

**ASSESSMENT AND COMPARISON OF GALLBLADDER MASS BY SONOGRAPHY AND HISTOPATHOLOGY**J. S. Sikarwar<sup>1</sup>, Rashmi Singh<sup>2</sup>, Vrashbhan Ahirwar<sup>3</sup>, Harish Bhujade<sup>4</sup>, Shilpi Muchhoria<sup>5</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: AIMS & OBJECTIVES:** To find out prevalence of gallbladder mass among the patients of gallbladder pathology & define morphological feature of gall bladder masses using real time gray scale ultrasonography and color Doppler flow imaging & power Doppler imaging to find out prevalence of gall stones among the patients of gall bladder mass. **MATERIAL AND METHOD:** 10424 patients were evaluated for gall bladder pathology with grey scale ultrasonography in between 1.10.12 to 30.09.2013 in Radiodiagnosis department of G.R.M.C. **RESULT:** 54 patients out of 10424 i.e. 0.5% were found to have gall bladder mass lesion. Among these 79.5% (43) of patients had gall bladder carcinoma, 9.3% (5) had gall bladder polyp, 87.4% (4) had mucocele of gall bladder 1.9% (1) had porcelain gall bladder and 1.9% (1) had gall bladder metastasis. The youngest patient in our study was 12 years old male presented with mucocele. Oldest patient in our study was 68 years old female presented with gallbladder carcinoma. 7% of overall gall bladder mass lesion were encountered in females showing clear female preponderance. Gall Stone embedded in 70% of gall bladder mass. **CONCLUSION:** J.A. group of hospital and G.R. Medical College, Gwalior serve a good proportion of population of M.P. and adjoining area of U.P. and Rajasthan which is endemic for gall bladder pathology. The present study concludes that ultrasonography is a powerful readily available and cost effective tool in the diagnosis of gall bladder pathology.

**KEYWORDS:** Ultrasound of gallbladder, carcinoma of gallbladder, gall bladder stone.

**INTRODUCTION:** Gall bladder mass lesions include a spectrum of disease entities those had remained a major cause of human morbidity and mortality since the ancient times. Prominent entities among these are carcinoma of the gallbladder, mucocele, polyp, porcelain gallbladder and parasitic infestations. Carcinoma of gallbladder dominates this list because of its comparative high prevalence and lethal nature.

Carcinoma of the gallbladder is the commonest biliary tract malignancy with poor prognosis. It ranks fifth in incidence of gastrointestinal carcinomas and represents about three fourths of extrahepatic biliary tract carcinoma. It accounts for approximately 6600 deaths per year in United States alone<sup>1</sup>.

There is considerable geographical variation in the incidence of carcinoma of the gallbladder. It is one of the most frequent neoplasm in Chile, and it is the leading cause of cancer deaths in females<sup>2</sup>. High prevalence rates are also reported from Israel, Mexico and Bolivia<sup>3</sup>. Intermediate incidence is seen in Japan and India<sup>4</sup>. Lowest incidence were found in Nigeria and Singapore. This geographical difference suggests the role of environmental, ethnic and genetic factors in the etiopathogenesis of this dreaded disease<sup>5</sup>. Carcinoma of the gallbladder is a disease of elderly women. This disease is more common in 4th to 6th decade of life in India<sup>6</sup>. Parity, younger age at menarche and early age at first pregnancy have been shown to increase the risk of gallbladder cancer in female<sup>7</sup>.

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The exact cause of gallbladder cancer is not known, however various predisposing factors have been proposed in its pathogenesis. Among the predisposing factors for carcinoma of the gallbladder, cholelithiasis is most frequent. Cholelithiasis is found in 3/4th of the patient with carcinoma of the gallbladder.

The epidemiology of carcinoma of the gallbladder runs parallel to that of cholelithiasis, both show a high female to male ratio, an increasing incidence with age and an identical variation among ethnic group. It has been suggested that chronic trauma and inflammation of gallbladder mucosa, caused by presence of gallstones induce epithelial dysplasia which may predispose to carcinoma<sup>1</sup>. The size of calculi was found to correlate with probability of developing gallbladder carcinoma<sup>5</sup>. Carcinoma of the gallbladder is found only in 1-3% of patients with cholelithiasis and 25% cases of gallbladder cancer do not have documented cholelithiasis<sup>1</sup>.

