

CASE REPORT

Focal nodular hyperplasia and hepatic adenoma: nuclear medicine perspective

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Abstract

Among benign space occupying hepatic lesions focal nodular hyperplasia (FNH) and hepatic adenoma (HA) occur predominantly in young and middle-aged women. These are mostly discovered incidentally and differentiation is essential because of different therapeutic approaches. We present two cases of FNH and HA and briefly describe the role of nuclear medicine in their imaging.

***Key words**: Focal nodular hyperplasia, hepatic adenoma, liver scan, ^{99m}Tc-Nanocolloid, radionuclide angiography*

Introduction

Space-occupying lesions of liver are a real source of concern not only for patients but can also pose a diagnostic problem for the physicians. Benign lesions like FNH and HA are not very uncommon and differentiation from the malignant lesions is a real challenge. Cross radiological sectional imaging (both radiation and non-radiation based) and nuclear medicine modalities together play an important role in this regard.

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Case 1

A 26-year-old married women presented with 3 months history of recurrent upper abdominal pain of mild to moderate intensity and not accompanied with vomiting. Her previous history was positive for infrequent use of oral contraceptives. Her haematological and biochemical parameters were within normal limits. An upper abdominal ultrasound was performed, which revealed a hypoechoic lesion (6.8 x 5.2 x 6.6 cm) with a central stellate scar occupying the left lobe of liver. Doppler study showed enhanced vascularity of the lesion (Figure 1). A dynamic CT scan was next performed which revealed a large well circumscribed lesion (7.5 x 6 cm) involving the left lobe (segments II and III) with a central hypodense stellate scar. The lesion was highly vascular with washout of tracer in the portal venous phase (Figure 2). Provisional diagnosis of hepatic adenoma was made and correlation with biomarkers and a radiocolloid scan advised. Her alpha fetoprotein was normal at 1.5 ng/dl. A radionuclide liver colloid scan was performed with dynamic, static and SPECT acquisitions (Figure 3). The dynamic images showed an increased perfusion blush over left lobe (comprising clinically known lesion).

