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RESEARCH ARTICLE
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COMPARING ROLE OF USG AND CT SCAN IMAGING IN BILIARY TRACT MALIGNANCY

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ABSTARCT

BACKGROUND

- Biliary tract cancer ranks as the second most common hepatobiliary malignancy after hepatocellular carcinoma.
- The entire biliary tree, including the gallbladder, is lined with simple columnar epithelium. When this epithelium undergoes malignant transformation, it most commonly results in adenocarcinomas.
- Biliarytumours present specific diagnostic challenges. Clinical history, geographic background, risk factors, patient's age and gender are often crucial for arriving at diagnosis of these tumors.
- Multimodality imaging plays a deep and integral role in the management of malignancies of the biliary tract.

MATERIAL AND METHODS

- This study involved 50 patients with suspected biliary tract malignancy, conducted from January 2024 to September 2024. The study group consisted of mainly patients from different parts of Gujarat, neighbouring states of Rajasthan and Madhya Pradesh.
- The research was carried out in the Department of Radiology at Gujarat Cancer Research Hospital and BJ Medical College in Asarva, Ahmedabad.

RESULTS:

- In my study, gallbladder cancer was found to be more prevalent (52%) than cholangiocarcinoma (26%) and periampullary carcinoma (22%) among all types of biliary tract malignancies.
- In my study, mass replacing gall bladder (11 patients, 42%) and gall bladder wall thickening(13patients, 50%)wereequallyprevalentingall bladdertumors.
- periductal infiltrating type was found to be the most common radiological feature of hilar cholangiocarcinoma on both USG and CT.
- In my study, all patients exhibited a dilated common bile duct and main pancreatic duct, known as the double duct sign. Periampullary lesions, either as intraluminal masses or wall thickening, were visualized in 73% (8 out of 11) of the patients.

CONCLUSION

- USG scored slightly better over CT in cases of mild wall thickenings of gall bladder for detecting and differentiating them from benign gall bladder wall lesions. However,CTwas more sensitive in detection of infiltration of lesions in adjacent liver.

- Among hilar and extrahepatic cholangiocarcinoma, USG was less sensitive than CT for detection of primary tumor.For detection of biliary tract dilatation, USG and CT were equally sensitive.
- CT was highly sensitive in detecting metastatic lesions in different regions of body.

KEYWORDS: Biliary tract, gall bladder, cholangiocarcinoma, CT, USG, peri-ampullary region.

INTRODUCTION

- Biliary tract cancer ranks as the second most common hepatobiliary malignancy after hepatocellular carcinoma.
- Classically,thecancersofthebiliarytractwereseparatedintothree categories:(i)canceroftheintrahepaticbiliarytract,(ii)canceroftheGallbladder and extrahepatic bile ducts, and (iii) cancer of the ampulla of Vater.
- The entire biliary tree, including the gallbladder, is lined with simple columnar epithelium. When this epithelium undergoes malignant transformation, it most commonly results in adenocarcinomas.
- Biliarytumourspresentspecificdiagnosticchallenges.Thesymptomsmayinclude malaise, mild fever, weight loss, or a sensation of fullness. In the case of biliary tract obstruction, jaundice may be the presenting sign. Common bile duct obstruction can also manifest as cholangitis or pancreatitis
- Clinical history, geographic background, risk factors, patient's age and gender are often crucial for arriving at diagnosis of these tumors. Accurate characterizationandstagingofthemalignancieswilldetermineresectabilityand impact on subsequent management.
- Multimodality imaging plays a deep and integral role in the management of malignancies of the biliary tract.
- Ultrasound is a preferred method for evaluating the biliary system when biliary disease is suspected. It offers an accurate, safe, non-invasive, cost-effective, accessible, and repeatable imaging option. However, it is operator-dependent and has some limitations in situations such as obesity, surgical dressings, and distended abdomen due to intestinal gas.
- COMPUTEDTOMOGRAPHY(CT)hasachievedmarkedsuccessinevaluating abnormalities of the bile ducts. A CT scan provides the opportunity to assess the full extent of the tumor and determine its potential for surgical resectability. Additionally, it can estimate pathological details, such as vascular infiltration and the presence of lymph node metastasis.

