Original Research Article

Ultrasonography and Computed Tomography Evaluation of Gall Bladder wall Thickening and it's Histopathological correlation

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Abstract

Background: Ultrasonography is usually the first preferred imaging modality for Gall bladder diseases. GB carcinoma is an important cause of thickening of the GB. USG is less sensitive in detecting GB malignancy, metastasis and staging than CT. Therefore, computed tomography (CT) is being increasingly used for early detection of GB carcinoma. **Objective:** Accuracy of Ultrasonography and contrast enhanced computed tomography (CECT) in correctly identifying the cause of GB wall thickening and comparing their findings with the histopathology. **Methodology:** After Ethical Approval this Prospective observational study was conducted in the Department of Radiology, Rajendra Institute of Medical Sciences, Ranchi over a duration of 18 months from April 2019 to October 2020. Data was entered in Excel sheet and analysed by SPSS. Results: 63 patients were enrolled, 43 were females (68.25%) and 20 were males (31.75%). Mean age of patients was 50.14 years with a standard deviation of 11.11. Mean GB wall thickness was 10.3 mm for malignant pathology with a standard deviation of 4.00. The association of focal/diffuse wall thickening with GB carcinoma was found to be significant (p− 0.001). Intra−hepatic biliary radical (IHBR) dilatation was observed in 11 patients (17.46%) and nine out of these eleven patients had GB carcinoma (p −0.002). The correlation of Loss of interface of thickened GB wall with liver parenchyma and malignancy was found to be significant (p−0.012). 7 (11.11%) patients with lymphadenopathy on Ultrasonography and CECT (p −0.0001) had a final diagnosis of malignancy on histopathology. The sensitivity of USG was found to be 70% while specificity was 66.60%. The sensitivity of CT was found to be 95.00% while specificity was 83.72%. **Conclusion:** Early detection of malignant cause is challenging because of identical presentations of benign and malignant conditions as wall thickening on imaging and vague clinical symptoms. Since carcinoma Gall bladder has very poor prognosis, early histopathological diagnosis following imaging diagnosis is crucial for reducing mortality and morbidity.

Keyword: USG, CECT, GB MALIGNANCY, SENSITIVITY, SPECIFICITY

Introduction

In suspected cases of Gall bladder diseases Ultrasonography is usually the first preferred imaging modality. GB wall thickening >3mm on Ultrasonography is a feature of acute Cholecystitis[1] but this finding is nonspecific. GB carcinoma is an important cause of thickening of the GB wall. The clinical symptoms of the GB carcinoma are often vague which mimics those seen in calculus disease and Cholecystitis[2]. USG is less sensitive in detecting GB malignancy than CT[3]. It is also unreliable for staging purposes. Therefore, computed tomography (CT) is being increasingly used for early detection of GB carcinoma. CT is also used for identification of potential malignant GB lesions and its metastasis detection and staging purposes[4]. The systemic diseases cause diffuse and less marked thickening while the neoplastic diseases result in focal and more exuberant thickening (frequently >10mm)[5].

Aims and objectives

Accuracy of Ultrasonography and contrast enhanced computed tomography in correctly identifying the cause of GB wall thickening and comparing their findings with the histopathology.

Methodology

After Ethical Approvalthis Prospective observational study was conducted in the Department of Radiology, Rajendra Institute of Medical Sciences, Ranchi over a duration of 18 months from April 2019 to October 2020. Informed written consent was taken from study participants. Data entry was done in excel sheet and analysed using SPSS.

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Inclusion criteria

- Patients with clinical suspicion of GB pathology or incidentally detected with GB wall thickening on USG.

Exclusion criteria

- Patients unwilling to participate in the study.
- Patients with known systemic causes of GB wall thickening such as ascites, hepatitis, liver cirrhosis, hypoproteinemia, kidney failure and congestive right heart failure.
- Acute cholecystitis on USG
- Patients with metastases.
- Pregnancy
- Contrast allergy
- Renal failure.

The patients were asked to fast for 8 hours before the USG examination. All cases of GB wall thickening were evaluated for presence of the type of thickening (focal or diffuse), presence or absence of layered wall thickening, homogenous or non-homogenous thickening, associated hepatic infiltration, IHBR dilatation or locoregional lymphadenopathy and evidence of distant metastases. A wall thickness cut off 10 mm was chosen to differentiate benign and malignant wall thickening in absence of specific signs of malignancy such as metastases[6,7]. Non-homogenous irregular wall thickening with loss of layered pattern, associated locoregional

lymphadenopathy, presence of IHBR dilatation, obvious evidence of distant metastases and obvious infiltration into the adjacent hepatic parenchyma was considered malignant. Wall thickening with hourglass narrowing, presence of comet tail or cystic spaces in walls were considered suggestive of adenomyomatosis[8,9,10].

