

Original Research Article

Spectrum of computed tomography findings in gall bladder carcinoma patients: a retrospective observational study from tertiary care oncology setup

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ABSTRACT

Background: Gallbladder carcinoma (CA) is the most common primary biliary carcinoma and fifth most common malignancy of the gastrointestinal tract. Patients are usually asymptomatic early in the course of the disease and as a result, therapeutic window is usually missed. Authors discuss spectrum of imaging findings in CA gall bladder with multidetector computed tomography (CT) as modality of choice.

Methods: Retrospective cross-sectional study conducted at Shaukat Khanum memorial hospital and research centre. Data from January 2019 to January 2020 which included 70 patients was collected from HIS. Patients with imaging findings of CA gall bladder were examined who had undergone contrast enhanced CT. Institutional review board approved this study.

Results: Out of 70 cases in this study, cholelithiasis was present in 60%. The commonest MDCT finding was mass replacing GB (78.6%), followed by eccentric/diffuse gall bladder wall thickening. Extension to porta hepatis was noted in 25 (35.7%) cases. Antroduodenal involvement was noted in 11 (15.8%), hepatic flexure involvement in 8 (11.4%). Vascular encasement/thrombosis of the portal vein noted in 6 (8.6%). Metastasis at presentation was seen in 16 patients i.e., 22.9%. Majority patients presented with stage III and IV disease.

Conclusions: Single-center tertiary care oncology hospital study gives insight about imaging findings of carcinoma gallbladder. Authors conclude that multidetector CT is the diagnostic tool of choice in detection of gall bladder carcinoma, locoregional disease, distant metastasis and hence operability and non-operability of the disease.

Keywords: Carcinoma, Gall-bladder, Malignancy

INTRODUCTION

Carcinoma of the gallbladder (GB) is the most common biliary tract malignancy and is the fifth most common malignancy of the alimentary tract.¹ Strong correlation between gallstones and GB cancer has been seen, approximately 4-5 times higher risk in patients with gallstones than in those without gallstones (73-98%). Multiple other causes such as history of biliary disease, elderly female, obesity, high carbohydrate diet, ethanol

and tobacco abuse and Mirizzi's syndrome, are associated with a higher risk for the development of GB cancer. Other risk factors include porcelain GB, choledochal cysts, anomalous pancreaticobiliary duct junctions and GB polyps >1 cm in size.² Gallbladder carcinoma has a peak incidence in the sixth and seventh decades of life and is three to five times more predominant in females.

Multidetector computed tomography (MDCT) plays an important role in the diagnosis and staging of GB

carcinoma for the purpose of management.³ Authors present MDCT spectrum of presentation in 70 patients with GB carcinoma studied retrospectively.

METHODS

Retrospective cross-sectional study was conducted at Shaukat Khanum memorial hospital and research centre, Pakistan. Data was collected from January 2019 to January 2020 from hospital information system using SPSS version 21.

Total 70 patients (27 men and 43 women) with imaging findings of CA gall bladder were included who had undergone contrast enhanced computed tomography (CECT) performed on 160 slice Toshiba scanners. These patients either came through OPD or emergency. Patients record collected through hospital information system after institutional review board approval. A proforma was filled which included patient age, gender, initial presentation of Ca gall bladder, hepatic infiltration, biliary dilatation, stage and nodal status. Findings were further correlated with tissue diagnosis.

Inclusion criteria

All patients with initial presentation whose staging CT had imaging findings of carcinoma gall bladder were included.

Exclusion criteria

Patients who had undergone previous chemotherapy/surgery/or any intervention were excluded.

MDCT protocol

Contrast enhanced CT was performed in all 70 patients. Patients fasted for at least 6-8 hours before the examination; no oral contrast medium was given. CT examinations were performed with a 160 slice Toshiba scanner. Each patient received 80-120 ml (depending on body weight) of a nonionic contrast material through an 18-gauge cannula inserted into a forearm vein. The contrast material was injected at a rate of 3 ml/s with an automatic power injector. MDCT scans were obtained at 65~75 seconds (portal venous phase) after initiation of the contrast injection.