AIMS AND OBJECTIVES

- To evaluate the role of imaging in diagnosis of various malignant biliary tract lesions and study its characteristics on different imaging modalities.
- Role of imaging in staging of malignant biliary tumors to determine surgical resectibility and their prognosis.
- Toguidesurgeon/clinicaloncologistintreatmentplanning&to determine prognosis

MATERIAL AND METHODS

- This study involved 50 patients with suspected biliary tract malignancy, conducted from January 2024 to September 2024. The study group consisted of mainly patients from different parts of Gujarat , neighbouring states of Rajasthan and Madhya Pradesh.
- All patients were scanned using the GE REVO MAXIMA 128, a sixteen-slice CT scanner.
- The research was carried out in the Department of Radiology at Gujarat Cancer Research Hospital and BJ Medical College in Asarva, Ahmedabad.

INCLUSION CRITERIA

- Those patients who were suspected to have biliary tract malignancy based on clinical history and ultrasound examination .
- Patients already detected to have biliary tract lesions on other imaging modalities like CT scan,

MRI and were advised USG/CT scan for the purpose of pre-treatment staging.

EXCLUSION CRITERIA

- All patients with contrast allergy and contraindications to CT scan procedure, were excluded from my study.
- Post-surgery patients were excluded.
- Those patients who refused to give consent for CT scan.

INFORMED CONSENT

All eligible patients wereproperlycounseledandgaveinformedconsentbefore entryintothestudy.

OBSERVATIONS AND RESULTS

The present study was a prospective type of study. A total of 50 patients with suspected biliary tract malignancy, conducted from January 2024 to September 2024 which were carried out at Gujarat Cancer and research institute, Ahmedabad following observation made according to age, site, nature, USG and CT appearance of masses and study data were analyzed.

Table1.Sitedistributionofpatientswithbiliary tract malignancydetectedby radiologic investigations.

Sr.No	Site of involvement	No.ofpatients	%
1	Gall bladder cancers	26	52
2	cholangiocarcinoma	13	26
3	Periampullary cancers	11	22

Table2.USG& CT findingsingallbladdercancers(morphologicalpattern)

Findings	Noofpatients	Percent
Massreplacinggall bladder	11	42
Asymmetricalwall thickening	13	50
Intraluminalmass	2	8