All MDCT examinations were performed with a 16- channel MDCT scanner.Non-ionic contrast material (IOHEXOL) was injected at the rate of 3.5 mL/s using a power injector. Enhancement of the GB wall was compared to the liver parenchyma. Like on USG, all cases of GB wall thickening were also evaluated for similar findings.

Results

In this study 63 patients were enrolled, 43 patients were females (68.25%) and 20 were males (31.75%). Maximum number of patients was in the age group of 51-60 years (21 patients) with mean age being 50.14 years with a standard deviation of 11.11. Mean GB wall thickness for benign pathology was 7.89 mm with a standard deviation of 2.22 and 10.3 mm for malignant pathology with a standard deviation of 4.00. The association of focal/diffuse wall thickening with GB carcinoma was found to be significant (p− 0.001). Forty-seven cases (74.60%) had asymmetrical GB wall thickening out of which nineteen patients (40.42%) were detected to have malignant pathology. The remaining 25.39% (16 cases) of patients had symmetrical thickening out of which only one patient (6.25%) had GB carcinoma. Intra−hepatic biliary radical (IHBR) dilatation was observed in 11 patients (17.46%) and nine out of these eleven patients had GB carcinoma (p −0.002).Loss of interface of thickened GB wall with liver parenchyma was observed in 11 cases (17.46%) out of which 10 cases were diagnosed as malignant. The finding was found to be significant (p−0.012). 7 (11.11%) patients with lymphadenopathy on Ultrasonography and CECT (p −0.0001) had a final diagnosis of malignancy on histopathology. The sensitivity of USG was found to be 70% with a 95% confidence interval (CI) of 45.72 to 88.11% while specificity was 66.60% with 95% CI of 66.60 to 91.61%. The sensitivity of CT was found to be 95.00% (95%CI of 75.13 % to 99.87%) while specificity was 83.72% (95% CI of 69.30% to 93.19%).

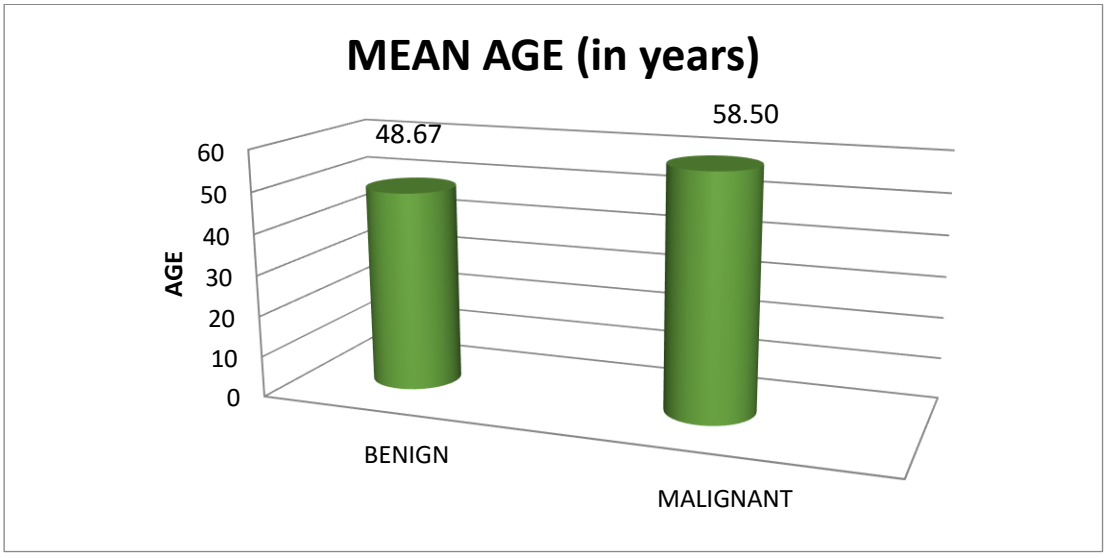


Figure 1: Mean age for benign and malignant wall thickening.

