



ORIGINAL RESEARCH PAPER

Radiology

Unusual Imaging Features of Carcinoma Gall Bladder in a Tertiary Care Center

KEY WORDS: Ultrasonography, Computed Tomography, GB carcinomas

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ABSTRACT

Background : A retrospective assessment of contrast enhanced computed tomography (CECT) scan findings in cytopathological and histopathologically proven cases of carcinoma of the gallbladder (GB) was performed to review the unusual imaging features of carcinoma gall bladder.

Aim The purpose of this study is to review the spectrum of unusual imaging features of gallbladder carcinomas and correlation with pathological findings to illustrate the final outcome.

Methods : A total of 50 patients with unusual imaging findings were analysed in a tertiary care Center in Bihar from the period of 2014 to 2016. All the patients were subjected to ultrasonography followed by 16 Slice CT (GE USA) computed tomography scan.

Results : The clinical presentation varied from dyspepsia, abdominal pain to clinically palpable lump abdomen and obstructive jaundice. Out of 50 cases 18 presented with perforation, 12 presented with empyema with features of chronic cholecystitis mimicking xanthogranulomatous cholecystitis, 15 presented with assymetrical mural thickening with portal vein thrombosis, 3with intramural polyp and 4 cases presented with perforation and necrosis in liver.

Conclusion : Since imaging modalities are first line of investigation so the radiologists should be aware of these unusual presentations as this tumor of poor prognosis.

Introduction

Gall bladder (GB) carcinoma is the 5th most common malignancy of the gastrointestinal tract and the commonest malignancy of the biliary tree. It occurs primarily in the sixth to seventh decade of life and is four to five times more common in women. CT scan provides definite information regarding invasion of the tumour into the adjacent organs, distant metastasis, delineation of the biliary tree and portal vein involvement. The radiological findings of GB tumors have been described as three basic patterns including a mass replacing the gallbladder, diffuse or focal thickening of the gallbladder wall, and a polypoid mass within the gallbladder lumen however there are various other unusual presentations yet to be elaborated. Only a few articles, however, have reported the radiologic findings of unusual malignant gallbladder neoplasms. Being familiar with radiologic findings of unusual malignant gallbladder tumors is worthwhile because they may show a different clinical behavior and prognosis than the usual adenocarcinoma. We present our experience of unusual imaging findings in 50 histologically proven cases of carcinoma GB.

Materials and methods

50 cases of unusual imaging presentations of carcinoma gall bladder were analysed and later confirmed on histopathology during a period of 2014 to 2016. The patients presented with a wide spectrum of complaints ranging from dyspepsia, abdominal pain to clinically palpable lump abdomen and obstructive jaundice. All the patients were subjected to 16 slice CT (GE USA). The breath-hold periods varied from 10 to 16 seconds with intervening breathing time of 8 seconds. The CT scan technique employed in our patients included a preliminary ultrasonography abdomen. All the cases were subjected to CT guided FNAC. Smears were methanol fixed and stained with Giemsa stain. Further these cases were confirmed on histopathology.

Results

The age of patients ranged from 32 to 78 years with the mean age of 55 years with definite female preponderance with male: female ratio of 3:5 (Table 1). The clinical presentation was variable ranging from dyspepsia, abdominal pain to clinically palpable lump abdomen and obstructive jaundice. On imaging 18(36%) cases presented with perforation, 12(24%) cases presented with empyema with features of chronic cholecystitis mimicking xanthogranulomatous cholecystitis, 15(30%) cases presented with assymetrical mural thickening with portal vein thrombosis,

3(6%) cases with intramural polyp and 4(8%) cases presented with perforation and necrosis in liver. (Figure 1,2,3,4) 22(44%) is associated with gall bladder stones. Fine The TNM staging and Modified Nevin system with staging protocol is described in Table 2. In the TNM system, T1 tumours involve only the mucosa and muscle layer, T2 tumours involve the peri-muscular connective tissue, T3. The distribution unusual imaging pattern in all the cases is described in Table 3. On fine needle aspiration cytology and histopathology all the cases were proved to be adenocarcinoma gall bladder. (Figure 5,6)