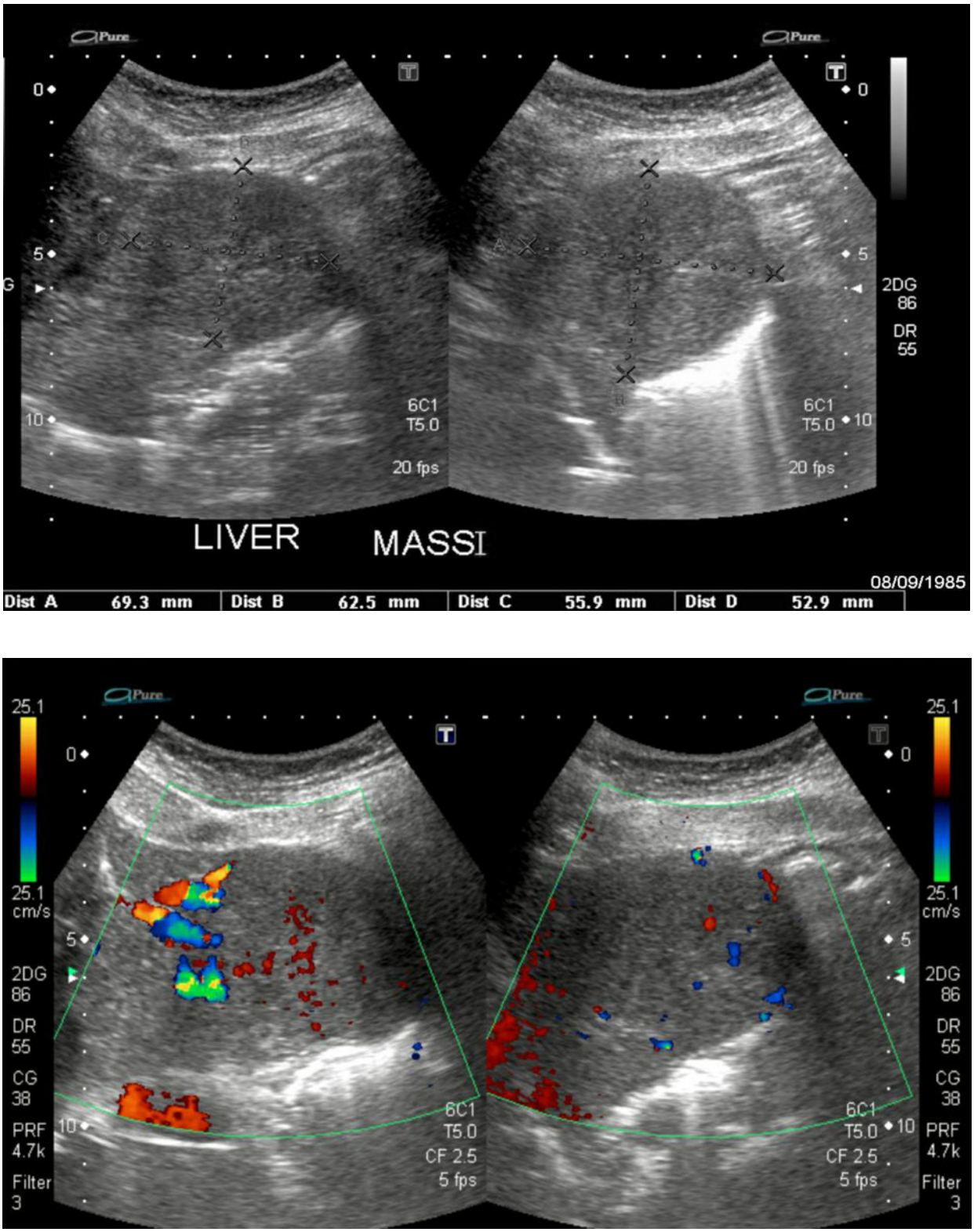

Figure 1 *(Top) Ultrasound of the abdomen showing a well defined hypoechoic lesion in the left lobe of the liver; (Bottom) Doppler study showing enhanced flow over lesion in left hepatic lobe*