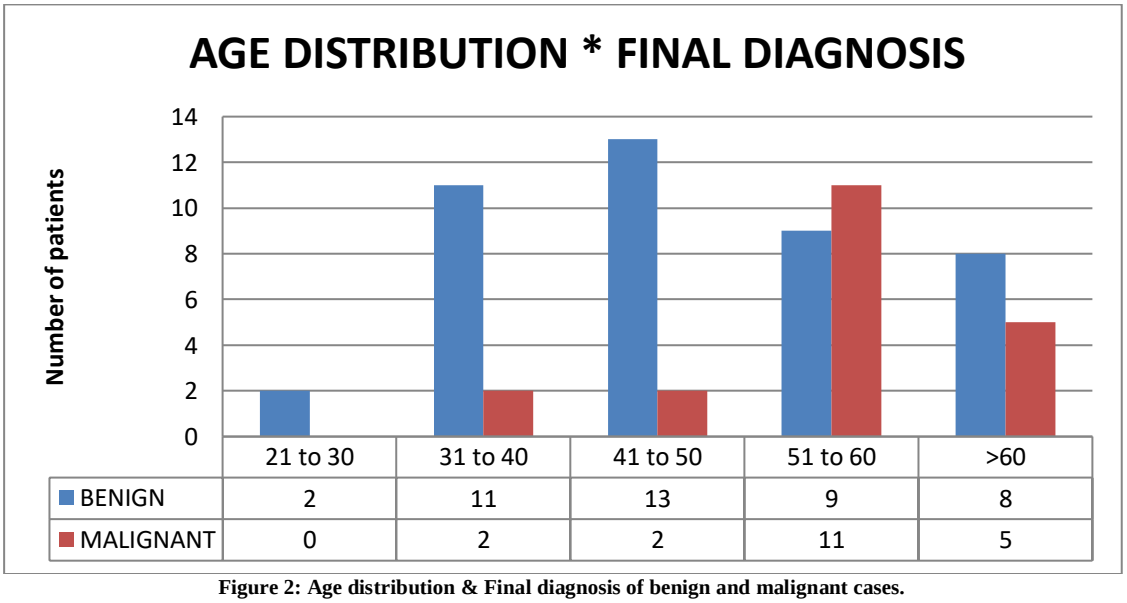


Figure 2: Age distribution & Final diagnosis of benign and malignant cases.