An association between typhoid carrier state and hepatobiliary cancer particularly that of carcinoma of the gallbladder has been noted<sup>8</sup>. In enteric fever, infection of gallbladder occurs regularly<sup>9</sup>. Typhoid and paratyphoid bacilli reside in the gallbladder of the carriers and are excreted through the bile duct. The risk of gallbladder cancer in typhoid carriers is 6 times higher than the risk for general population.<sup>10</sup> The lifetime risk of gallbladder cancer was found to be 6% in carriers.

Calcification of gallbladder or porcelain gallbladder is an important risk for carcinoma of the gallbladder accounting for 12-61%.<sup>1</sup> Xanthogranulomatous cholecystitis is a variant of chronic cholecystitis and also present as a risk factor.<sup>11</sup> But the association may be coincidental. Factors responsible for benign gallbladder diseases such as age, hormonal and dietary factors also seem to be associated with gallbladder carcinogenesis.

Bile acids are tumor promoters and co-mutagens. Increased degradation of primary bile acids to secondary bile acids in the gallbladder bile has been observed in patients with carcinoma of the gallbladder. Marked increase in the secondary bile acids and raised biliary deoxycholate have been observed in gallbladder bile in the patients with gallbladder carcinoma<sup>12</sup>. Combination of bile stasis and bacterial infection of biliary system producing altered bile salts were thought to be related to carcinogenesis.<sup>13</sup> Numerous other factors in etiopathogenesis of the carcinoma of the gallbladder have been proposed and investigated including biliary cyst malignancy transformation of benign neoplasm, anomalous junction of pancreaticobiliary duct system, ulcerative colitis and cholecystoenteric fistula<sup>1</sup>.

As only 65 to 70% of cases of gallbladder are associated with cholelithiasis so there must be some other risk factors for 25 to 30%. Typhoid carrier stage may be important risk factor as it causes formation of secondary bile acids in gallbladder which is carcinogenic. The present study is based on this hypothesis.

### AIMS & OBJECTIVES

- To find out the incidence of gallbladder pathology among the patients of Jayarogya Hospital.
- To find out prevalence of Gallbladder Mass among the patients of gallbladder pathology.
- To find out prevalence of gallstones among the patients of Gallbladder mass.
- To find out the prevalence of other sonographic finding among the patients of gall bladder masses.
- To compare the relative occurrence of these findings among the patients.

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**MATERIAL AND METHODS:** The present study will be a cross sectional observational study to be carried out in the OPD/IPD of Jayarogya Hospital, Gwalior & G.R. Medical College, Gwalior. This will include the patients coming to Radiology Department for Ultrasonography 1.10.12 to 30.09.2013.

**OBSERVATIONS:** The present study entitled "Ultrasonographic evaluation of patients of gallbladder pathology" attending Jayarogya Hospital, Gwalior for the duration of one year.

In our study a total of 10424 patients were evaluated with grey scale ultrasonography for gall bladder pathology.

Among these 54 patients of gallbladder mass lesion were evaluated with grey scale ultrasonography, color, duplex and power Doppler. Role of the above modalities was studied in defining the characteristics and extent of the lesions. The imaging findings were correlated with surgical/histopathological/FNAC findings.

Lesion	No. of Cases	%age
Gallbladder Carcinoma	43	79.5
Gallbladder polyp	5	9.3
Mucocele	4	7.4
Porcelain gallbladder	1	1.9
Metastasis	1	1.9
<b>Total</b>	<b>54</b>	<b>100</b>

**TABLE -1: DISTRIBUTION OF CASES**

Carcinoma gallbladder was the commonest type (79.5%) of mass lesion in gallbladder encountered in our study. Metastasis accounted for (1.9%) cases. All the benign masses in total accounted for remaining (18.6%) of gallbladder mass lesions. Gallbladder polyps are most common among the benign lesions accounting for (9.3%) cases, with mucocele second most common accounting for (7.4%) of cases.

Lesion	10-20	20-30	30-40	40-50	50-60	60-70	Total
Gallbladder Carcinoma	-	-	9	12	14	8	43
Gallbladder polyp	-	1	2	1	1	-	5
Mucocele	1	-	-	1	2	-	4
Porcelain gallbladder	-	-	-	-	1	-	1
Metastasis	-	-	1	-	-	-	1
<b>Total</b>	<b>1</b>	<b>1</b>	<b>12</b>	<b>14</b>	<b>18</b>	<b>8</b>	<b>54</b>

**TABLE 2: AGE DISTRIBUTION**

The youngest patient in our study was 12 year old male presented with mucocele. Oldest patient in our study was 68 year old female presented with gallbladder carcinoma. Maximum numbers of cases of carcinoma GB were encountered in the age group of 50-60 years. No case of gallbladder carcinoma was seen below the age of 32 years.