Table 1 Age and Sex Distribution of Gall Bladder carcinomas

Age Group (Yrs)	No. of cases		Total	Percentage
	Female	Male		
<30	-	-	-	-
31-40	3	2	5	10
41-50	8	4	12	24
51-60	11	4	15	30
61-70	12	3	15	30
>70	2	1	3	6
	36	14	50	100

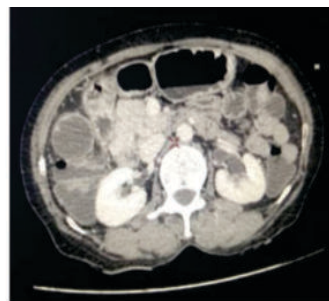


Fig1 Assymetrical Mural thickening

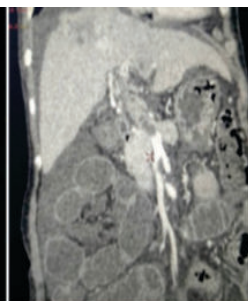


Fig 2 Perforation with portal vein thrombosis

Table 2 CT Staging: TNM and Modified Nevin System with staging protocol

Stage	TNM System	Modified Nevin System
I	T1N0M0	In situ carcinomas
II	T2N0M0	Mucosal/Muscular invasion
III	T3N0M0	Transmural direct liver invasion
	T3N1M0	
IV A	T4N0M0	Lymph Node Metastasis
	T4N1M0	
IV B	TxN2M0	Distant metastasis
	TxNxM1	



Fig 3 Mural Stratification

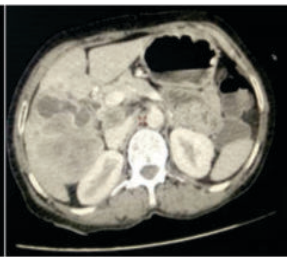


Fig 4 Perforation with exophytic mass

Table 3 Case distribution with unusual imaging and Pathological Confirmation

S. No	Unusual Findings	No. of Cases (Total 50)	(%)	FNAC/HP	Prognosis
1	Perforation	18	36%	Adenocarcinoma	Poor
2	Empyema with features of chronic cholecystitis	12	24%	Adenocarcinoma	Poor
3	Assymetrical mural thickening with portal vein thrombosis	15	30%	Adenocarcinoma	Poor
4	Intramural Polyp	3	6%	Adenocarcinoma	Poor
5	Perforation with necrosis in liver	4	8%	Adenocarcinoma	Poor

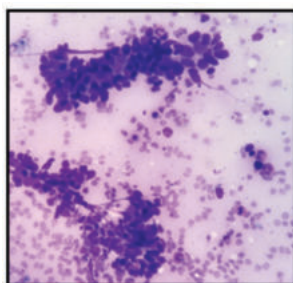


Fig 5 FNAC showing clusters of neoplastic cells with glandular pattern (Giemsa Stain 40x)

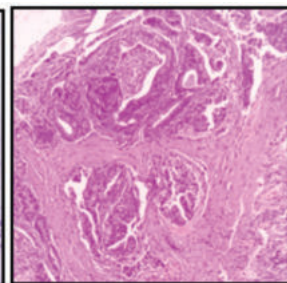


Fig 6 Glandular pattern of neoplastic epithelial cells adenocarcinoma (H&E 40x)

Discussion

Gall Bladder carcinoma is the 5th leading cause of gall bladder malignancy. Imaging detection at early stages of gall bladder carcinoma is necessary. Clinical presentation is mostly vague with

majority of the patient being asymptomatic or present with dyspepsia and vague abdominal pain. Those with obstructive jaundice usually present in advanced stages of the disease.³ Due to this early imaging in the form of ultrasound abdomen is very useful in picking up such lesions. It is very quick, effective and non-invasive technique. Preoperative CTscan, MRI or PET scan for tumor recognition is essential especially for unusual presentations for early diagnosis and treatment.²