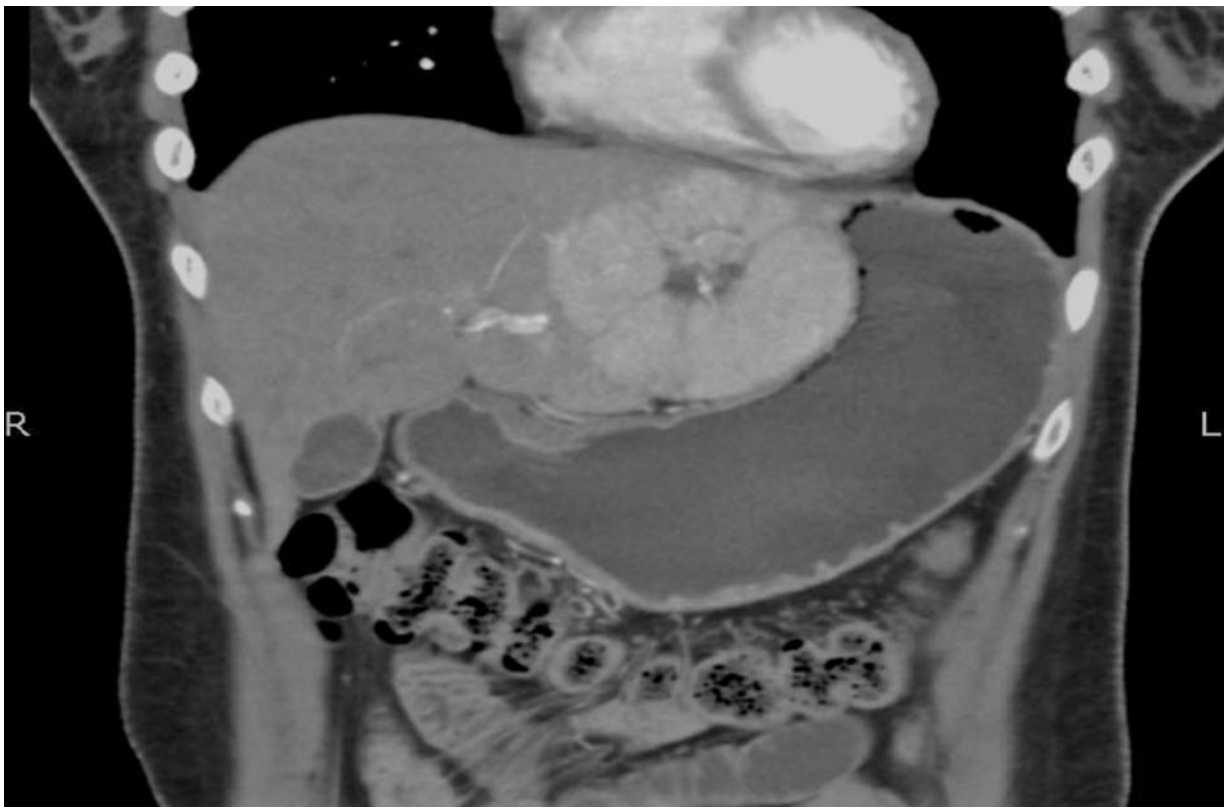

Figure 2 *Contrast enhanced CT scan showing a well circumscribed lesion in the left lobe with a central hypodense stellate scar*

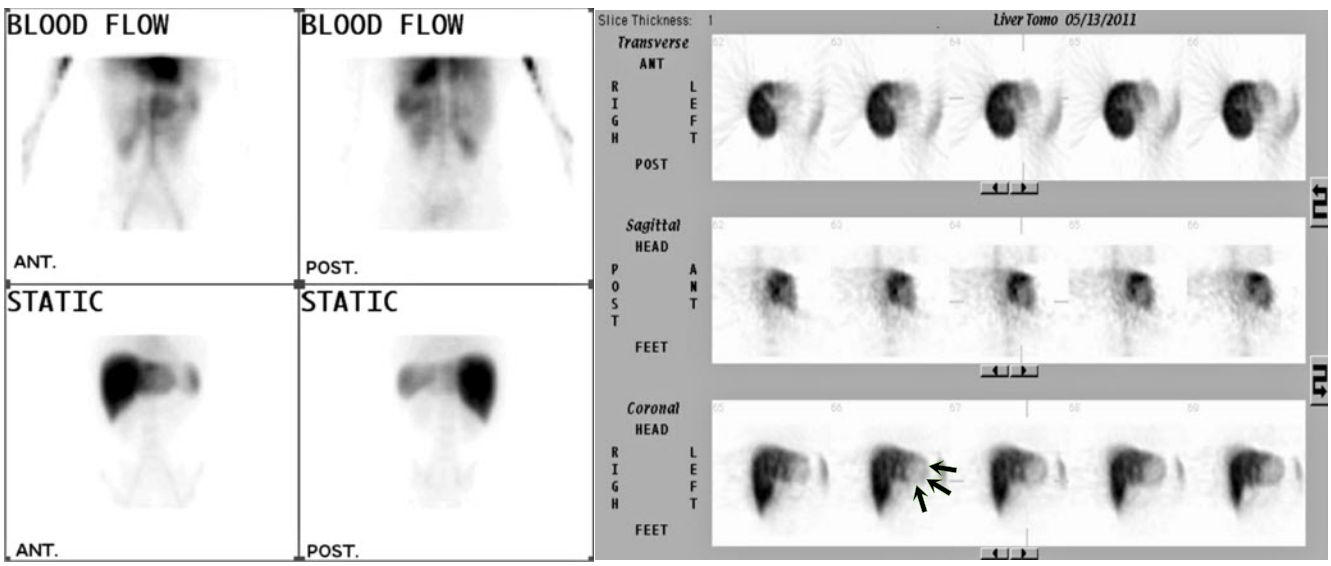

Figure 3 *(Left) ^{99m}Tc-Nanocolloid scan showing enhanced flow over left lobe in the blood pool phase images and with reduced tracer uptake seen on the delayed images; (Right) radiocolloid SPECT scan showing a doughnut lesion involving left hepatic lobe (arrow)*