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Patients above the age of 40 years account for 34/43 (80%) cases of gallbladder carcinoma. Only 2 cases are encountered in the age group of 20-30 years, gallbladder polyp and mucocele one case each. Mean age for the benign lesions is less compared to the age for malignant lesions.

Lesion	Male	Female	Total
Gallbladder carcinoma	10	33	43
Gallbladder Polyp	2	3	5
Mucocele	1	3	4
Porcelain gallbladder	-	1	1
Metastasis	-	1	1
<b>Total</b>	<b>23(24%)</b>	<b>41 (76%)</b>	<b>54</b>

**TABLE 3: DISTRIBUTION OF CASES ACCORDING TO SEX**

\*\*\*No. inside brackets showing percentage

41 cases (76%) of gallbladder mass lesions were encountered in females, showing clear female preponderance, accounting for more than three fourth of all cases. In gallbladder carcinoma also, females are accounting for 33/43 (77%) of cases i.e. more than three fourth cases. 7 out of 10 Benign lesions were encountered in female accounting for 70% of cases.

USG Features	No. of Cases	%age
<b>Poly Paid Mass</b>	8	18.6
• Fundus	5	11.6
• Body	1	2.3
• Neck	2	4.6
<b>Asymmetric thickening of Gallbladder wall</b>	5	11.6
<b>Filling/Replacing Gallbladder</b>	30	69.8

**TABLE 4: PRIMARY SONOGRAPHIC FEATURE OF GALLBLADDER CARCINOMA**

Majority of gallbladder carcinoma presented as a mass filling or replacing the gallbladder accounting for (70%) of cases. Second most common presentation is that of polypoid mass (18.6%). Least common presentation is asymmetrical thickening of gallbladder wall (12%). GB masses presenting as polypoid lesions are most common in fundus of the gallbladder.

S. No.	Features	No. of Cases	%age
<b>COLOR AND DUPLEX DOPPLER</b>			
<b>Grading of vascular signal</b>			
1.	Grade 0, No flow	3	6
	Grade 1 spotty flow*	10	23.3
	Grade 2 Multiple Scattered Flow	26	60.5
	Grade 3 continuous flow**	4	9.3
2.	<b>Duplex Doppler***</b>		
	Peak systolic velocity > 40 cm/s < 40 cm/s	43	100

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<b>POWER DOPPLER FEATURES</b>			
1.	<b>Grading of vascular signal</b>		
	Grade 0, No flow	3	6.9
	Grade 1 spotty flow*	1	2.3
	Grade 2 Multiple Scattered Flow	12	27.9
	Grade 3 continuous flow**	27	62.7
2.	<b>Pattern of Vascularity**</b>		
	Arborizing pattern	26	60.4

**TABLE 5: COLOR, DUPLEX AND POWER DOPPLER FEATURES OF GALLBLADDER CARCINOMA**

\* < 2 signals per cm.

\*\* For a distance of > 2.5 cm

\*\*\* Performed in 40 cases as 3 cases showed no vascular signal on CDFI.

**Color, Duplex and Power Doppler Features of Gallbladder Carcinoma:** 93% of the gallbladder carcinomas were vascular with majority of them showing Grade 2 vascularity on CDFI. All the tumor vessels had a peak systolic velocity > 40 cm/s.

Power Doppler showed more Doppler signals than color Doppler in gallbladder carcinomas. In 9 cases, vascularity which was Graded 1 on color Doppler shifted to Grade 2 on Power Doppler. Further, 10 cases of Grade 2 improved to grade 3 vascularity on power Doppler. Arborizing pattern was seen in 26 cases (60%) on power Doppler imaging.

<b>Cholelithiasis</b>	<b>No. of Patients</b>	<b>Percentage (%)</b>
<b>Gallstones detected</b>	30	70
• Gallstones embedded in mass	24	56
• Gall stones in lumen of gall bladder (exclusively)	6	14

**TABLE 6: ASSOCIATED GALLSTONES IN CASES OF GALL BLADDER CARCINOMA ON ULTRASONOGRAPHY**

On ultrasonography associated calculus with gallbladder carcinoma are seen in 30 cases accounting for (70%) of cases.

Calculus is seen more commonly embedded in mass, seen in 24 cases, accounting for (80%) of cases in which calculus is seen. Calculus exclusively seen in the lumen of gallbladder in 6 cases (20%).

