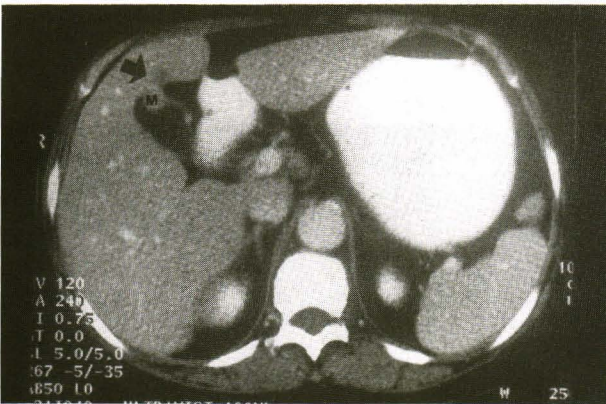


Figure 10. CT scans reveals a small intraluminal mass at the fundus of gallbladder (M). Low density lesion in the adjacent hepatic parenchyma is demonstrated (arrow), suggestive of local invasion. Pathological examination confirmed this diagnosis.

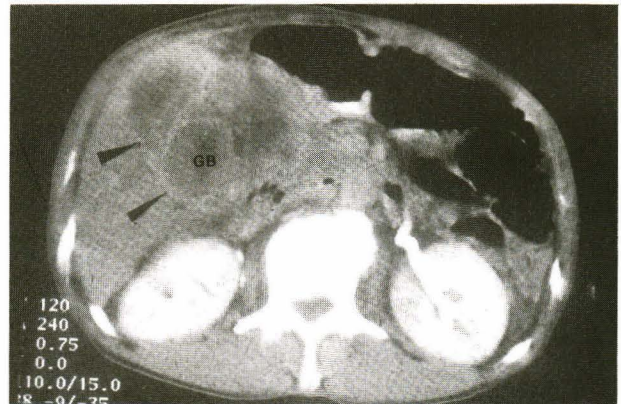


Figure 11 A. Primary feature type B with severe local extension. Post-contrast CT scan reveals diffuse thick-walled gallbladder (GB) with local extension (arrowheads).

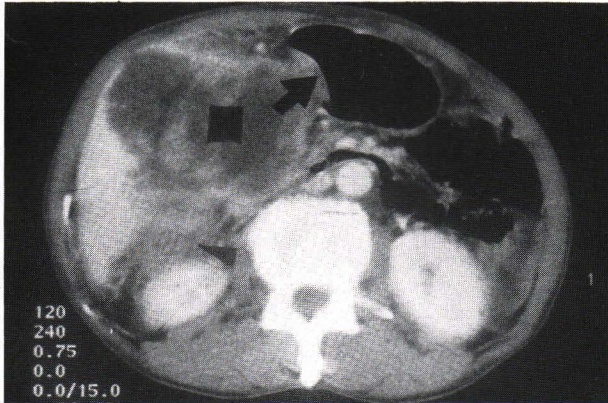


Figure 11 B. The same patient as figure 11A. CT scans at the more inferior level reveals direct spread into the adjacent transverse colon (arrow) and Gerota's fascia (arrowhead).

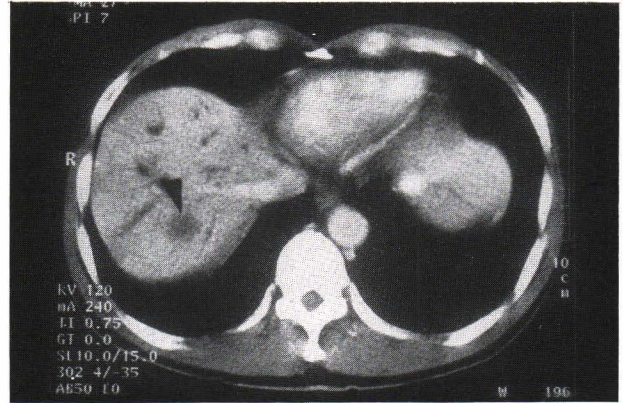


Figure 12. Distant metastasis in the patient diagnosed gallbladder carcinoma, type B, A low density nodule in the superoposterior segment (segment 7) of the right hepatic lobe is seen (arrowhead).

