RESULTS

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All cases (40) gave good satisfactory scans.

Real Time Ultra-Sonography

Of the Liver Disease

Focal Liver Lesions:

1 - Liver Cysts :

The diagnosis of a cyst was based on established ultra-sonographic criteria: a totally echo-free area even with high-gain settings, spherical or oval in shape with a sharp smooth border and relatively high-amplitude echoes beyond the cyst compared with those at a similar depth transmitted through the adjacent normal tissue "bright up flare"

Ultra-sonography showed 9 patients to have liver cysts. Solitary cysts were found in 8 patients and multicystic in one patient. Five cysts were hydatid cysts and four were simple cysts. The ultra-sonographic findings in these 9 patients are shown in table (1).

Table (1): Ultrasonographic patterns of patients with liver cysts.

Ultra-sonographic findings	Solitery cyst 8 patients	Multi-cystic one patient
Totally echo-free	4	-
spherical	5	1
Oval	3	-
Sharp smooth border	8	1
Echoes beyond the cyst	4	1

All the cysts are correctly diagnosed as in table (1). The ultrasonographic findings in these 9 patients are shown in table (1). The simple liver cysts showed up as totally echo-free areas in four cases (Fig. 7). They were spherical in shape in two patients with solitary cyst, oval in two patients with solitary cyst.

A sharp smooth border in eight patients with solitary cyst and one in multicystic liver was noted. The hydatid liver cysts showed up as relative echoes beyond the cyst were observed in the four patients with solitary cysts and one in multicystic liver (Fig. 8). The only consistent feature compatible with a simple cyst was a totally echo-free area. The presence of two or more of the classic ultra-sonographic criteria for a cyst, however was adequate

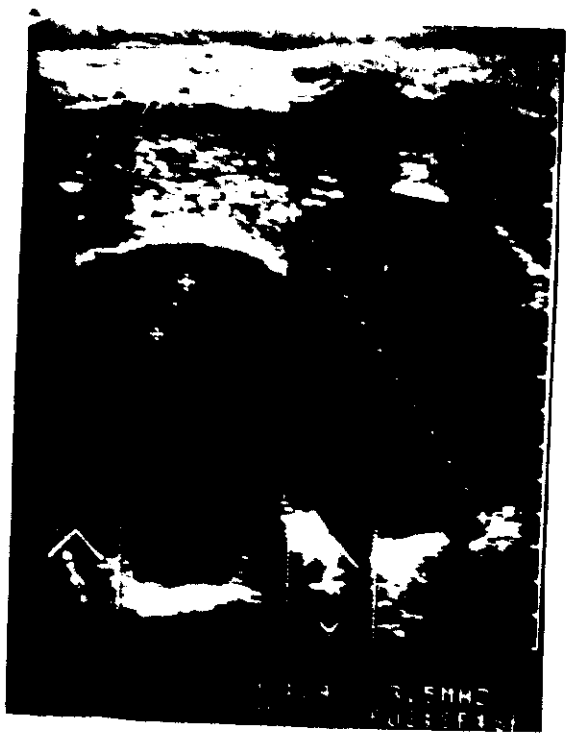

Fig. (7) : Real time ultra-sonography scan of the liver shows liver simple cyst as echo-free area with a strong back of echo.

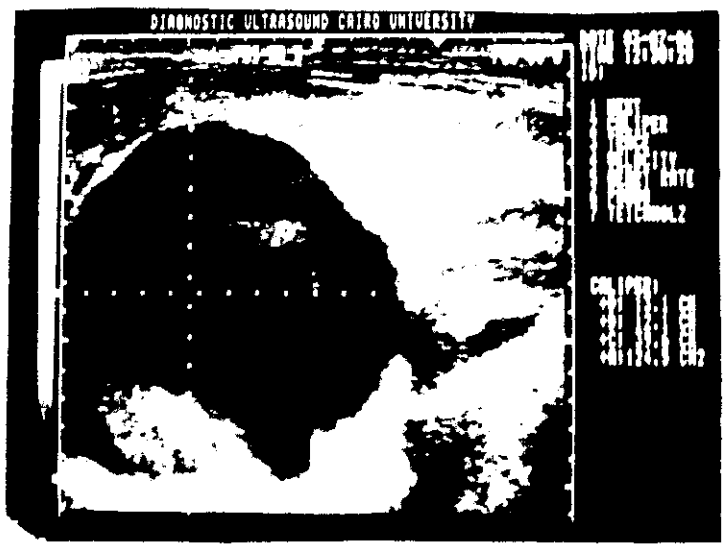

Fig.(8) : Real time ultra-sonography scan shows a cyst, echoes inside the cyst representing debris or daughter cysts, diagnosed as hydatid cyst.