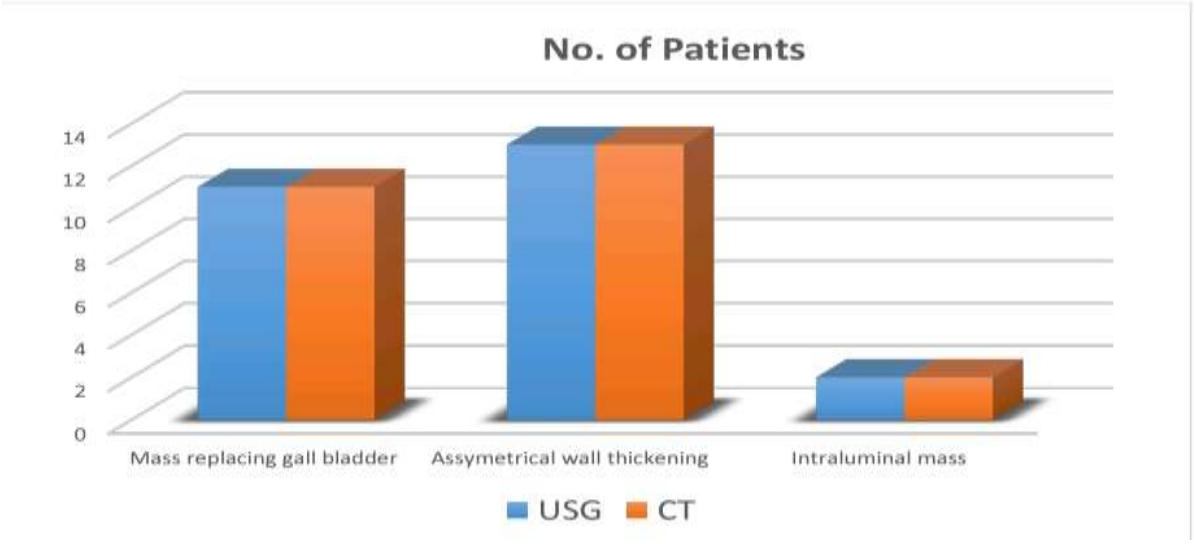


Table3.USGfindingsingallbladdercancers (echogenicity)

Echogenicity	Noofpatients	Percent
Hypoechoic	22	85
Isoechoic	3	11
Hyperechoic	1	4

Table4.CTfindingsingallbladdercancers (Attenuation & enhancement)

Attenuation	Noofpatients	Percent
Hypodense	25	96
Isodense	1	4
Hyperdense	0	0
Enhancement	**Noofpatients**	**Percent**
Homogenous	2	8
Heterogenous	24	92

Table5.distributionofcholangiocarcinomaaccordingtosite

Site	Noofpatients	Percent
Intrahepatic	2	16
Hilar	6	46
Extrahepatic	5	38

Table6.USGandCTfeaturesofcholangiocarcinoma(morphological pattern)

		Total	Mass forming	Periductal infiltrating	Intraductal polypoidal type	Lesion not visualized
USG	Intrahepatic	2	2	0	0	0
	Hilar	6	1	2	1	2
	Extrahepatic	5	0	1	3	1
CT	Intrahepatic	2	2	0	0	0
	Hilar	6	1	3	1	1
	Extrahepatic	5	0	2	3	0

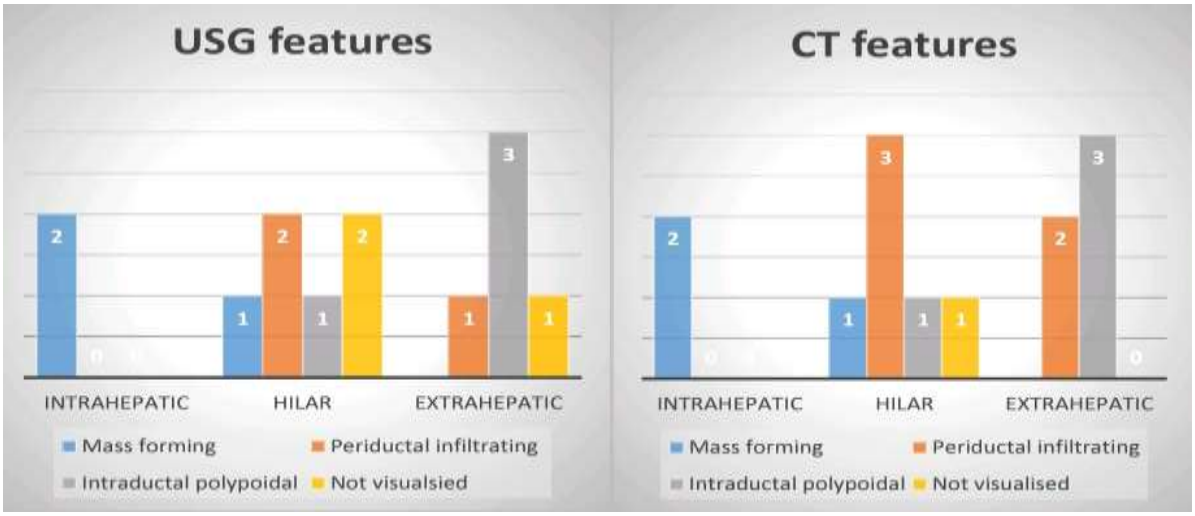


Table7.Biliarytractandmainpancreaticductstatusin cholangiocarcinoma

	Totalpatients	**Biliarytract dilatation**	**Prominent/dilated Main pancreatic duct**
Intrahepatic	2	1 (IHBRproximal to lesion only)	0
Hilar	6	6 (dilatationupto confluence,CBD nondilated)	0
Extrahepatic	5	5 (wholebiliary tract dilated)	5