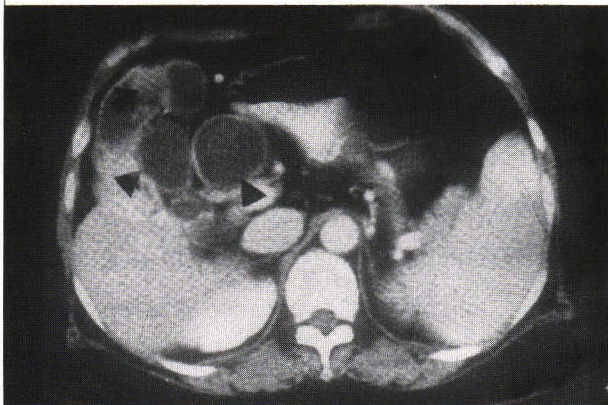


Figure 13A. CT image of a 62-year-old woman shows a broad-based irregular soft tissue mass (arrow) projecting from the infolding fundus of gallbladder. Associated choledochal cyst type is identified (arrowheads).

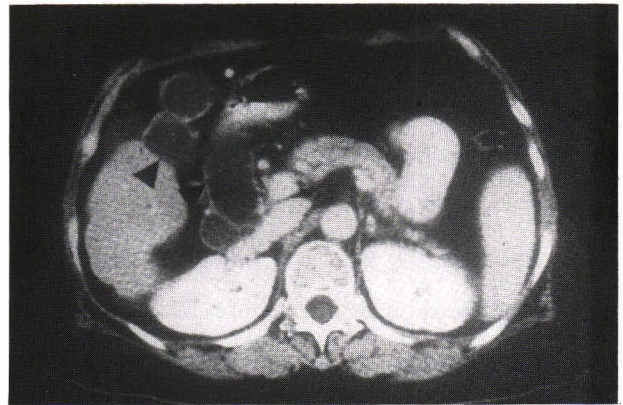


Figure 13B. CT scan at the more inferior level reveals extrahepatic duct cysts (arrowheads).

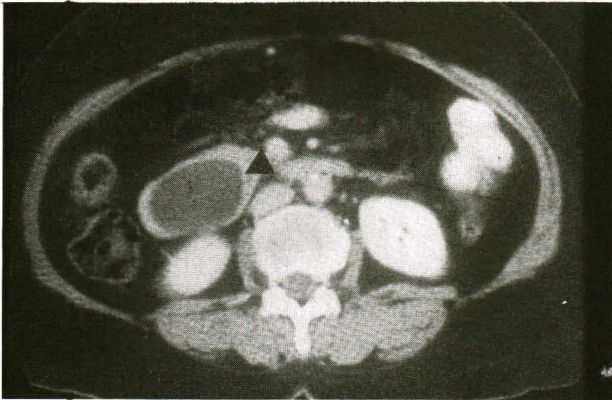


Figure 13C. A 4 x 5.5 cm cystic dilatation of the distal common bile duct which protrudes into the duodenum is noted, consistent with choledochoceles (arrowhead).

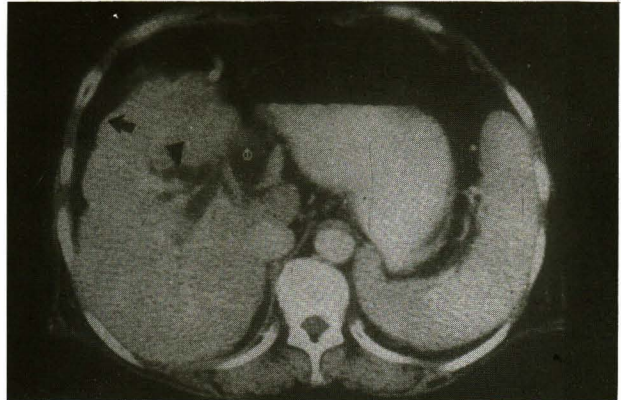


Figure 13D. Nodularity of the right hepatic lobe is seen (arrow) with mild splenomegaly, liver cirrhosis is suggested. Intrahepatic duct dilatation with proportional gradual tapering at the periphery is observed (arrowhead).

disease progresses, its clinical manifestation is not specific and overlaps with benign gallbladder diseases.⁽¹²⁾ Therefore, radiologic evaluation is important to suggest the initial diagnosis of gallbladder cancer.

Because the extent of primary gallbladder tumor effects surgical management and prognosis, it is important to stage the disease preoperatively.^(1,13)

Sonography is still considered the imaging of choice for evaluating patients with gallbladder disease. This modality can detect a primary gallbladder tumor or local extension into the liver, however, there are limitations in evaluating the full extent of disease, especially the diagnosis of metastasis to peritoneum and lymph nodes.⁽¹⁹⁾

CT has been shown to be superior to sonography in the demonstration of nodal involvement.⁽²⁰⁾ The accuracy in detecting gallbladder cancer by CT is about 60 – 74 %.^(7,21)