RESULTS

Various parameters as described above were studied and observations were recorded. Out of 70 patients 43 (61.4%) were females and 27 (30.8%) were males, with female to male ratio of 1.5:1. Age distribution in this series ranged from 38 to 86 years. With highest peak seen at 57, 63, 67 years with 5 patients in each age group making total of 21.3% patients. Second highest incidence was at 61 years making 5.7% (Figure 1).

Out of 70 cases in this study, cholelithiasis was present in 60% (Figure 2). The commonest MDCT finding at presentation (Figure 3) was mass replacing GB in 55 patients (78.6%) (Figure 4 and 5). Second common findings were of eccentric/diffuse gall bladder wall thickening which was seen in 14.2%, least common presentation was of polyp/polypoidal growth which was 7.1%. Hepatic infiltration was seen was seen in 48 (68.5%) patients out of which 36 (51.4%) showed more than 2 cm hepatic infiltration (Figure 4 and 5). Whereas 12 (17.1%) patients showed less than 2 cm hepatic invasion.

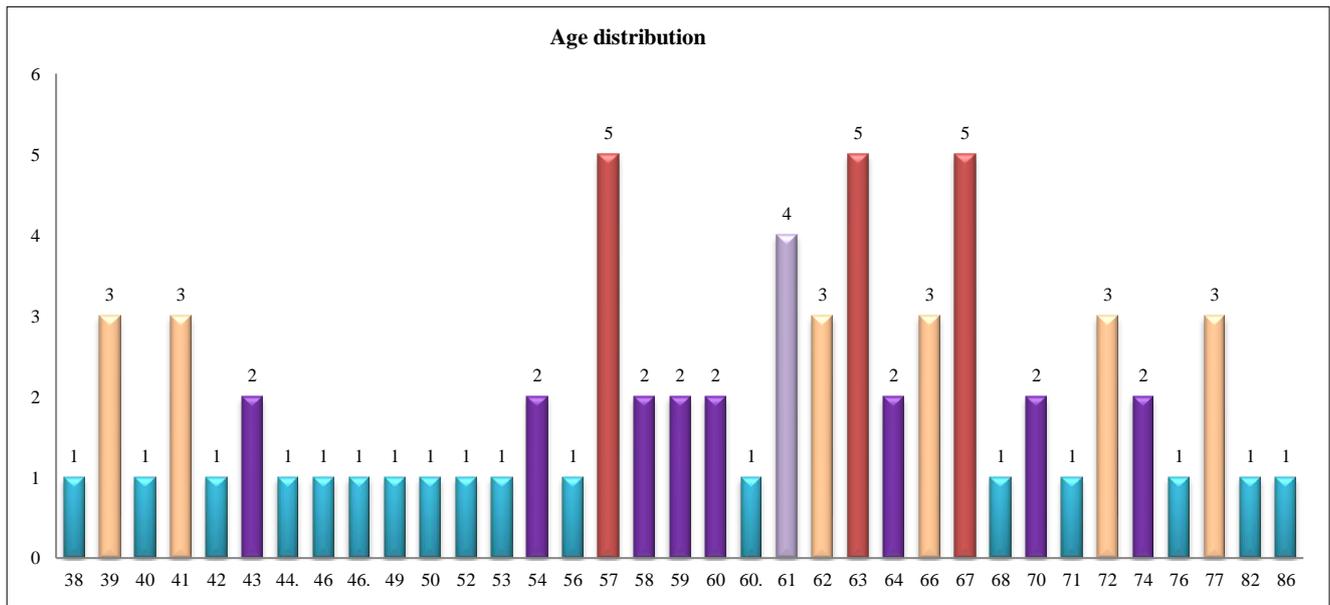


Figure 1: Age distribution in patients of CA gall bladder.