to differentiate between a true simple cyst and other totally echo-free lesions. There was no correlation between the cyst size and the amount of echo adequate to differentiate between a true simple cyst and other totally echo-free lesions. There was no correlation between the cyst size and the amount or relative echoes beyond the cyst. There were no associated cysts in the pancreas, kidney and spleen thus no cases of polycystic disease were detected.

2 - Liver abscess :

A localized, relatively echo-free area with diminished numbers and/or strength of echoes as compared with surrounding liver parenchyma was diagnosed as a liver abscess. A true positive diagnosis of the liver abscess was obtained in three patients and no false negative. The correlation between the final diagnosis and the ultrasonographic finding is shown in Table (2).

Table (2): Correlation between final diagnosis and ultrasonographic findings in liver abscess.

Final diagnosis	No. of patient	Clinically	Ultra-sonography
Abscess present	3	3	3
No abscess	-	-	-

Fig.(9) : Real time ultra-sonography scan of the liver, shows amoebic abscess, of hypo-echoic aensity and ill-defined edge.

All abscesses were single, two in the right lobe and one in the left lobe. All showed localized relatively echo-free areas with ill defined walls. There was no apparent abscess wall (Fig. 9).

Pressing the probe slightly during scanning elicited local tenderness over the abscess.

3 - Liver tumours :

The liver tumours were confirmed in 26 patients (18 primary hepatocellular carcinoma and metastasis in 8 patients).

The correlation between the ultra-sonographic findings and the final diagnosis in the cases of tumours is presented in table (3).

Table (3): Correlation between the clinical diagnosis, ultrasonographic diagnosis and final diagnosis in patients with liver neoplasm.

No. of patients	Clinical diagnosis	U.S. diagnosis	Final diagnosis	False Postitive
28	28	28	26	2

The clinical diagnosis of liver neoplasm was made in 28 cases, all there 28 cases were also diagnosed by ultrasound as liver tumours, but the final diagnosis of liver neoplasm based on liver biopsy was found in 26 cases only. The diagnostic accuracy of ultrasonography in the solid of the liver was

92.85% and false positive in 7.15%. The two cases which were falsely diagnosed by ultrasound as tumours were later correctly diagnosed by selective coeliac arteriography and laparotomy as haemangioma.

Three ultra-sonic patterns were observed in liver tumours :

a) Localized, relatively echo-free area with diminished numbers and/or strength of echoes as compared with the surrounding liver parenchyma. This pattern was observed in 18 patients 69% (15 patients with primary HCC and 3 patients with metastases) (Fig. 10).

b) Localized echogenic areas with increased number or strength of echoes as compared with the surrounding liver parenchyma. This pattern was observed in 6 patients (23%) with liver tumours (5 patients with meatstases and one patient with primary HCC) (Fig. 11).

c) Alteration in the echo-architecture with mixed echogenic and/or echo-free areas, but with no clearly definable circumscribed masses. This pattern was observed in two patients (8 %) with primary HCC (Fig. 12).

No ultrasonographic characteristics were observed that enable one to differentiate a primary tumour from metastasis except after needle biopsy, laboratory investigations and clinical suspicion of neoplasm any where.