**DISCUSSION:** In our study a total of 10,424 patients were evaluated with grey scale Ultrasonography, out of these 54 patients were evaluated with grey scale sonography, color and duplex Doppler. In our study ultrasound was able to correctly diagnose all the 54 cases of gallbladder mass lesions, confirmed by surgery/histopathology/FNAC, suggestive of specificity of sonography of 100% in diagnosing the gallbladder mass lesions.

In our study, Carcinoma was the commonest type (79.5%) of mass lesion encountered in gallbladder. Metastasis accounted for (1.9%) cases. All the benign masses in total accounted for remaining (18.6%) of gallbladder mass lesions. Gallbladder polyps are most common among the benign lesions accounting for (9.3%) cases, with mucocele second most common accounting for

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(7.4%) of cases and porcelain gallbladder accounting for (1.9%) of masses. In our study group youngest patient was 12 year old male presented with mucocele. Oldest patient in our study was 68 year old female presented with gallbladder carcinoma. Maximum numbers of cases were encountered in the age group of 50-60 years.

Patients above the age of 40 years account for 34/43, (80%) cases of gallbladder carcinoma and 74% of all the mass lesions. 76% of overall GB mass lesions were encountered in females, showing clear female preponderance, with female to male ratio 3:1.7. Most cases in our study presented with pain in abdomen, mostly in right hypochondrium accounting for 37/54 (58%) cases. Most common sign encountered in our study is lump in right hypochondrium accounting for 35/54 (64%) of all GB masses. Three cases of polyps were diagnosed incidentally on ultrasonography, for complaints unrelated to GB masses. Our findings are in concordance with the references.<sup>14,15</sup> 5 cases of gallbladder polyp were observed, 3 cases were observed incidentally on sonography, other common presentation was pain. 4 cases of mucocele were observed; mucocele represented the youngest case in our study.

One case of porcelain gallbladder was observed in our study. No vascular signal were demonstrated on CDFI and PDI. One case of metastasis to gallbladder was observed. On sonography it appeared as focal thickening of wall with echogenic nodule in the wall of gallbladder. On CDFI and PDI the lesion revealed to be avascular. Carcinoma gallbladder was the most common type of mass lesion of gallbladder encountered in our study, accounted for (79.5%) of all cases. Among malignancies carcinoma was the only lesion except for 1 case (1.9%) of metastasis. Carcinoma accounted for 43/44 (98%) of all malignancies.

Females accounted for (77%) of cases of carcinoma, suggestive of female preponderance with female/male ratio of 2.3:1.

In our study 93% of the gallbladder carcinomas were vascular with majority of them showing grade 2 vascularity on CDFI. Grade 2 or more signal seen in 70% of patients. Similar results were reported by ref<sup>15</sup>, who found abnormal color signal in 81% of cases.

Power Doppler imaging showed greater sensitivity than CDFI. In addition PDI is not subjected to aliasing and is angle independent. Power Doppler showed vascularity in 93% of cases. PDI showed grade 2 or more signal in 90% of cases, 60% of cases demonstrated arborizing pattern on PDI. Thus PD appeared superior to CDFI in our study. All the tumor vessels had a peak systolic velocity >40 cm/s.

Associated calculus in gallbladder carcinoma were seen in (70%) of cases, seen on sonography. Calculi are seen as echogenic foci with posterior acoustic shadowing. Calculus is seen more commonly embedded in mass, seen in 24 cases, accounting for (80%) of cases in which calculus is seen. Calculi were exclusively seen in the lumen of gallbladder in 6 cases, (20%).

**CONCLUSION:** In our study conducted for duration of 1 year in J.A. Group of Hospital and G.R. Medical College, Gwalior which serves a good proportion of population of M.P. and adjoining areas of U.P. and Rajasthan, 6.6% (43) patients had gallbladder Mass 0.7% (5) had gallbladder polyp, 0.6% (4) had Mucocele of gallbladder, 0.1% (1) patient had porcelain gallbladder and 0.1% (1) showing gallbladder metastasis.

The present study concludes that ultrasonography is a powerful, readily available and cost effective tool in the diagnosis of Gallbladder Pathology. Grey scale ultrasonography, along with color



Doppler imaging and power Doppler should be used as a first line investigation in the evaluation of gallbladder mass lesions. The lesions diagnosed as benign on ultrasonography require no further radiological evaluation. The lesions which are diagnosed as malignant on ultrasonography should be subjected to the further evaluation by Histopathology/FNAC to decide the proper course of further management of patient.