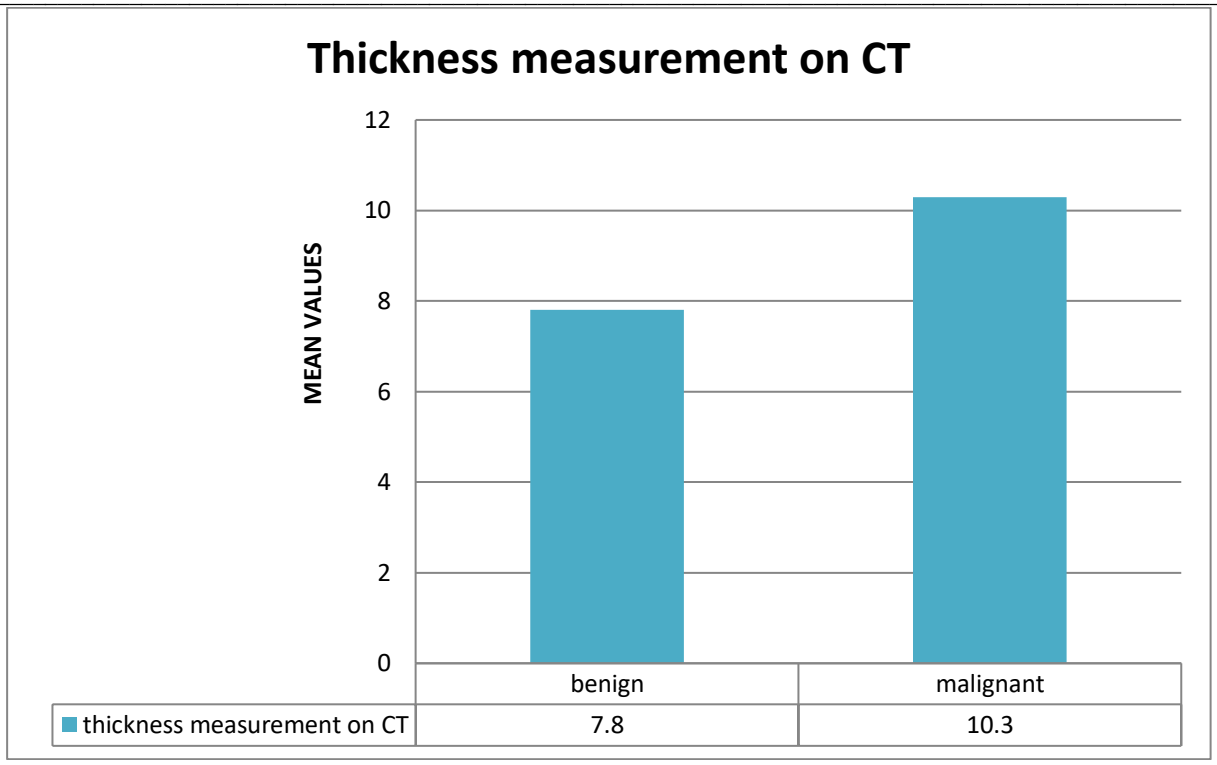


Figure 3: Mean value of thickness measurement of benign & malignant

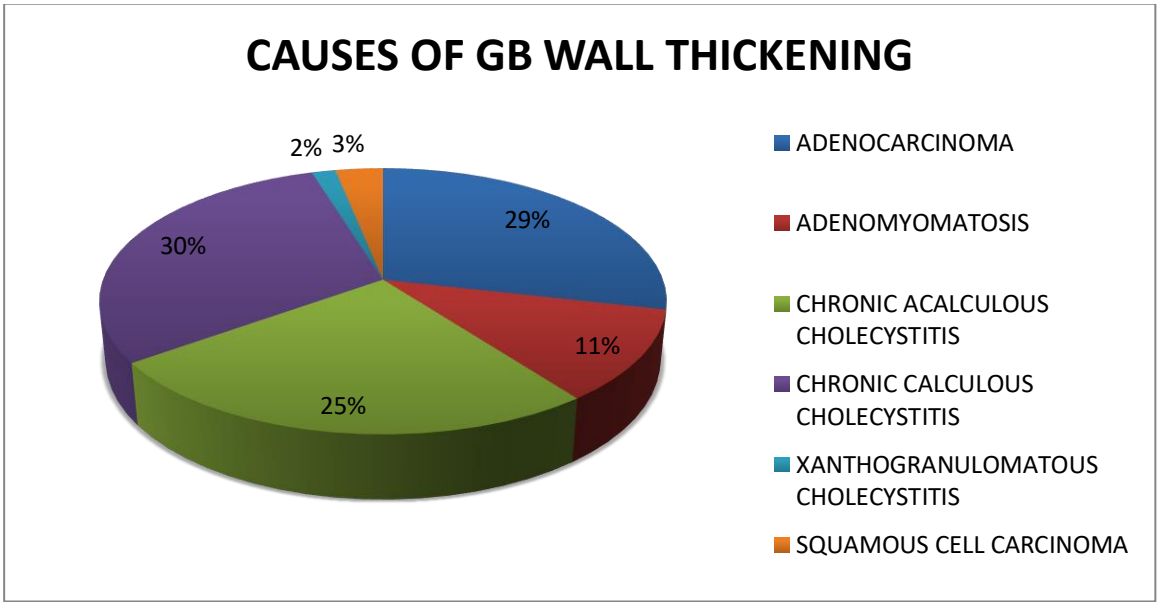


Figure 4: Causes of Gall Bladder wall thickening.

Table 1: Association of age with GB wall thickening

		Final Diagnosis			
		Benign	**Malignant**	**Total**	**p Value**
Age (years)	21-30	2 (100%)	0 (0.00%)	2	0.001
	31-40	11 (84.61%)	2 (15.38%)	13	
	41-50	13(86.66%)	2(13.33%)	15	
	51-60	9 (45%)	11 (55%)	20	
	>60	8 (61.53%)	5 (38.46%)	13	
Total		43 (68.25%)	20 (31.74%)	63 (100%)	

Table 2: Association of IHBR dilatation on USG and CT with malignant GB wall thickening:

		Final Diagnosis			
		Benign	**Malignant**	**Total**	**p Value**
IHBR dilatation	No	41(78.84%)	11(21.15%)	52	0.002
	Yes	2 (18.18%)	9 (81.81%)	11	
Total		43(68.25%)	20(31.74%)	63(100%)	