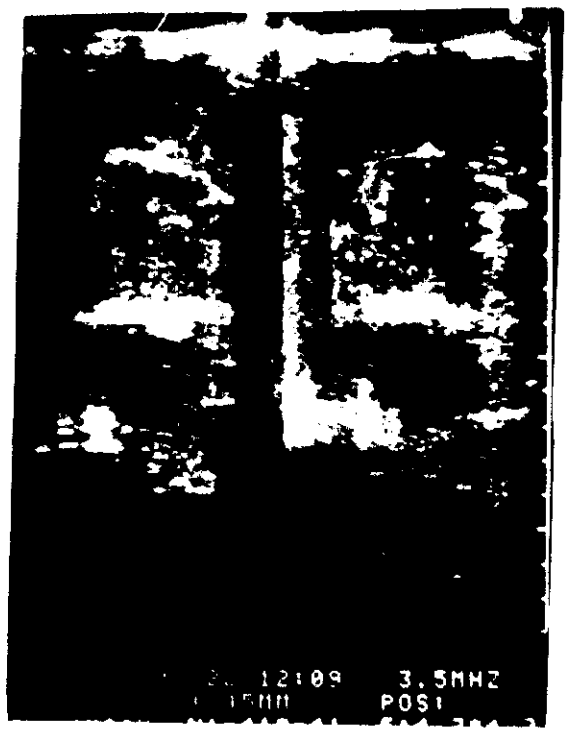

Fig.(10) : Real time ultra-sonography of the liver shows multiple hypo-echoic areas of HCC.

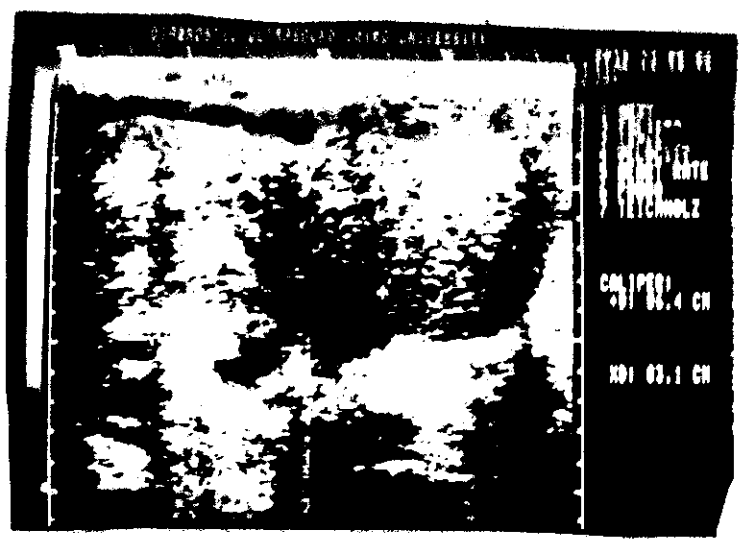

Fig. (11) : Real time ultra-sonography of the liver HCC show discrete echogenic area.

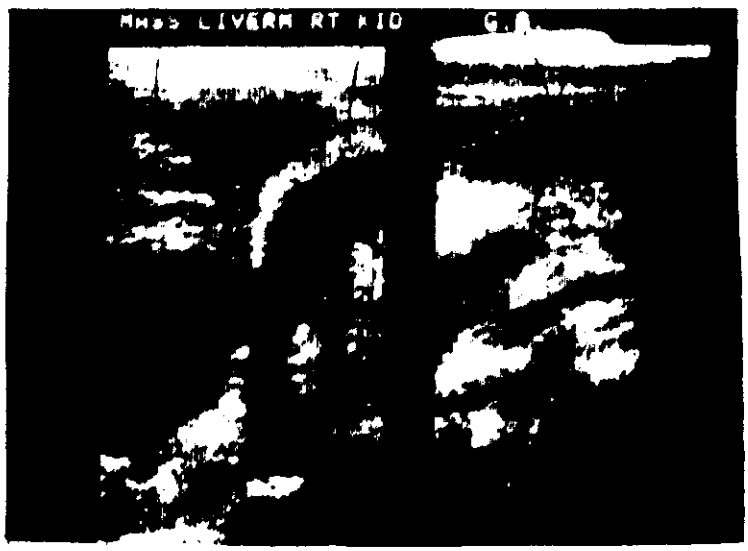

Fig.(12) : Real time ultra-sonography of HCC show alteration of echo architecture without localization.

Comparison of the different ultra-sonographic patterns in the 8 patients with liver metastasis did not show any definite correlation with the site of the primary lesion. The relative frequencies of the above mentioned ultra-sonographic patterns in the liver tumours are presented in table(4).