Table8.USGandCTfeatureofperiampullarycarcinoma(morphology)

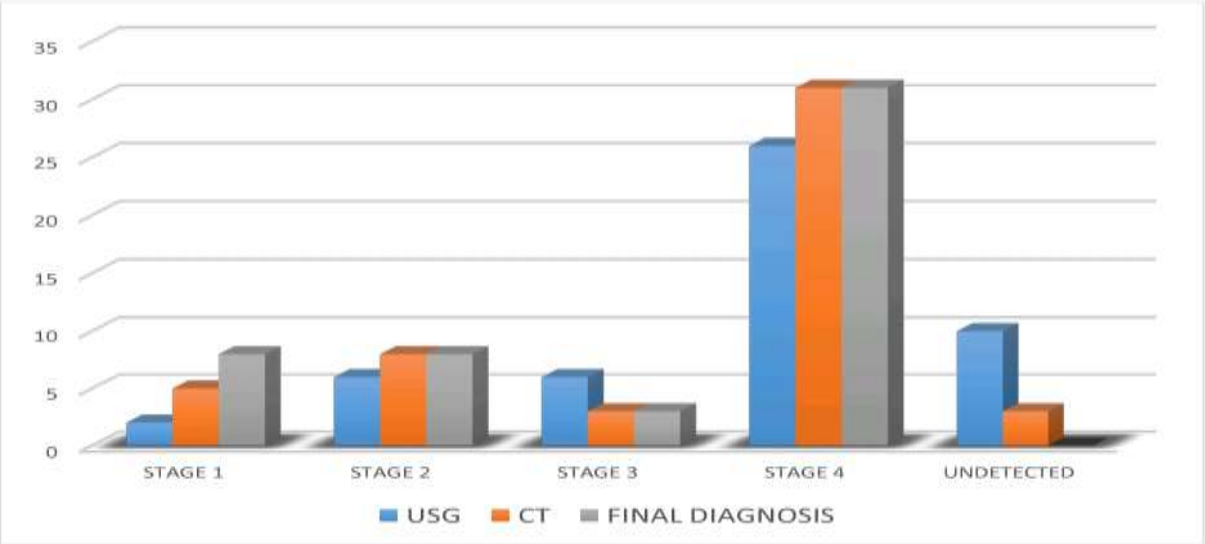
Feature	**Noofpatients**	
	USG	**CT**
Periampularymass	3	6
Wallthickening	1	2
Notvisualised	7	3
Total	11	11

Table9.Associatedradiologicalfeatureofperiampullarycarcinoma

Feature	**Noofpatients**	
	USG	**CT**
Dilatedbiliarytract	10	11
Dilated/prominentmain pancreatic duct	8	11 (Dilatedin8patients and prominent in 3 patients)

Table11:COMPARISONSTUDYOFTNMSTAGING:

Stage	**USG**	**CT**	**Finalstage**
I	2	5	8
II	6	8	8
III	6	3	3
IV	26	31	31
Undetected	10	3	