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**MUCOCELE:**



**Fig. 1: Image shows Mucocele of Gall Bladder**



**Fig. 2: Image shows Gall Bladder Mass with infiltration of liver**

**GALL BLADDER MASS:**



**Fig. 3: Image shows Gall Bladder Mass**



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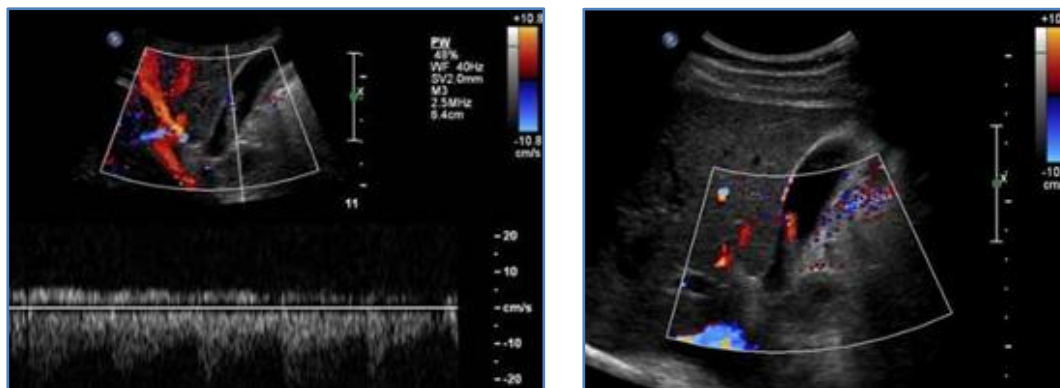