Table (4): Ultrasonographic patterns in liver tumours.

Ultrasonographic pattern	Liver metastasis number (%)	Malignant hepatoma No. (%)
a) Totally echo-free area	-	-
b) Localized relatively echofree area	3(37.5 %)	15 (83.3 %)
c) Localized relatively echogenic area	5(62.5 %)	1 (5.5 %)
d) Alteration of echo-architecture	0 (0 %)	2 (11.2 %)
No. of patients with tumours	8	18

CLINICAL PRESENTATION OF ALL MASSES

Symptoms: The presenting symptoms in 40 patients are summarised in table (5).

Table (5): The presenting symptoms in all patients.

Clinical minifestation	No. of Cases	Percent %
Abdominal pain	40	100 %
Weight loss	22	55 %
Weakness	16	40 %
Nausea	24	60 %
Vomiting	8	20 %
Jaundice	24	60 %
Loss of appetite	24	60 %
Abdominal swelling	40	100 %

Abdominal pain was frequently severe. It was most always localised to the right hypochondrium or epigastrium, although occasionally it was felt in the left hypochondrium. The pain was usually continuous and became more and more severe with progression of the disease in liver neoplasm, it was not related to posture, intake of food or defecation. The pain was aching in nature, not related to meal in liver abscess and hydatid cysts, and burning in haemangioma.

Swelling of the abdomen was caused either by ascites or by the patient's ability to feel the enlarged tumorous liver. Some patients were not truly anorexic but were reluctant to eat, because of a feeling of fullness, or discomfort in the upper abdomen after meals.

The miscellaneous group of symptoms include constipation dizziness, dark urine, diarrhoea and cough. Each occurred in a small number of patients.

Duration of Symptoms :

Symptoms were present for less than one month in 10% of the patients, from 1-2 months 40%, from 3-4 months 37.5% and from 5-6 months 12.5%.

Physical Signs :

The physical findings in 40 patients at the time of admissions to the units are summarized in table (6).

The liver was enlarged in 97.5% and shrunken in 2.5%. The liver was always firm in consistency, and was stony-hard in neoplasms and its surface was often irregular or nodular.

Table (6): Summary of the physical findings in 40 patients with liver masses.

Physical findings	No. of patients	Persent %
Hepatomegaly	39	97.5 %
Ascites	24	60.0 %
Splenomegaly	7	17.5 %
Jaundice	24	60.0 %
Muscle wasting		
- Slight	8	20.0 %
- Marked	16	40.0 %
Fever	8	20.0 %
Edema of lower limbs	7	17.5 %

Generalized or more usually, focal tenderness of the liver was almost uniformly noted particularly in cases of amoebic liver abscess.

Ascites, often moderate in amount at the time of admission to hospital, usually increased with the passage of time, and in some cases was sufficiently tense during the later weeks of the illness to cause considerable discomfort. When aspirated the fluid was often blood stained.

Jaundice was usually mild at the time of admission, but it almost always became more obvious during the patient's stay in the ward. In others jaundice was severe when they were

first seen, showing a picture, resembling that of biliary obstruction. Fever was of mild or moderate severity, and was intermittent in nature. Tense ascites may have prevented detection of an enlarged spleen in some patients.

Table (7): Comparison between the sonographic and computerised axial tomographic patterns of liver metastases.

	Sonographic pattern				CAT scan			
Total number	Hypo-echoic	%	Echo-genic	%	Hypo-dense	%	Hyper-dense	%
8	3	37.5	5	62.5	8	100	0	0.0

Among the 8 patients with liver metastases, 5 patients revealed an echogenic pattern while 3 patients revealed a hypoechoic pattern. All cases have shown hypodense areas (Fig. 13) in the CAT scanning table (7). Among the five patients with echogenic metastases, 4 had adenocarcinoma of the colon and one had Hodgkin's disease. The 3 patients with hypoechoic metastases had carcinomata of the pancreas, breast and kidney.

Table (8): Associated pathology in the remaining liver tissue with hepatocellular carcinoma.

	Remaining liver tissue			
Total number	Normal liver tissue	Micronodular cirrhosis	Macronodular cirrhosis	Not reported
18	2	6	6	4

The results of the microscopical examination of the remaining liver tissue in patients with hepatocellular carcinoma which was done by needle biopsy are shown in table (8).