SUMMARY AND CONCLUSION

- Total 50 patients of biliary tract malignancy were studied using 128 slice Computedtomography(CT)scanmachineandPHILIPS ModelAFFINITI70 USG machine.
- **Gallbladdercancerwasmostcommonin30-50yearagepatientswithsignificant numberofpatients in51 to 70 years age. Most cases ofcholangiocarcinomaand peri-ampullary carcinoma were seen at or above 50 years of age.**
- **Within gender specific distribution, gall bladder cancers were 2-3 times more common in females compared to males. Cholangiocarcinomas were equally distributedamongbothgenders.Casesofperi-ampullarycarcinomaamongmales were twice compared to females.**
- In gall bladder cancer patients, patients presented as either mass replacing gall bladder fossa or wall thickening in equal distribution with less common presentation as intraluminal mass. Most of them appeared hypoechoic on USG. On CT, almost all tumors were hypodenseon NECT and showed heterogeneous enhancement.BothUSGandCTwerehighlysensitivefordetectionofpathology in primary lesion among gall bladder cancers.
- USG scored slightly better over CT in cases of mild wall thickenings of gall bladder for detecting and differentiating them from benign gall bladder wall lesionslikeacute/chroniccholecystitisandadenomyomatosis.However,CTwas more sensitive in detection of infiltration of lesions in adjacent liver.
- Among intrahepatic cholangiocarcinoma, most common presentation was mass forming type showing no immediate enhancement, but few of them showed delayed enhancement on post contrast study.
- Hilar cholangiocarcinoma most commonly presented as periductal infiltrating type with half of patients showing delayed enhancement on post contrast study.
- Extrahepatic cholangiocarcinoma either presented as intraductal polypoidal lesionorwallthickening.Manyofthemshowedmildpostcontrastenhancement.
- Among hilar and extrahepatic cholangiocarcinoma, USG was less sensitive than CT for detection of primary tumor. In all patients of hilar and extrahepatic cholangiocarcinoma, biliary tract dilatation above the level of obstruction was presentwhichwasvisualizedonbothUSGandCTscanswithadditionalfinding of dilated or prominent MPD in many of extrahepatic cholangiocarcinoma patients. For detection of biliary tract dilatation, USG and CT were equally sensitive with CT scoring slightly above in patients with large abdominal circumference.
- All patients of peri-ampullary carcinoma presented as dilated biliary tree and MPD (double duct sign) detected on either USG or CT. USG was much less

sensitive(36%)fordetectionofprimarytumoramongperi-ampullarycarcinoma patients and even CT was not highly sensitive (73%).

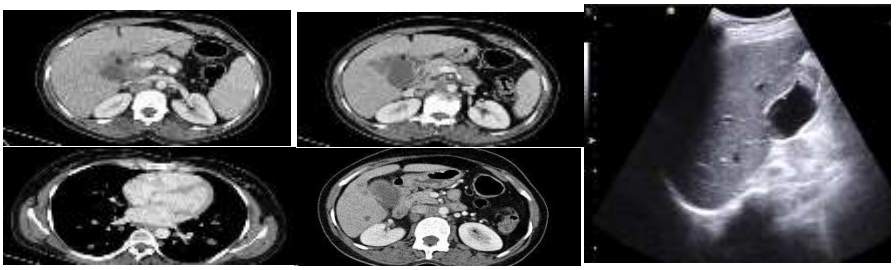
- Amongearlystagesinbiliarymalignancies(stageIandII),althoughUSGand CT were able to detect pathologyin most of patients but both of themwere not sensitive in accurately differentiating stage I from stage II lesions.
- USG has significantly lower sensitivity than Computed tomography (CT) in detecting enlarged lymph nodes. USG is not suitable for the comprehensive staging of biliary tract malignancies.
- CT was highly sensitive in detecting metastatic lesions in different regions of body.USGwashighlysensitivefordetectingmetastaticlesionsinliver,butcould not detect metastasis in lung.
- USG being less expensive and radiation free, is the first line investigation in patients of gall bladder cancers and cholangiocarcinoma. But CT remains the investigation of choice.
- Computed tomography is superior diagnostic imaging modality than USG prior to treatment which improved detection and characterization of tumor contribute to better diagnostic accuracy and consequently reduction of invasive procedure which led to significant reduction of mortality and morbidity from tumor.