Majority of the malignancies of the GB are adenocarcinomas. In this study all the cases were confirmed as adenocarcinoma. The exact aetiology of carcinoma GB is unknown, however, several associated risk factors have been identified. The closest association is with cholelithiasis, which is seen in 65 – 95 % of patients as reported in different series. Other factors related are calcification of GB wall (porcelain GB), genetic factors, anomalous pancreatic biliary duct junction, infections and environmental carcinogens. In our study, 22(44%) patients had associated gallstones. In the present study, the male: female ratio was 3:5 and the mean age of presentation was 55 years. Similar observations have been reported earlier by Kumar et al⁴, in their experience of 116 cases of carcinoma GB in North India. This variation may represent the regional distribution of disease or indicates the changing trend in the disease statistics. As in states like Bihar the Ganga belt is prone for gall bladder malignancy probably due to arsenic exposure in the contaminated water. It has been hypothesized that chronic irritation of mucosa by gall bladder stones causes ulceration and inflammation of the mucosa followed by repetitive epithelial repair, which may lead to malignant transformation. A long period of 15 years is required for dysplasia to progress to invasive carcinoma.⁵

In suspected cases of GB carcinoma, ultrasonography is often the first imaging technique because of its relative low cost and widespread availability. Although it is first line of imaging but it has its limitations such as interference by bowel gas, limited depth resolution and inadequate visualization of parts of the gallbladder in the region of posterior acoustic shadowing in the presence of calculi and picking up early lesions. In such cases it can be unreliable for staging and CT scan or MRI may be required for further characterisation of potentially malignant gall bladder lesions and metastatic survey. Magnetic Resonance Imaging (MRI) is generally done in inoperable cases with obstructive jaundice for delineation of the biliary tract anatomy in patients considered for palliative stenting. The most common presentation of GB carcinoma is a sub-hepatic mass replacing or obscuring the gall bladder often with invasion of the adjacent liver. This pattern may be present in 40-65% of patients. George et al⁶ in his study described that 25% cases present with intraluminal mass. On ultrasonography heterogeneous, predominantly hypoechoic tumor fills the lumen. Anechoic foci of trapped bile or necrotic tumor may be present. Also there may be echogenic shadowing foci from gall bladder stones or calcifications. GB carcinoma is usually hypodense on unenhanced CT, with upto 40% of lesions showing hypervascular foci of enhancement. On MRI GB carcinoma usually shows hypo-to isointense signal characteristics on T2 weighted sequences. On CT or MRI intense irregular enhancement may occur at the periphery of large primary gall bladder carcinoma. They may also present as assymetrical wall thickening with portal vein thrombosis. Assymetrical wall thickening is seen in 30-40% of cases. In our study it was seen in 30% of the cases and were associated with portal vein thrombosis. The wall is usually 4 -13 mm in thickness and is assymetrically thickened and nodular. In such cases it is very difficult to differentiate from acute and chronic cholecystitis, Xanthogranulomatous cholecystitis and adenomyomatosis.^{7,8,9} However on contrast enhanced CTscan and MRI diffuse symmetrical wall thickening suggest a non-neoplastic process whereas assymmetric, irregular or extensive thickening may have marked enhancement during the arterial phase can raise the suspicion of GB carcinoma. A hypodense halo representing mural oedema in the thickened GB wall can be helpful on CT of cholecystitis rather than carcinoma. The presence of intramural hypoattenuated nodules occupying a large area of the thickened GB wall is considered diagnostic of xantho-granulomatous

cholecystitis. 10,11,12 15-25% of the cases may present as gall bladder polypoidal lesion. Malignant lesions are usually larger than 1cm and may have a thickened implantation base. The differential diagnosis to be considered are adenomatous or hyperplastic cholesterol polyps, carcinoid tumor, metastasis or melanoma. On ultrasound, if the movement of a polypoidal mass occurs with a change in patient's position then a pseudotumor, biliary sludge or clot can be considered. These polypoidal lesions show homogenous enhancement on the contrast-enhanced images. Areas of necrosis or calcification are usually not seen in polypoidal GB carcinoma. Sometimes hepatocellular carcinoma involving the gall bladder fossa can mimic GB malignancy. In our study 4 cases presented with perforation and necrosis in the gall bladder fossa. On CT scan evaluation normal GB, even if displaced by a tumour, suggests a hepatic primary rather than a GB carcinoma. CT is better than ultrasound for detecting lymphadenopathy, especially for N2 nodal stage. Apart from this patient some of the patients present with perforation.^{13,14,15}