Hepatocellular carcinoma occurred on top of a previously normal liver tissue in two patients, on top of micronodular cirrhosis in 6 patients with alcoholism and on top of macronodular cirrhosis in 6 patients. In 4 patients the pathology of the remaining liver tissue was not reported.

Table (9): Laboratory investigations of hepatocellular carcinoma of confirmation of the diagnosis.

Total number	↑AP	%	↑ASAT	%	↑ALAT	%	↑Bilirubin	%	↑AFP	%
18	15	83.3	18	100	13	72.2	17	94.4	18	100

Routine laboratory tests performed in all 18 patients with hepatocellular carcinoma are shown in table (9).

Increased serum alkaline phosphatase was noticed in 15 patients 83.3%, ASAT increased in 18 patients 100%, ALAT increased in 13 patients 72.2% and bilirubin increased in 17 patients 94.4%. They are not specific for diagnosis of hepatocellular carcinoma.

Increased levels of AFP occurred in all cases 18 (100%) and had best specificity for diagnosis of Hepatocellular carcinoma.

Table (10): Laboratory investigations in liver metastases for confirmation of the diagnosis.

Total Number	↑AP	%	↑ASAT	%	↑ALAT	%	↑ Bilir-ubin	%	↑ AFP	%
8	7	87.5	8	100	7	87.5	7	87.5	0	0.0

Routine laboratory tests performed on all 8 patients who were diagnosed by unltra-sonography as metastases in the liver are shown in table (10).

Increased AP occurred in 7 patients 87.5% increased ASAT in 8 patients 100% increased ALAT in 7 patients 87.5% increased bilirubin in 7 cases 87.5% and increase in AFP in none of the patients.

They have little specificity for diagnosis of matastases of the liver.

Serum Bilirubin :

Serum bilirubin concentrations were raised at the time of admission to the hospital in 24(60%) of patients with liver masses. The elevation occurred mainly in cases of liver neoplasms. Other cases such as haemangioma, liver abscess, hydatid cyst and simple cyst have shown normal serum bilirubin (Table 11). The degree of elevation was usually slight or moderate.

Table (11): Serum bilirubin in patients with liver masses.

Liver masses	No. of patient	↑Bilir-ubin	Normal bilirubin	%
HCC	18	17	1	42.5%
Metastases to liver	8	7	1	17.5%
Hemangiomata	2	-	2	0.0%
Liver abscess	3	-	3	0.0%
Hydatid cyst	5	-	5	0.0%
Simple cyst	4	-	4	0.0%
Total	40	24	16	60 %

Serum Albumin :

It was subnormal in all patients. About 60% of cases of liver neoplasms had albumin level below 3 gm% and 38% of cases had albumin level above 3 gm%. In 73% of patients total serum proteins were above 6 gm% while in 8.27% it was below 6 gm%.

Radiologic Results :

Chest radiographs. Postero-anterior plain radiographs of the chest in HCC (18 cases) revealed a soft tissue mass in all cases at the time of admission and raised right copula of the diaphram in 14 patients (77%) and there were no pulmonary metastases. In metastases of the liver all patients (8) had soft tissue mass in the upper abdomen, 2 cases had raised

Right copula of diaphragm (25%) and 2 patients (25%) had pleural effusion. In the cases of liver abscess, all the patients had a soft tissue mass in the upper abdomen at the time of admision and also 2 raised right copula of diaphragm and one case had pleural effusion.

In cases of hydatid cyst,(20%)had elevated right copula of the diaphragm and all patients had a soft tissue mass in the upper abdomen (100%). Cases of simple liver cyst and hemangioma had a normal X-ray chest.

Exploration

The operation has been done for 25 patients, 3 for amoebic abscess, 5 for hydatid cysts, 4 for simple cysts, 3 patients for liver secondaries 8 for hepato-cellular carcinoma and two for haemangioma.

All the patients explored gave results similar to ultra-sonography except in cases of haemangioma, which were diagnosed by ultra-sonography as a solid neoplasm in the liver, but at exploration it proved to be a haemangioma. Liver biopsy was done for all patients except those with haemongioma. In all cases the pathological diagnosis proved similar to the sonographic diagnosis. The biopsy was taken from the mass in the liver and the remaining liver tissue by needle biopsy.