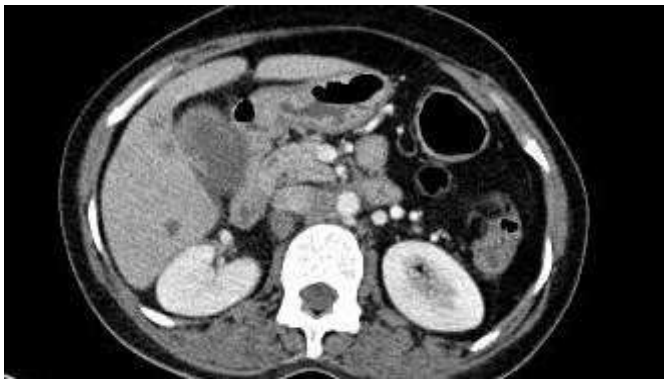
IMAGE PLATES

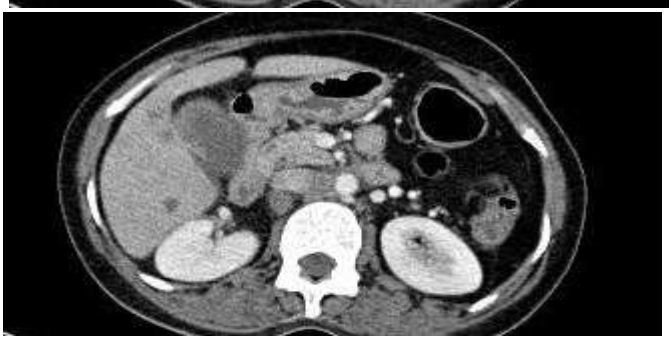
CASENO1.CAGALLBLADDER(STAGEIVA)

✓ OnUSG,thereisasymmetricwallthickeningnoted involvinggallbladder infiltrating adjacent liver parenchyma.

✓ OnCTscan,heterogeneouslyenhancing wallthickeninginvolvinggallbladder infiltrating adjacent liver parenchyma with lung and liver metastasis.

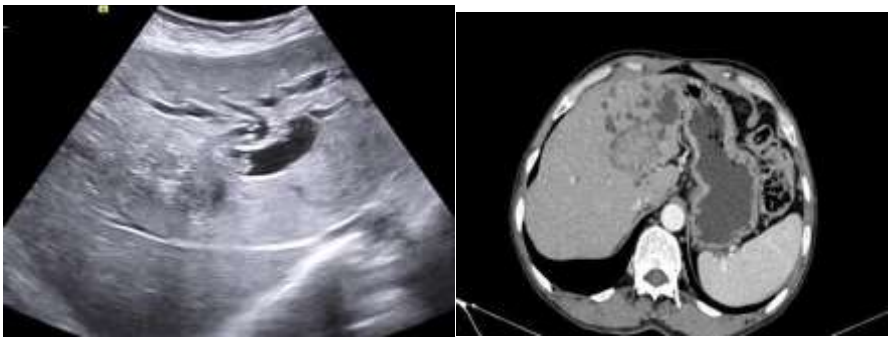






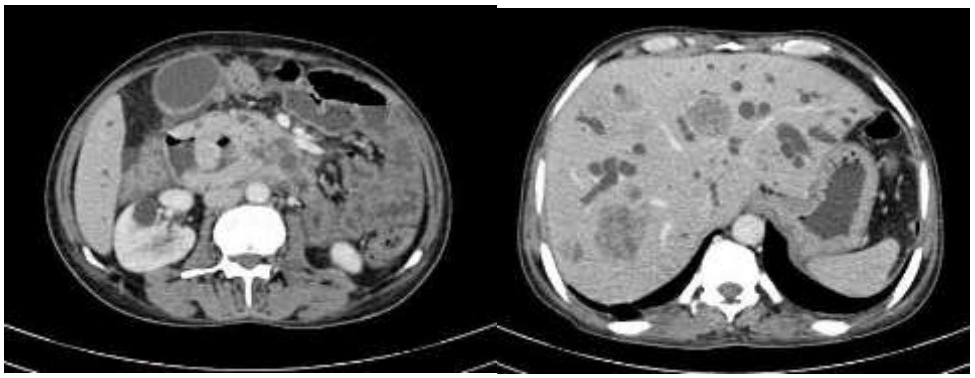
CASE2: CHOLANGIOCARCINOMA(STAGEI)

✓ USG showed intraluminal isoechoic lesion fillingup the lumen of proximal LHD with dilatation of distal IHBR.