Y axis: number of pts, X axis: age

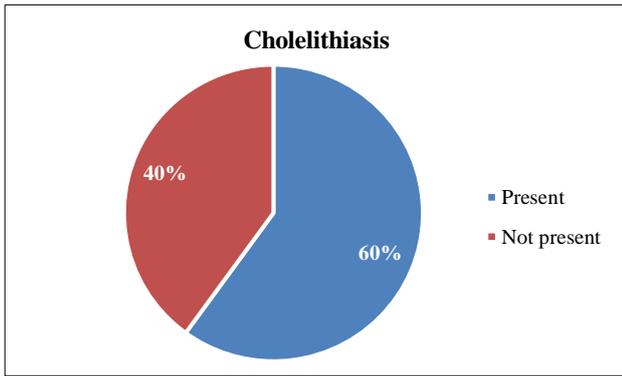


Figure 2: Percentages of patients with and without cholelithiasis.

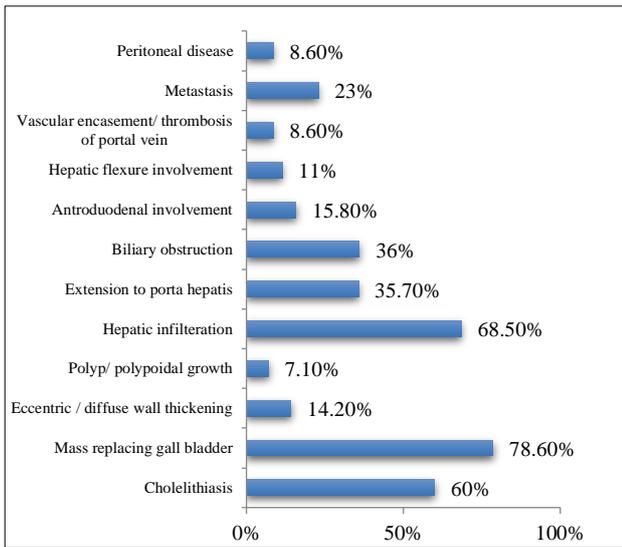


Figure 3: Percentages of different presentations.

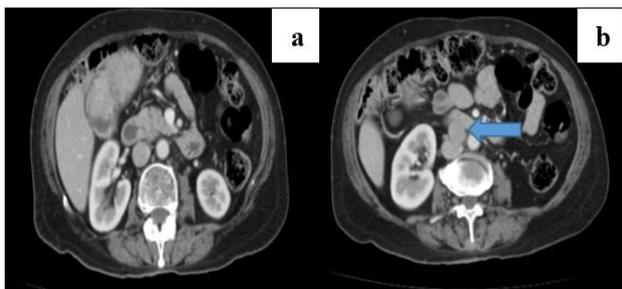


Figure 4: (a) 53 years old female with poorly differentiated adenocarcinoma. Mass partially replacing gall bladder with extension into adjacent hepatic parenchyma, large lymph node noted in periduodenal region, (b) (blue arrow).

Extension to porta hepatis was noted in 25 (35.7 %) cases (Figure 7). Biliary obstruction at presentation was seen in 26 (36%) cases. Antroduodenal involvement was noted in 11 (15.8%), hepatic flexure involvement in 8 (11.4%) (Figure 6) and involvement of pancreas in 4 cases (5.7%). Vascular encasement/ thrombosis of the portal vein noted

in 6 (8.6%). Metastasis at presentation was seen in 16 patients i.e., 22.9% (Figure 8). Peritoneal disease was seen in 6 patients (8.6%) (Figure 5).