To conclude, radiologic findings of unusual malignant gallbladder tumors are varied and overlap with those of ordinary gallbladder carcinoma. Despite their rarity, one should be aware with the wide spectrum of radiologic findings of these unusual tumors and an understanding of their pathologic background may lead to improved diagnostic accuracy and early management of the cases.

References

- Gore RM, Yaghmani V, Newmark GM, et al. Imaging benign and malignant diseases of the gall bladder. *Rad Clinics North America* 2002; 40: 1307-23.
- Furlan A, Ferris JV, Hosseinzadeh K, Borhani A. Gall Bladder Carcinoma Update: Multimodality imaging Evaluation, staging and treatment Options. *AJR* 2008;191(5):1440-47
- Haaga JR, Herbener EH. The gallbladder and biliary tract. In: Haaga JR, Lanzieri CF, Gilkeson RC, editors. *CT and MR Imaging of the whole body*. 4th ed. St Louis: Mosby, 2003; 1357-60.
- Kumar S, Jain A, Jain S. Gallbladder Carcinoma: Experience of 116 cases. *Trop Gastroenterol* 2001; 22: 172-3.
- Rosai J. Gall bladder and extra-hepatic bile ducts. In: Rosai J, Ackerman LV, editors. *Surgical Pathology*. 9th ed. St Louis: Mosby, 2004; 1044 - 9.
- Lt Col RA George, Col SC Godara, Lt Col P Dhagat, Maj PP Som. Computed Tomographic Findings in 50 Cases of Gall Bladder Carcinoma. *MJAFI* 2007; 63 : 215-219
- Yun EJ, Cho SG, Park S et al. Gall Bladder cancer and chronic cholecystitis: differentiation with two-phase spiral CT. *Abdom Imaging* 2004;29:102-108
- Levy AD, Murakata LA, Rohrmann CA. Gallbladder carcinoma: radiologic-pathologic correlation. *Radiographics* 2001;21:295-314
- Fong Y, Kemeny N, Lawrence TS. Cancer of the Liver and Biliary tree. In: DeVita VT Jr, Hellman S, Rosenberg SA, editors. *Cancer: Principles and Practice of Oncology*. 6th ed. Philadelphia: Lippincott, Williams and Wilkins, 2002; 1187- 202.
- Shath S, Bedford A, Chopra S. Primary gall bladder cancer : recognition of risk factors and role of prophylactic cholecystectomy. *Am J Gastroenterol*, 2000; 95:1402-10.
- Yoshimitsu K, Honda H, Shinoraki K, Aibe H. Helical CT of the local spread of carcinoma of the gallbladder: evaluation according to the TNM system in patients who underwent surgical resection. *Amer J Roentgen* 2002; 179: 423-8.
- Kim BS, Ha HK, Lee IJ, Kim JH. Accuracy of CT in staging of Gallbladder carcinoma. *Acta Radiol* 2002; 43 : 25.
- Levy AD, Murakata LA, Rohrmawn CA. Gall bladder carcinoma: radiologic – pathologic correlation. *Radiographics* 2001;21:295-314.
- Yun FJ, Cho SG, Park S, Park SW. Gallbladder carcinoma and chronic cholecystitis: differentiation with two-phase spiral CT. *Abdom Imaging* 2004; 29: 102-8.
- Chun KA, Ha HK, Yu ES, Shinn KS. Xantho-granulomatous cholecystitis : CT features with emphasis on differentiation from gallbladder carcinoma. *Radiology* 1997; 203 : 93-7.