ULTRASOUND DIAGNOSIS OF LIVER AND BILIARY TRACT LESIONS

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SUMMARY

Over a two year period, 323 livers were examined using ultrasound. Majority of these cases were icteric and ultrasound could distinguish obstructive from non-obstructive jaundice. Primary and secondary liver tumours were also detected. Liver abscesses, and radiolucent gallstones were picked up by ultrasound, the areas under study being scanned using standard methods as outlined by various ultrasonographists.

INTRODUCTION

Prior to the existence of ultrasound as an imaging device, various methods have been used to detect lesions in the liver with varying degrees of accuracy, and these include blood chemistry, plain and contrast radiography as well as isotope imaging. Present day investigations have been revolutionized by ultrasound and where it is available, it is the examination of choice in determining the underlying cause of liver abnormalities. Apart from its high degree of accuracy, grey-scale ultrasonography provides much more information when applied to investigation of the hepatobiliary tract (Taylor and Mc Cready, 1976).

MATERIALS AND METHODS

Three hundred and twenty three liver examinations were performed over a two-year period from April 1979 to March 1981. All cases examined were scanned using the Nuclear Enterprise Diasonograph 4200 unit with 1.5 MHz. and 2.5 MHz. transducers, with pulse repetition rate of 600 per second.

Pulsed echo ultrasound imaging involves the passage of high speed ultrasound produced by a transducer in pulses in rapid succession through a tissue or organ. The reflected echoes are converted into electrical information displayed as two-dimensional grey-scale image and as amplitude echoes or 'A' scan. This information is required to ensure accurate interpretation of disease processes in organs and tissues. The techniques used for ultrasonic scanning of the liver were those used by Taylor and Hill (1975). The liver, being a large organ, is fairly easy to scan but difficulties may be encountered if the patient is obese and scars from previous operations are present. Overlying bowel gas can also produce confusing echoes resulting in difficulties in interpretation.

RESULTS AND DISCUSSION

Requests for liver ultrasound scans over the same period were divided into four broad categories, namely jaundice (to distinguish obstructive from non-obstructive jaundice), liver tumours, liver abscesses, and gall stones.

Jaundice

Ultrasound provides very quick and accurate information of the state of the biliary duct system. Hence it can distinguish between obstructive and non-obstructive jaundice. Dilatation of the whole biliary tree indicates extrahepatic biliary obstruction and quite often the site of obstruction located. Hadidi (1980) reported a 96.6 percent

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overall accuracy in determining the cause using ultrasound. In cases where the actual site of obstruction is in doubt, percutaneous transhepatic cholangiogram or endoscopic retrograde cholangiopancreatography should be the next examination of choice.

In my series of 323 liver cases, 170 jaundiced patients were examined. Out of this 35 cases were due to extrahepatic obstruction, 22 being due to carcinoma of the head of pancreas. The majority of icteric cases were due to viral hepatitis.

Fig. 1 shows a typical case of obstruction of the biliary duct system. Tracing the path of the common bile duct, the obstruction was noted at the ampullary region by a carcinoma, as shown in Fig. 2.

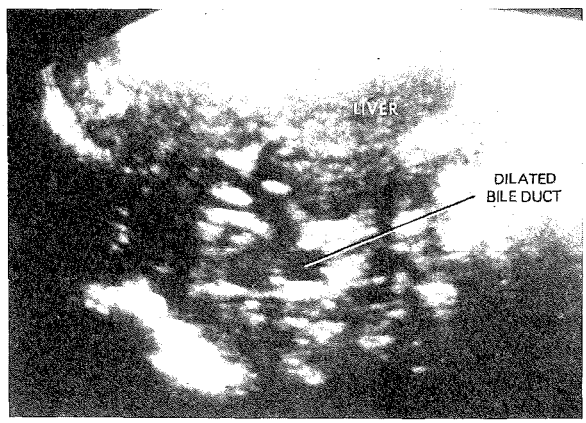

Fig. 1 Longitudinal section of the liver showing dilated bile ducts.