Table 3: Association of loss of interface with liver parenchyma with malignant wall thickening:

		Final Diagnosis			
		Benign	**Malignant**	**Total**	**p Value**
Interface with liver parenchyma	Lost	1 (9.09%)	10(90.90%)	11	0.012
	Preserved	42(80.76%)	10(19.23%)	52	
Total		43(68.25%)	20(31.74%)	63(100%)	

Table 4: Association of significance of lymph nodes on CT with malignant thickening:

		Final Diagnosis			
		Benign	**Malignant**	**Total**	**p Value**
Lymph nodes on CT	No	43(81.13%)	10(18.86%)	53	<0.0001
	Yes	0 (0%)	10 (100%)	10	
Total		43(68.25%)	20(31.74%)	63(100%)	

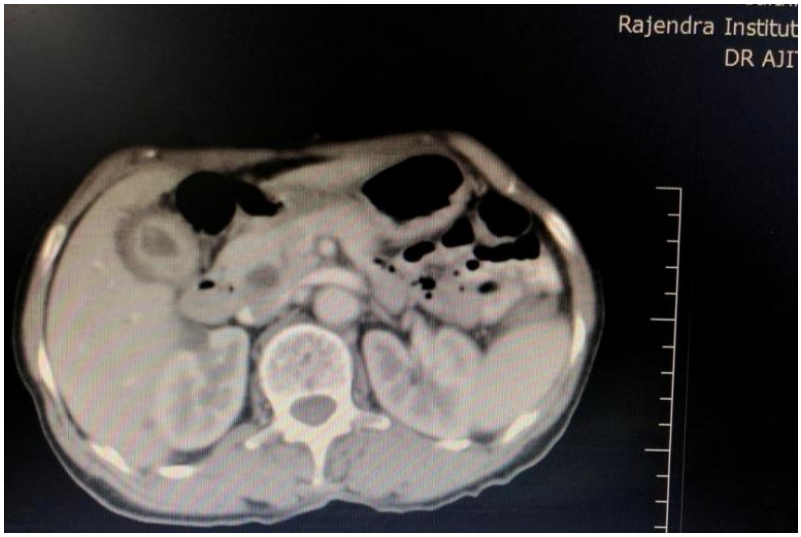
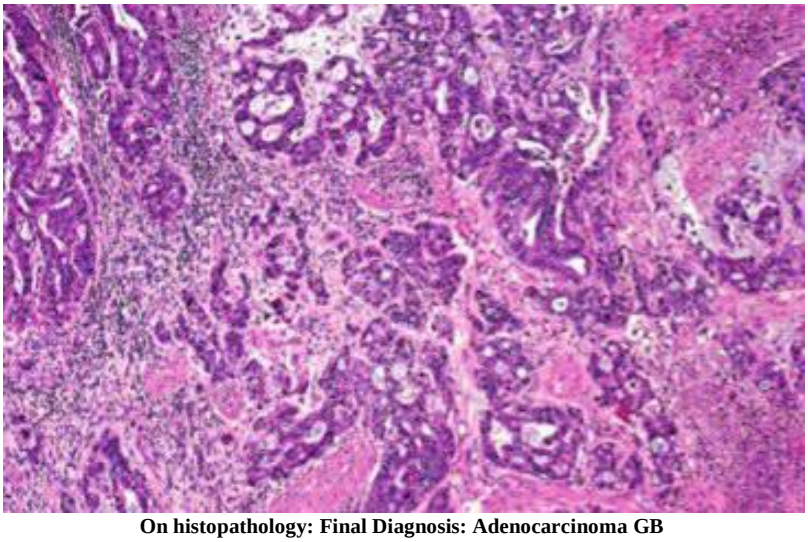