Primary features

The common primary features of gallbladder carcinoma seen using CT vary in several reports. In our series, we found the pattern of an intraluminal mass within the gallbladder in four patients (50 %). This pattern was the most frequent primary feature of gallbladder cancer in two previous studies.^(12,13) Koga et al. suggested that intraluminal tumor more than 1 cm in diameter was more likely to be malignant, whereas tumor less than 1 cm was more often benign, commonly cholesterol polyp.⁽²¹⁾ Allibone reported that

an intraluminal mass within the gallbladder, with a fungate appearance and irregular border, was strongly suggestive of gallbladder cancer.⁽²²⁾ The CT appearance as an intraluminal mass does not necessarily mean that the tumor is in early stage or it is resectable.⁽²³⁾ This CT pattern may be indistinguishable from benign disease such as polyp, adenoma, papilloma and tumefactive sludge. Unless associated findings are detected, gallbladder carcinoma is more confidently diagnosed.

Wall thickening was reported in four patients (50 %) in our series, the same as the type of an intraluminal mass within the gallbladder. It was identified as the most common primary feature of gallbladder cancer in the study of Rooholamini et al.⁽⁷⁾ This feature is the most difficult pattern to distinguish from benign conditions, particularly chronic cholecystitis. One patient in our study was also preoperatively misdiagnosed as cholecystitis. Smathers et al. suggested that the presence of a curvilinear low attenuation "halo" around the gallbladder wall was specific for complicated cholecystitis.⁽¹⁵⁾ Irregularity of the gallbladder wall does not definitely differentiate benign from malignant conditions. In one study, gallbladder irregularities had been found more commonly in patients with gallbladder cancer than those with benign diseases.⁽²⁴⁾ But Rooholamini et al. revealed 11 % of their cases with gallbladder carcinoma had smooth wall thickening on CT.⁽¹⁷⁾

A mass replacing the gallbladder fossa was not found in this present study. In several series, this feature was the most frequent manifestation.^(19,20,25) The CT appearance of this group sometimes cannot be differentiated from complicated cholecystitis.⁽²⁰⁾ Thus, careful examination of associated findings is

very helpful.

Associated findings

Dilatation of the biliary tree was the most common associated finding in this study (62 %). CT could suggest the cause of obstruction, which may be either by the tumor mass itself or enlarged lymph nodes. Smathers et al. found biliary obstruction at the level of porta hepatis was one of specific signs in distinguishing gallbladder carcinoma from complicated cholecystitis.⁽¹⁵⁾ Itai et al. suggested that bile duct dilatation frequently occurred in gallbladder cancer, but only rarely in hepatoma or metastatic liver tumors.⁽²⁶⁾ Ohtani et al. reported that 3 of 16 cases (19 %) who had dilated extrahepatic ducts, had extrahepatic bile duct carcinoma concomitant with gallbladder carcinoma.⁽¹³⁾ Although the incidence was not too frequent, we should be aware of this condition. In our country, cholangiocarcinoma is more common than gallbladder carcinoma. Hilar type of cholangiocarcinoma should be in the differential diagnosis in cases of dilated intrahepatic bile ducts with or without mass at common hepatic bile duct and invasion into the gallbladder.

Nodal involvement was reported in four of eight patients in our series, composed of retroportal, right celiac and superior mesenteric nodes. We preferred the CT criteria of positive nodes proposed by Ohtani et al. because of high positive predictive value.⁽¹¹⁾ Ohtani et al. found that nodal involvement was the most common spread of gallbladder carcinoma.⁽¹³⁾ Nodal metastasis was the most useful and specific sign favoring the diagnosis of gallbladder carcinoma more than benign gallbladder disease.⁽¹⁵⁾ Moreover, detecting positive nodes on CT imaging is

essential to assess the staging of cancer, which affects prognosis. If there is involvement of any regional lymph nodes, the disease is categorized as stage II.

Many studies have revealed that the liver is the most frequently involved adjacent structure in patients with gallbladder cancer.^(3,12,20) In the present study, the result was not dissimilar. Hepatic extension is probably facilitated by anatomic factors, because the perimuscular connective tissue of the gallbladder is continuous with the interlobular connective tissue of the liver, resulting in uninterrupted spreading.⁽²⁷⁾ The sensitivity of CT in detection of direct spread to the liver more than 2 cm in size is as high as 100%.⁽¹³⁾ Although the sensitivities in detection of direct spread to other organs such as GI tract or pancreas on CT were only 50 % and 57 %, respectively, there were high positive predictive values, about 90 % and 100%, respectively.⁽¹³⁾ In our series, CT could demonstrate direct extension to duodenum, transverse colon, pancreas and Gerota's fascia of right kidney in affected cases.

There was one patient with distant metastasis in this study. CT showed an hepatic nodule in the superoposterior segment (segment 7) of the right hepatic lobe. When distant metastases are detected, including interaortocaval node involvement, the disease is consistent with stage IV.