CASE3:PERIAMPULLARYCARCINOMA(STAGEIV)

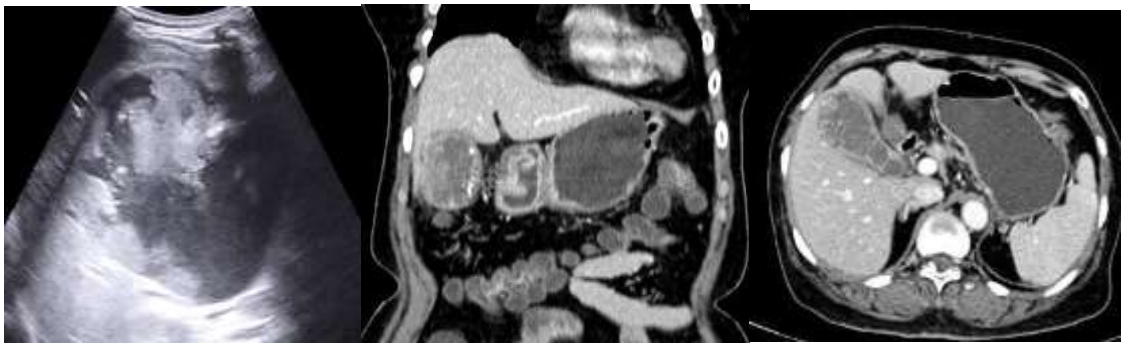
✓ CECT showed isodense wall thickening involving periampullary region infiltratingheadofpancreasandduodenalwallwithheterogeneouslyenhancing metastatic deposits in both lobes of liver and dilated biliary tree.



CASENO4.CAGALLBLADDER(STAGEIII)

✓ OnUSG,isoechoicpolypoidalintraluminalwallthickeninginvolvinggall bladder.

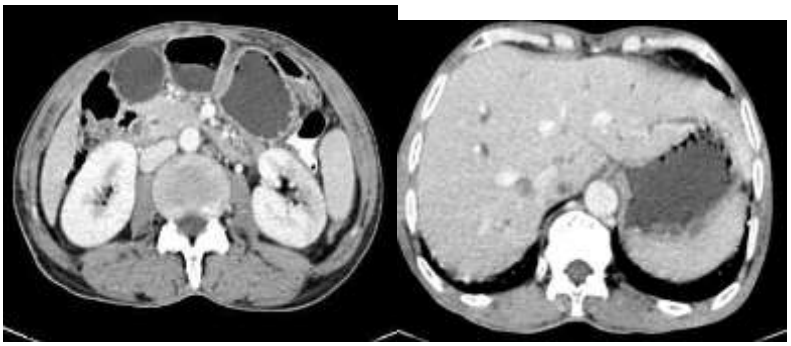
✓ OnCTscan,intraluminalpolypoidalwallthickeninginvolvinggallbladder with periportal lymph node.



CASE5:PERIAMPULLARYCARCINOMA(STAGE IV)

✓ CTscanshowedill-definedisotohypodenselesionatampullawithhypodense metastatic deposit in liver.

✓ CTscanshowedill-definedisotohypodenselesionatampullawithhypodense metastatic deposit in liver.



CASE6 :CHOLANGIOCARCINOMA(STAGEIV)

✓ OnUSG,thereisisotohypoechoicirregularinfiltratinglesionnoted inright lobe of liver with hypoechoic metastasis in both lobes of liver.

✓ CTscanshowedheterogeneouslyenhancinginfiltrativelesion inrightlobeof liver

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