Fig 5: Diffuse symmetric thickening of homogenously enhancing GB wall on CECT



On histopathology: Final Diagnosis: Adenocarcinoma GB

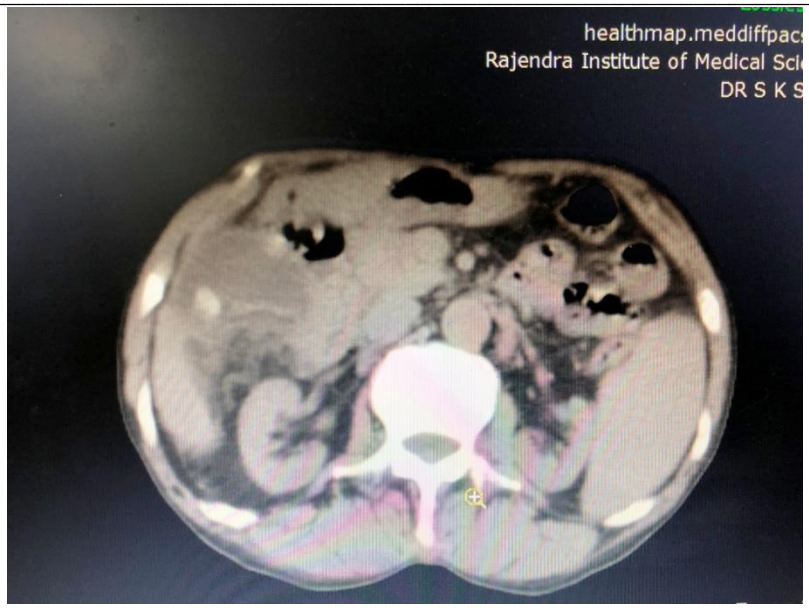
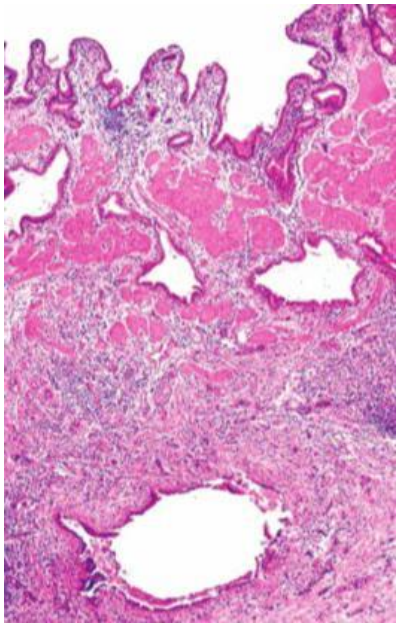


Fig 6: Diffuse symmetric thickening of GB wall with hyperdense calculus & Pericholecystic fluid collection.



Diagnosis on Histopathology: Chronic Cholecystitis

Discussion

The mean age of presentation in our study was 50.14 +/- 11.11 years in general but for patients with GB carcinoma it was 58.50 +/- 8.1. Mean age for carcinoma of GB was higher in other study (73.1 for females and 70.5 years for males)[11]. Age was found a significant finding for carcinomatous wall thickening agreeing with contemporary literature[12]. Similar to other studies a female preponderance was also found in our study for malignant wall thickening[11,13]. Sandhu et al (2017) who also conducted their study in India also found Chronic Cholecystitis as the most common and malignancy as the second most common cause[14]. 2nd common malignant cause was Squamous cell carcinoma accounting for 3.17% cases. Similar to our study Chronic Cholecystitiswas also the most common cause of GB wall thickening in the studies conducted by Shlaer et al, Engel et al and Handler[15, 16, 17]. Like our finding thicker and irregular GB wall was found to be more commonly associated with malignancy in the study done by Yun et al (20/35 patients, 57.1%) and Kim et al. In both these studies this association was statistically significant[18,19]. In our study the association of malignant wall thickening with peri-choledochal lymphadenopathy was very significant with a p-value <0.001 similar to Barbosa et al[7]. Calculi were found in a total of 27 cases on USG and 9 were associated with malignant wall thickenings. The p value was found to be significant similar to yun et al[18]. Our finding was similar to the study done by Fultz et al where 36.36% (8/22 patients) of cases having GB carcinoma, was observed to have IHBR dilatation while slightly higher percentage of patients had IHBR dilatation in the study done by Palma et al (61.11%) and Ruiz et al (43.75%)[20,12,21].

Thus, according to our study early hyper-enhancement, the presence of increased GB wall thickness, locoregional lymphadenopathy, loss

of interface with liver parenchyma and IHBR dilatation are strong indicators of malignancy.

Conclusion

Ultrasonography and Contrast enhanced CT is essential imaging modality for detection of gall bladder pathology. Early detection of malignant cause is challenging because of identical presentations of benign and malignant conditions as wall thickening on imaging and vague clinical symptoms. Since carcinoma Gall bladder has very poor prognosis early histopathological diagnosis following imaging diagnosis is crucial for reducing mortality and morbidity.

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