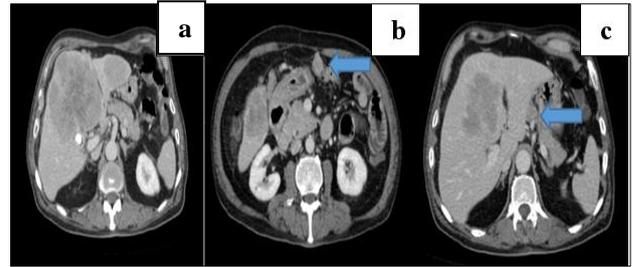


Figure 5: (a and b) CECT in portal venous phase of calculus in expected position of gall bladder with replacement of gall bladder large infiltrating mass invading segment IV, V and VI. Another lesion in segment III was reported as metastatic deposit. (b) Anterior peritoneal deposit (blue arrow) and, (c) Gastrohepatic node.

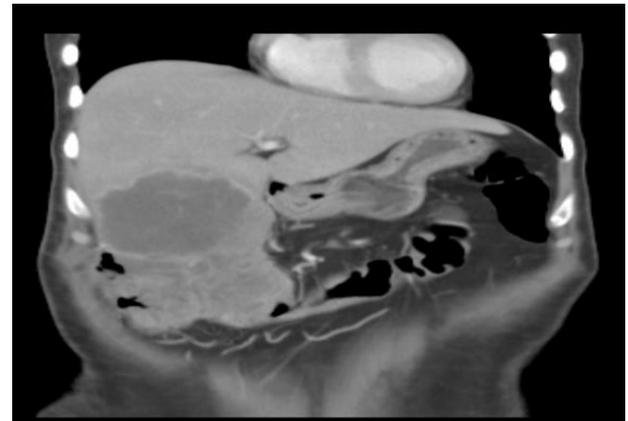


Figure 6: A 59 years old male. CECT of large mass replacing the gall bladder with invasion into hepatic flexure.

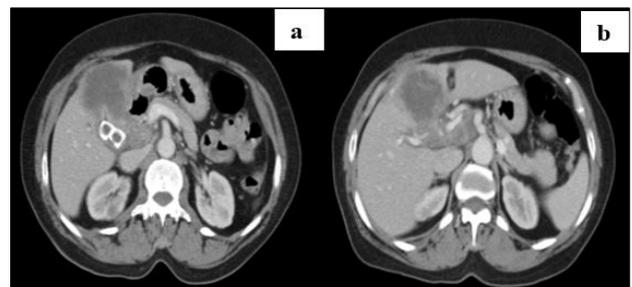


Figure 7: (a) Cholelithiasis with mass replacing gall bladder and more than 2 cm hepatic invasion. Mass extending to porta hepatis with necrotic nodes at hepatic hilum, (b) T4, N1.

N1 disease (3 nearby lymph nodes) was present in 39 cases (55.7%) which included cystic duct, peri choledochal or porta hepatis nodes. N2 disease (4 or more nearby nodes) was seen in 14 cases (20%) at presentation,

which included peripancreatic, periduodenal, celiac or superior mesenteric nodes. No nodal involvement was noted in 17 (24%) patients.

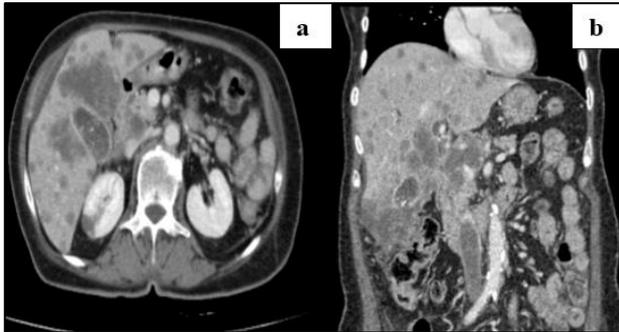


Figure 8: A 63 years old female with faint gall bladder stones, (a) Infiltrative mass from fundus of gall bladder extending to adjacent hepatic parenchyma with multiple hepatic metastasis and necrotic nodes at hilum and peripancreatic region, (b) Stage was T4, N2, M1.