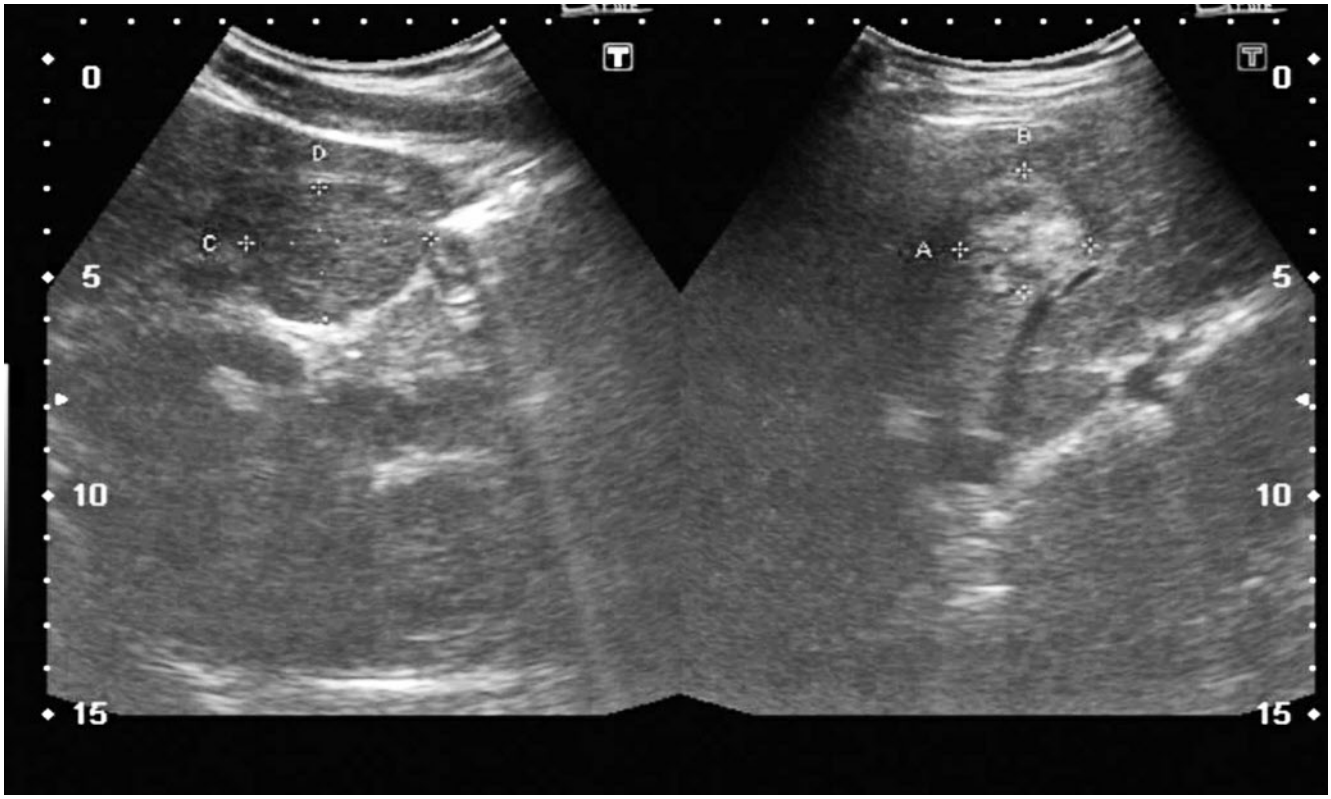

Figure 4 *Ultrasound abdomen showing a large hypoechoic (left) and a smaller lesion with mixed echotexture (right)*