Computerised tomography :

It has been done in 8 patients with liver metastases. All masses were displayed as hypodense areas in the liver (Fig. 13). The primary tumours were, carcinoma of the colon in 4 patients, carcinoma of the pancreas in one patient and in 3 patients the primary tumours were in the breast, kidney as well as a case of Hodgkin's disease.

Isotopic Scanning by ^{99m}TC Sulphur Coloid :

Isotopic scanning was done in two cases with liver masses. All masses were displayed as a filling defect area in the liver (Fig. 14). The isotopic scanning was done for conclude the pathological lesion and confirm the diagnosis, but could not differentiate cystic from solid masses.

Angiography :

Selective coeliac arteriography was done pre-operatively in two cases (Fig. 15). The decision to perform selective arteriography was based on the fact that in both cases sonography could not reach a conclusive diagnosis of a solid lesion in view of the presence of very fine echo-free areas inside, which raised the suspicion of a haemongioma. Both arteriography and laparotomy proved the diagnosis of a haemagioma.

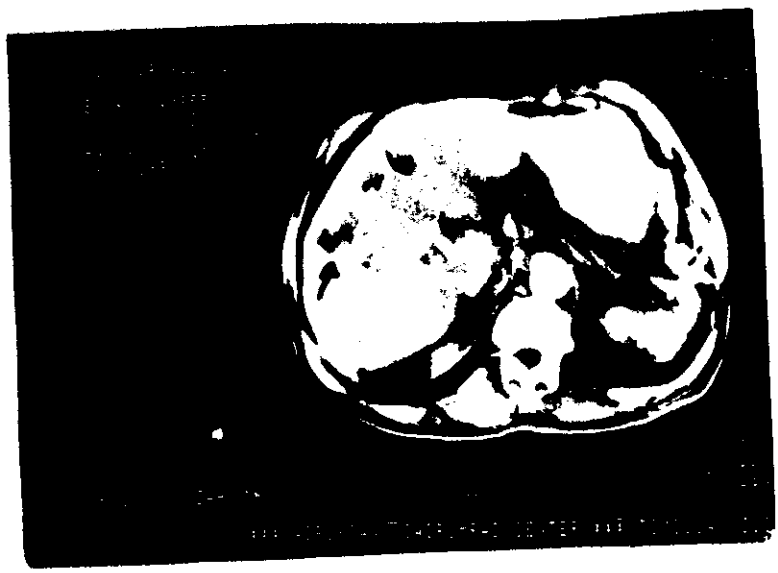

Fig. (13) : CT scan of liver showing multiple hypodense areas the right lobe d denoting meoplasm in the liver.

Fig.(14): Isotopic scanning with Tc sulpher colloid showing filling defect in the right lobe but not differentiate solid from cystic lesion.

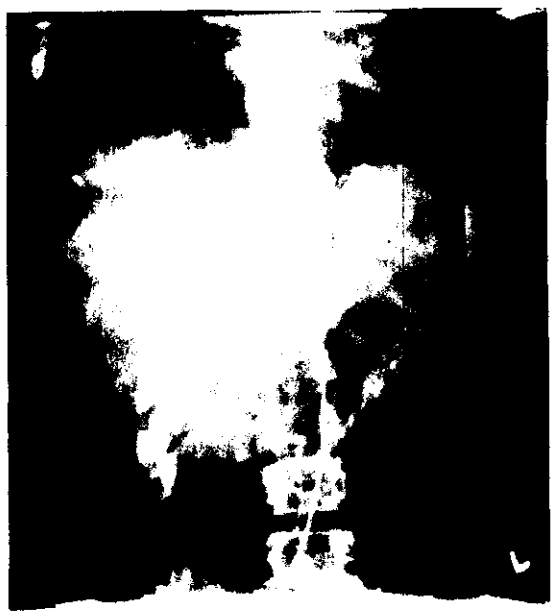

Fig. (15) : Selective coeliac oxis arteriography of cavernous haemangioma of the liver. Note the contrast condensed in the lesion.