MR number	
Age:	Gender:
Primary gall bladder CA presentation on CT:	
Cholelithiasis:	+ve, ve
Gall bladder fossa mass	
Mass replacing gall bladder and extending to adjacent hepatic parenchyma	>2 cm, <2 cm
Eccentric focal thickening	
Circumferential thickening	
Polyp:	mm
Biliary obstruction/ dilatation	
Extension to porta hepatis	
Involvement of duodenum	
Involvement of colon	
Involvement of pancreas	
Vascular encasement / thrombosis	
Omental / peritoneal involvement / ascites / pleural effusion	
Metastasis	
Nodal status	
Stage	
HP	

Figure 8: CA gall bladder proforma.

No patient was seen in stage I disease. 9 patients i.e., 12.9% with stage II disease, 9 (12.9%) patients presented with IIIA (T3, N0, M0) and 29 patients presented with IIIB (T1-3, N1, M0) disease i.e., 41.4%. Second highest percentage presented with IVB (any T, N2, M0 or any T, any N, M1) with 23 patients (32.9%).

Tissue diagnosis was carried out mostly through ERCP and ultrasonographic guided biopsy and few also

underwent surgery. 58 patients tissue diagnosis turned out to be adenocarcinoma and few (3) squamous cell carcinomas. 3 patients were of benign etiology (chronic cholecystitis and xantho-granulomatous cholecystitis). 1 patient biopsy turned out to be high grade neuroendocrine tumor. 5 patients did not undergo tissue diagnosis after the initial CT scan evaluation.

Staging was done according to AJCC (American Joint Committee on Cancer) 8th edition.

DISCUSSION

CA GB has been known for its poor prognosis with overall 5-year survival rate reported to be 4%. Approximately 6500 new cases of GB carcinoma are reported annually in the United States, with a 4:1 female:male ratio. Female predominance is thought to be related to the higher incidence of cholelithiasis in women, since 70-80% of GB carcinomas are associated with gallstones.⁴

According to Jindal G et al age distribution in their study ranged from 33 to 82 years. Male to female ratio was 1:1.5.¹ In this study age range was 38-86 years with female to male ratio 1.5:1.

Pain was the predominant symptom in Jindal et al study, followed by jaundice and weight loss.¹

According to another study the most common presenting symptom was pain in the abdomen (82.8%) followed by anorexia (41.4%) and significant weight loss (39.4%).⁵

On imaging the commonest presentation seen is diffuse, irregular, enhancing wall thickening in 49.4%, followed by focal mass lesion arising from GB (43.7%), with intraluminal component.⁴

Gallbladder carcinoma may appear as a mass completely replacing the GB, a focal or diffuse asymmetric GB wall thickening or intraluminal polypoid lesion. According to literature that mass replacing the entire GB was the commonest imaging feature and was seen in 62.8% of patients, followed by asymmetrical wall thickening of the GB in 45% of patients, and polypoid intraluminal mass in 11.4% of patients.¹ Associated cholelithiasis was seen in most cases. In this study common presentation was mass replacing the gall bladder which was seen in 78.6%, eccentric/diffuse gall bladder wall thickening (14.2%) was second common, least common presentation was of polyp/polypoid growth which was 7.1%. However, the study conducted by Sachidananda et al, showed that GB carcinoma was uncommon in South India and association with cholelithiasis was also low (19.6%).⁶ In this study cholelithiasis was seen in 60% patients showing strong correlation with CA GB.

Amongst the associated findings, liver infiltration was the most common, as observed by Jindal G et al and other

authors and also in this study group.^{1,7} The spread of GB carcinoma to the liver and adjacent organs is facilitated by the lack of a muscularis mucosa and submucosa in the GB wall and its direct venous drainage through the liver parenchyma to the hepatic veins.