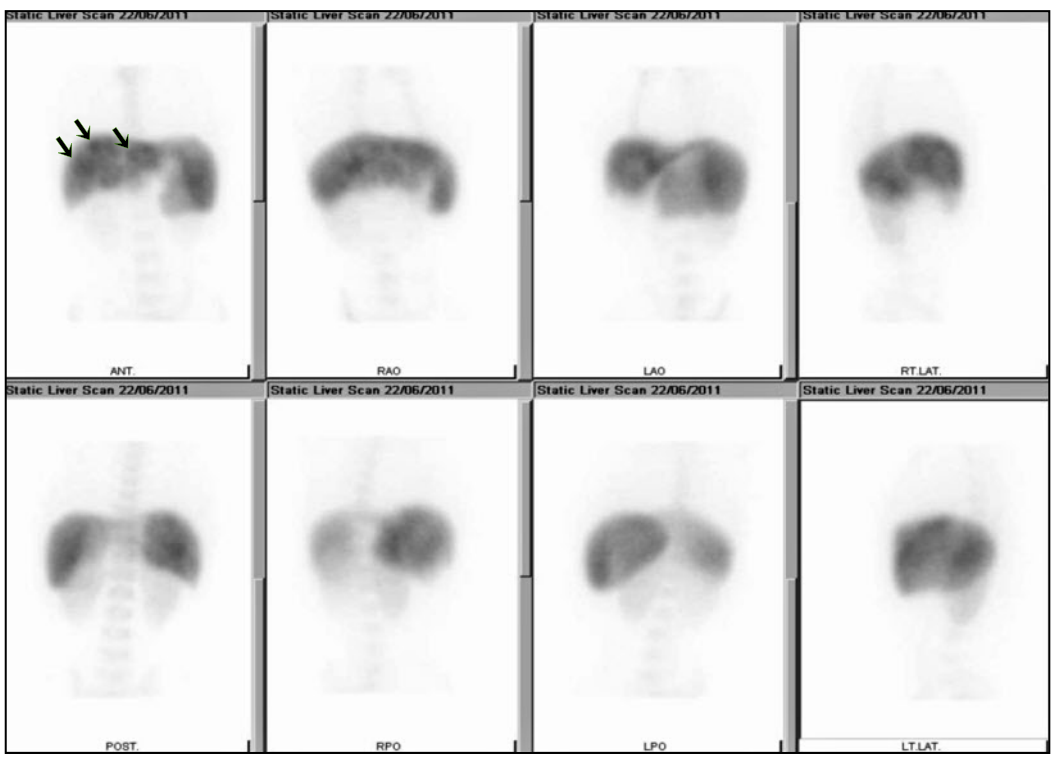

Figure 5 *(A) Radiocolloid scan showing ill-defined areas of nonhomogenous tracer distribution (arrows) with splenomegaly*