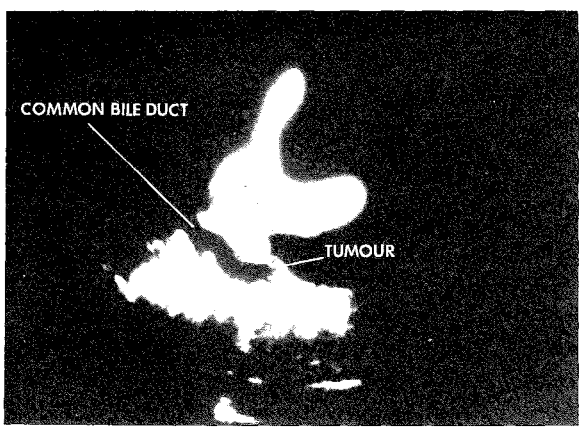

Fig. 2 Longitudinal section along the dilated common bile duct showing a tumour in the ampullary portion of the duct.

By far the commonest cause of obstructive jaundice in the eldery is due to carcinoma of the head of pancreas. Fig. 3 shows a typical appearance of such a lesion, as seen on a longitudinal scan.

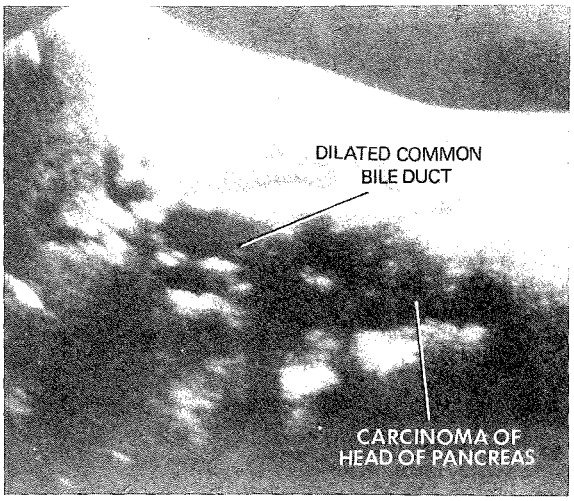

Fig. 3 Longitudinal section showing obstruction of the common bile duct by carcinoma of the head of pancreas.

Recurrent jaundice in childhood due to choledochal cyst used to be a problem in diagnosis in the past. Ultrasound scanning has proven to be very useful in detecting such a lesion and a typical appearance is shown in Fig. 4. Fig. 5 shows a case of liver cirrhosis with ascites and such patients may present with jaundice.

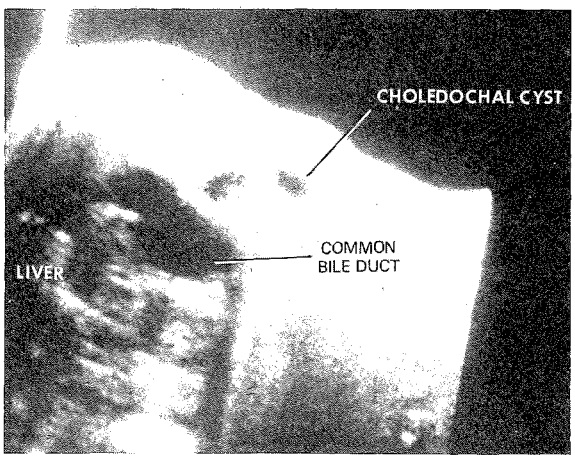

Fig. 4 Longitudinal section along a choledochal cyst.