In the present study, cholelithiasis was found in one case with the primary feature of intraluminal mass within the gallbladder. Gallstones can be associated findings in several benign gallbladder diseases. However, many studies have reported a significant association between cholelithiasis and gallbladder cancer.^(3,10,28) Kapoor et al. found

associated gallstones about 71 % in patients with gallbladder cancer.⁽⁸⁾ In agreement with another study, gallstones were present in 85 % of cases.⁽²⁹⁾ In study of Lowenfels et al., risk of gallbladder carcinoma in subjects with gallstones was suggested to depend on race, sex and the duration of exposure of gallstones.⁽³⁰⁾ They found that gallstones were frequent and appeared early in Indians, and the risk was higher.⁽³⁰⁾ Paraskevopoulos et al. recommended that symptomatic patients who had large gallstones (>3 cm) and had an intact mucosa after treatment of stone disease needed regular follow up.⁽²⁹⁾ They claimed that the remaining damaged mucosa seemed to be a predisposing factor for malignancy.⁽²⁹⁾

Calcification of the gallbladder wall or "porcelain" gallbladder a less common associated finding.⁽¹⁷⁾ In our series, it was found in one case. Generally, the incidence of porcelain gallbladder is quite low, ranging between 0.06 % and 0.8 % of cholecystectomy specimens.⁽¹⁸⁾ But in cases with gallbladder carcinoma, the incidence of associated mural calcification is higher. Kane et al. reported porcelain gallbladder in 33 % of their patients with gallbladder cancer.⁽¹⁸⁾

In our series, CT also revealed associated choledochal cyst type I and III (by Todani Modification Alonso-Lej classification) in a 62-year-old female patient. Tsuchiya et al. reviewed 17 patients with congenital choledochal cyst and found one case was associated with carcinoma of the gallbladder.⁽³¹⁾ In 1991, Ozmen et al. reported villous adenocarcinoma of the gallbladder with associated congenital choledochal cyst and anomalous pancreaticobiliary ductal junction in a 61-year-old woman.⁽³²⁾ This may indicate close association between congenital

choledochal cyst and primary gallbladder carcinoma.

The specific and most helpful CT signs in distinguishing gallbladder carcinoma from complicated cholecystitis that reported by Smarthers et. al were focal mass in the gallbladder, biliary obstruction at the level of the porta hepatis, invasion with protrusion of the anterior surface of the liver and nodal metastasis.⁽¹⁵⁾ Rooholamini et al also reported the features that favor the diagnosis of gallbladder carcinoma included a fungate intraluminal mass with an irregular border, presence of lymphadenopathy, invasion of the liver, replacement of the gallbladder with a mass and bulging of the quadrate lobe of the liver.⁽¹⁷⁾ Unfortunately, these findings were in advanced stage. Early diagnostic imagings of early gallbladder carcinoma is rather difficult. Onoyama et al. could successfully diagnosed early gallbladder carcinoma preoperatively about 34 %. They found that early carcinoma tended to be missed when gallstones were present especially in the flat type tumor rather than protruding type tumor. Careful checking of the diagnostic images is important to detect occult cancer when it accompanies stones. Ohtani et. al failed to detect gallbladder abnormality by CT in 5 of 59 patients consisting of pT2 to pT4 staging. Thus, failure of CT to detect gallbladder carcinoma does not necessary mean the presence of early carcinoma. Cytologic analysis of bile and detection of p53 protein might be useful tools for precise detection of the cancer.⁽¹⁰⁾ Aretxabala et al. suggested prophylactic cholecystectomy for all patients with gallbladder disease in areas with a high incidence of carcinoma of the gallbladder because of the difficult preoperative diagnosis of early lesion.⁽³³⁾

Conclusion

CT scan is a noninvasive technique that can give helpful information in patients with gallbladder carcinoma. This modality can be used for evaluation of both primary features, associated findings of the tumor and extension of the disease. In far advanced cases, a combined approach using CT and percutaneous biopsies may reduce the number of explorative laparotomies. In this study, common primary features consisted of two patterns : an intraluminal mass within the gallbladder (50 %) and focal or diffuse wall thickening (50 %). Associated findings demonstrated by CT included bile duct dilatation (5 cases), nodal involvement (4 cases), direct spread to adjacent structures (3 cases), and distant metastasis (1 case). Associated cholelithiasis and porcelain gallbladder were identified by CT, one patient with each finding. We also found a choledochal cyst in one case. Awareness of these all CT appearances can help the radiologist to suggest the diagnosis of gallbladder carcinoma, and differentiate this disease from other overlapping diseases more correctly.

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