Duodenal and hepatic flexure involvement was seen by Jindal G in 18.5% of cases.¹ Dwivedi et al, and Kalra et al reported such invasion in 41.4% and 8.3% of their cases, respectively.^{7,8} Portal vein thrombosis was seen in 11% of cases, which is comparable to Dwivedi et al series (12.6%), while Kalra et al reported a higher association of portal vein thrombosis (20%).^{7,8} In this study duodenal and hepatic flexure involvement was noted in 12.9% and 11.4%. Whereas antral involvement was noted in 2.9%. Portal vein encasement/thrombosis was noted in 8.6%.

Lymphatic drainage from the GB occurs in a predictive fashion and correlates with the pattern of lymph node metastasis seen in GB carcinoma. Initially, cystic duct and pericholedochal nodes are involved, followed by distant metastasis to nodes to the head of pancreas and then to aortocaval nodes. Low sensitivities have been reported for the detection of positive nodes on CECT. However, involvement of N1 or N2 nodal stations is not a criterion for non-resectability of GB carcinoma.⁸

The prevalence of lymphatic spread is high in gallbladder carcinoma. Lymphatic metastases progress from the gallbladder fossa through the hepatoduodenal ligament to nodal stations near the head of the pancreas. Three pathways of lymphatic drainage have been suggested: the cholecyst retropancreatic pathway, the cholecyst oeliac pathway, and the cholecysto mesenteric pathway. The cystic and pericholedochal lymph nodes are the most commonly involved at surgery and are a critical pathway to involvement of the celiac, superior mesenteric, and para-aortic lymph nodes.^{9,10} The node of the foramen of Winslow, the superior pancreatoduodenal node, and the posterior pancreatoduodenal nodes are the most common nodes demonstrated by CT (positive lymph nodes are more likely to be greater than 10 mm in anteroposterior dimension and have ring like or heterogeneous contrast material enhancement. The masses produced by lymph node metastasis around the distal common bile duct and pancreatic head may mimic a pancreatic head carcinoma.⁹

Hematogenous metastases are most commonly seen in the liver. Pulmonary, skeletal, cardiac pancreatic, renal, adrenal, and cerebral metastases occur less frequently. Hematogenous metastases to the liver are well depicted by CT and MR imaging.⁹

MDCT provided 83.9% accuracy in evaluating the T-staging of gallbladder carcinomas.⁹ One of the benefits that MDCT can provide is the ability to provide MPR images in any axis. Several studies have shown that adding MPR image to the axial images allows improved diagnostic performance of preoperative tumor staging in gastrointestinal tract malignancies. The findings of the

combined axial and MPR images allowed improved diagnostic accuracy compared with the results of axial imaging only.¹¹⁻¹³

Tumor staging is the main part for the management of GB carcinoma. AJCC has given the TNM staging system, which usually defines, and is determined by, the depth of invasion, extension into adjacent structures, lymph node involvement and metastatic spread. The primary stage of GB carcinoma, which decides the treatment, is the "T" stage. Surgery is usually performed for T1/T2 (tumors confined to GB wall). Tumors extending beyond the GB wall are considered T3 and T4. T3 tumor can be resected with en bloc and resection of adjacent organ, whereas T4 tumors are irresectable. According to AJCC, primary GB carcinoma has been classified as T1, confined to lamina propria or the muscle layer of the GB (T1A and T1B, respectively), T2 extending to serosa, T3 perforating the serosa or directly invading the adjacent structure, T4 invading the main portal vein, hepatic artery or distant organs.¹

Limitation of the study the sample size was limited which consisted of only 70 patients. Further these 70 patients were not all from Punjab rather these were referred from different cities to authors oncology institute and few were also from neighbor country Afghanistan. In addition, not all patients underwent tissue diagnosis for further confirmation.

CONCLUSION

Single-center tertiary care oncology hospital study gives insight about imaging findings of carcinoma gallbladder. Authors conclude that multidetector CT is the diagnostic tool of choice in detection of gall bladder carcinoma, locoregional disease, distant metastasis and hence operability and non-operability of the disease.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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