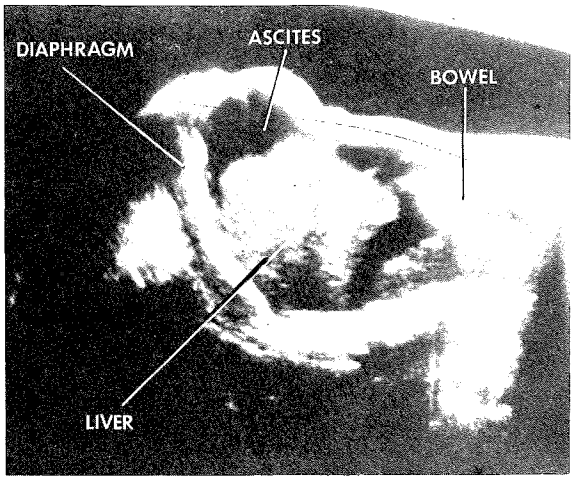

Fig. 5 Longitudinal section of the abdomen showing cirrhotic liver and ascites.

Liver tumours

Palpable liver masses may be seen on the ultrasound scan as space-occupying lesions and depending on the echo patterns, the type of lesion can be inferred. Mc Ardle (1976) reported a success rate of 80 percent in the detection of hepatic neoplasms using ultrasound. Hepatomas generally show high echo patterns, though low echoes may be present in areas of necrosis. A typical hepatoma scan is shown in Fig. 6. A childhood liver tumour such as hepatoblastoma is shown in Fig. 7.

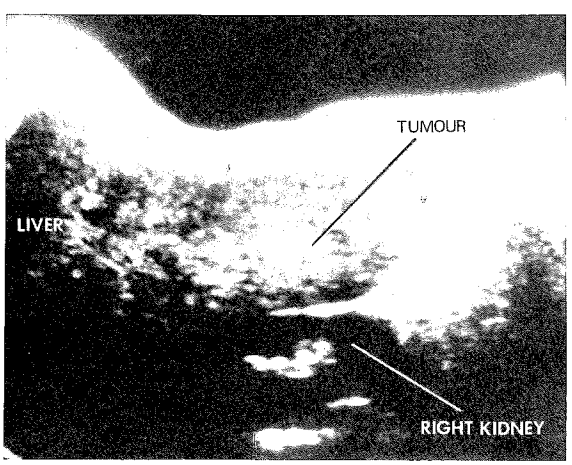

Fig. 6 Longitudinal section of the liver showing hepatoma of the right lobe. Note the dense echoes.

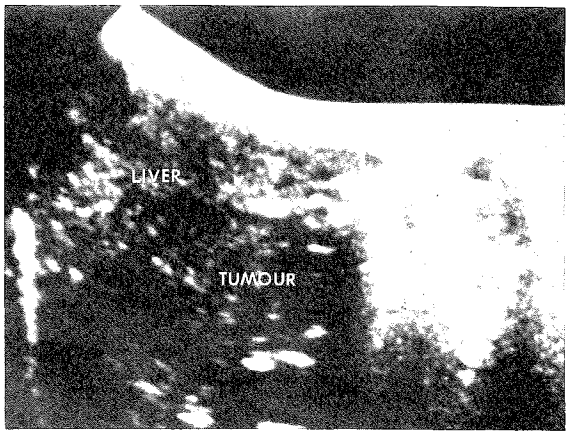

Fig. 7 Longitudinal section showing a large hepatoblastoma in the right lobe of the liver.

One hundred and nineteen clinically enlarged livers out of the series were scanned and primary liver tumours were detected in 33 cases. Secondary deposits from various primary sites were detected in 23 cases. Secondary deposits in the liver are usually well defined initially, but because of the subtle changes in tissue appearance, may require adjustments in the gain settings of the equipment. Fig. 8 shows a secondary deposit from leiomyosarcoma of the small intestine.