**Fig. 4: Image shows Gall Bladder Mass with calculus**

## POLYP:

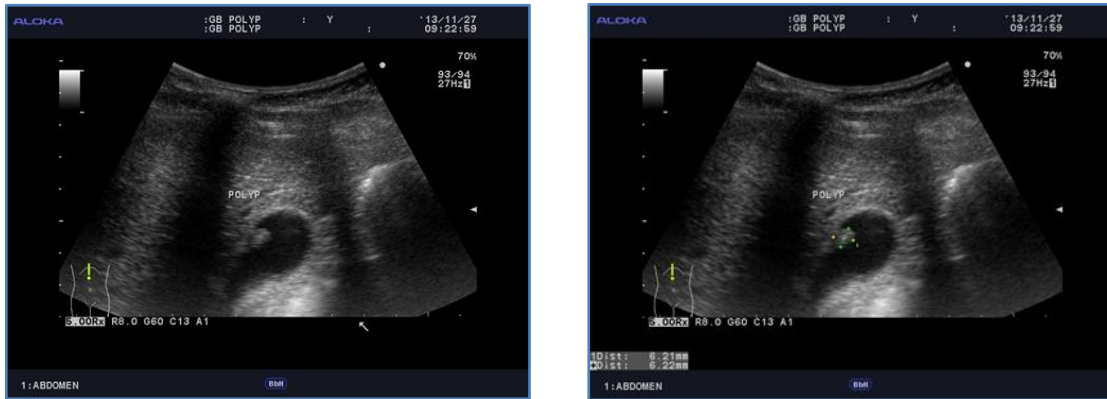


**Fig. 5: Image shows solitary Gall Bladder polyp on USG No posterior acoustic shadowing**

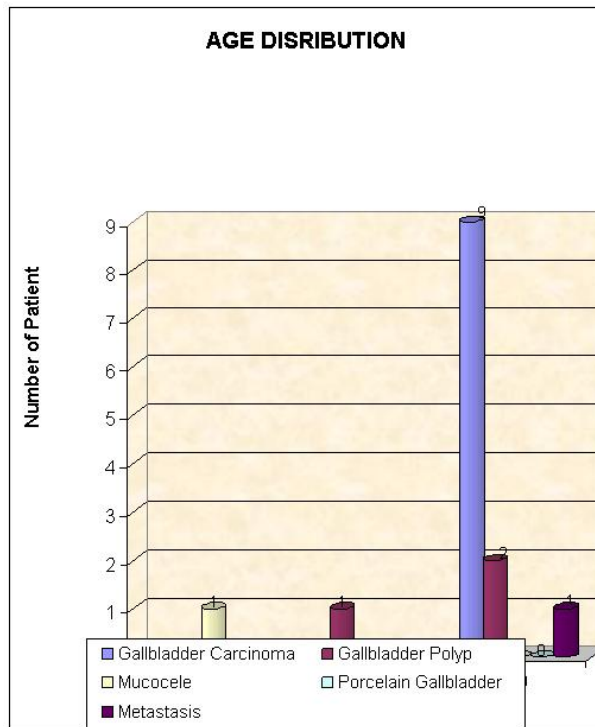
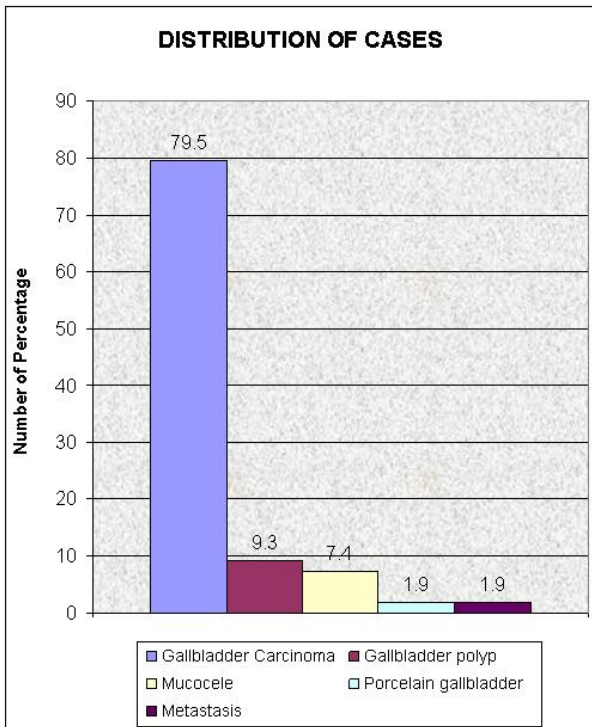


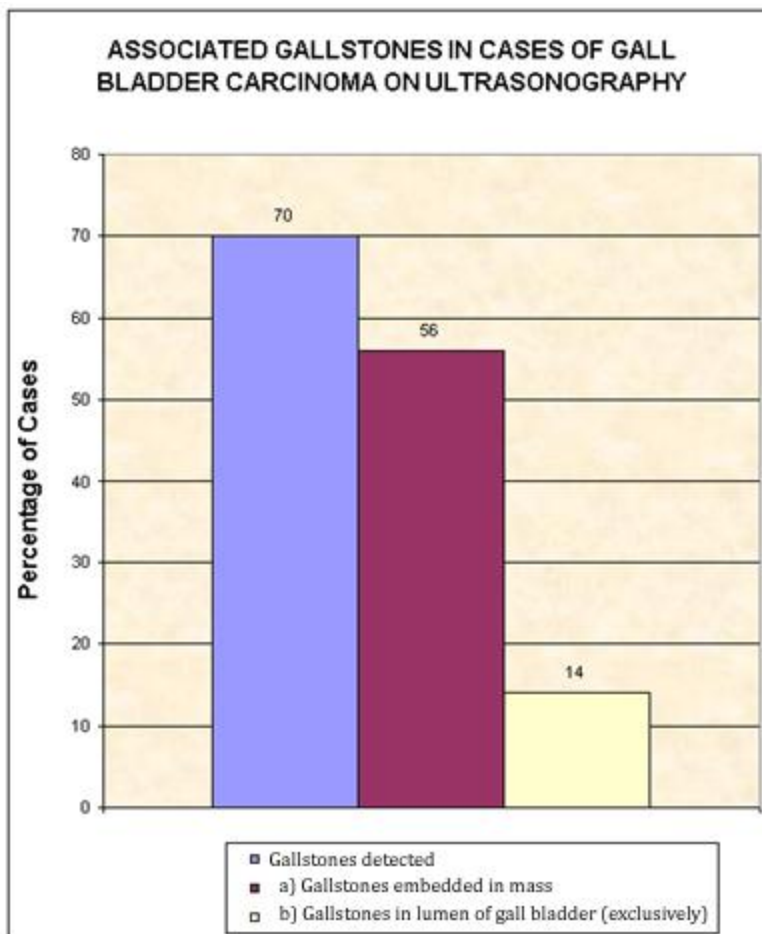
**Fig. 6: Image shows real vascularity in gall bladder polyp**

POLYP:



**Fig. 7: Images show solitary Gall Bladder Polyp on USG No Posterior Acoustic shadowing**



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