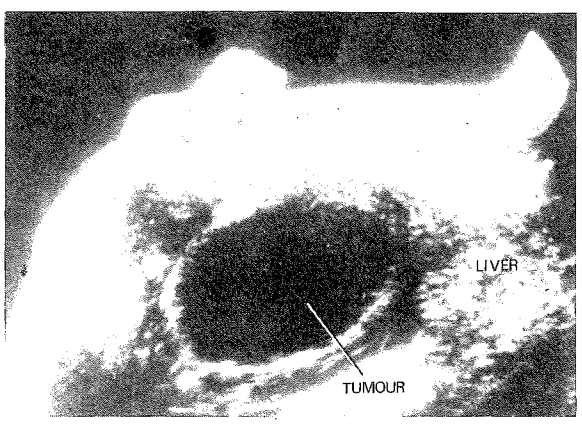

Fig. 8 Transverse section across the right lobe of the liver showing a secondary deposit from leiomyosarcoma of the small intestine. Note the cystic nature of the deposit.

Liver abscesses

Ultrasound has also proven to be very useful in detecting liver abscesses, not only because the

lesions are easily shown but also whether the abscesses are multiple or loculated. Boultbee (1979) in his series detected multiple lesions in 25 percent of his cases. Fig. 9 shows an abscess cavity in a young Indian boy. In my series about 70 percent of the liver abscesses were seen in the Indian ethnic group. Seventeen liver abscesses were detected in the series and 16 were found in the right lobe. Three cases, or 17.6 percent from this small series, were multiple abscesses.

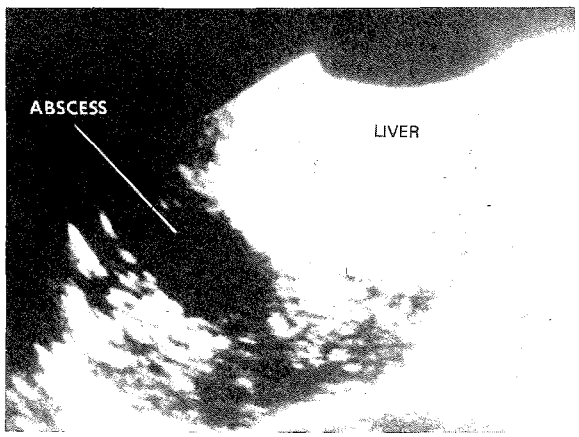

Fig. 9 Transverse section across the right lobe of the liver showing an abscess cavity.

Gallbladder stones

Prior to ultrasound imaging, clinicians depended a great deal on plain and contrast radiography to detect gallstones. These examinations are now superseded by ultrasound and in the majority of cases, no further investigation is required.

Fourteen cases of gallstones were detected in the present series; all of them were not visible on plain radiographs. Fig. 10 shows a typical example of a gallstone. The techniques used to scan the gallbladder area are those as outlined by Foster and Laughlin (1977).

CONCLUSION

Experiences by various ultrasonographists point to the fact that this examination has solved many diagnostic problems involving the liver and biliary tract. Costly and often invasive examinations can be reduced or even avoided in some cases. With early detection of lesions, treatment can be instituted early and hospital stays are shortened. There is no hazard as compared to ionizing radiations. Although ultrasound has its limitations, it offers a very quick and often accurate method of screening the patient.

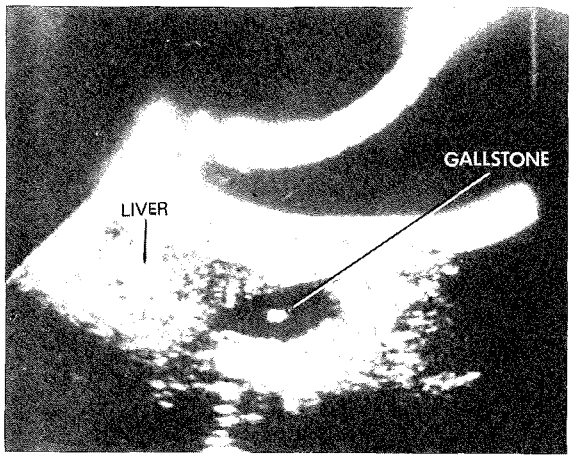

Fig. 10 Longitudinal section of the liver and gallbladder showing a gallstone.

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