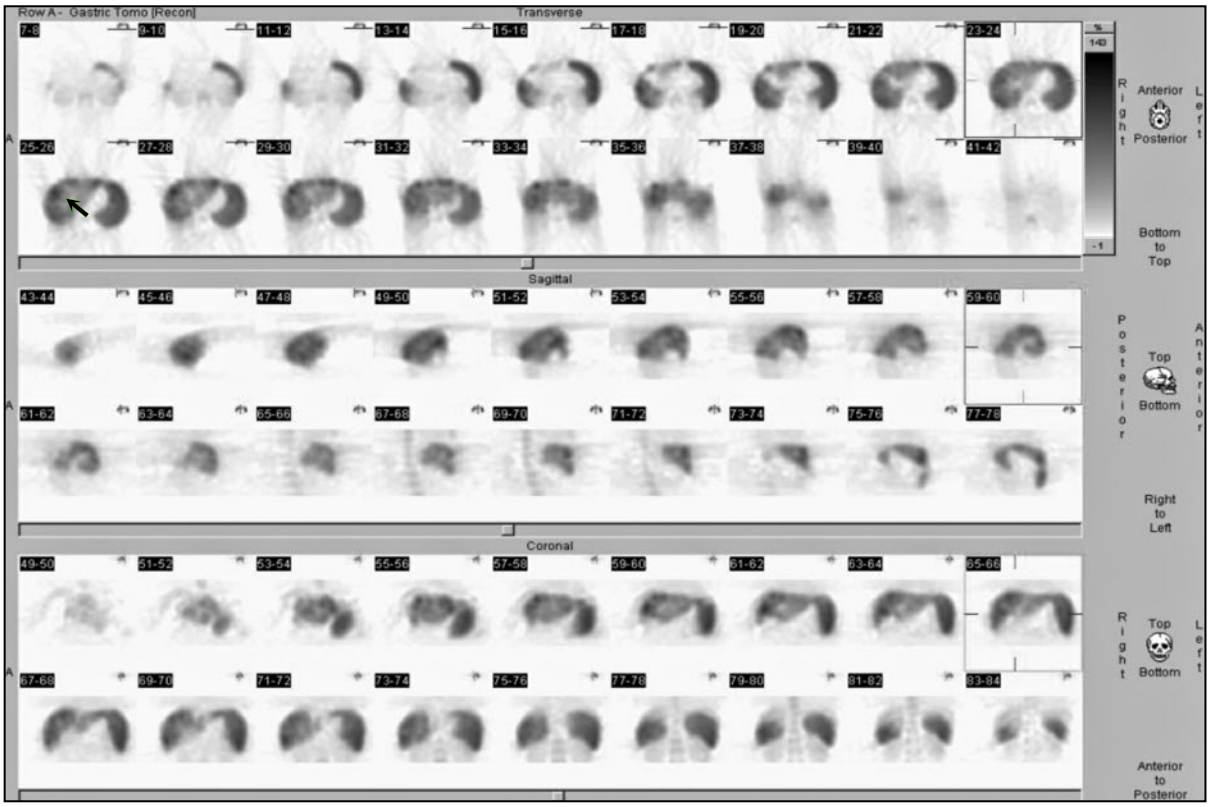

Figure 5 *(B) SPECT showing nodular areas in transaxial slices (arrows)*

Case 2

A 16-years-old girl presented with longstanding history of vague abdominal pain and dyspepsia. Her general physical condition was reasonable good. Haematology, LFTs and renal functions were within normal limits. The ultrasound of the upper abdomen revealed two discrete lesions with mixed echo texture (2.8 x 2.8 cm) and hypoechoic (4 x 3.1 cm) involving the right hepatic lobe (Figure 4). Ultrasound findings were consistent with a provisional diagnosis of focal nodular hyperplasia. A radionuclide colloid scan (planar and SPECT acquisition) was next performed, which revealed ill-defined areas of non-homogenous tracer deposition over both hepatic lobes with splenomegaly (Figure 5a and b).

Discussion

Focal nodular hyperplasia (FNH) and hepatic adenoma (HA) are benign and uncommon space occupying lesions of liver which occur predominantly in young and middle-aged women. These are mostly discovered incidentally and differentiation is essential because of different therapeutic approaches [1, 2].

FNH of the liver is characterized by nodular hyperplasia of the hepatic parenchyma around a central stellate area of fibrosis associated with an anomalous artery or vascular malformation [3]. Association of several vascular anomalies with focal nodular hyperplasia, such as teleangiectasies, haemangiomas, and arteriovenous malformations at the hepatic hilum, support the hypothesis of a vascular origin of focal nodular hyperplasia [3, 4]. In FNH arterial blood flows centrifugally from the anomalous central arteries. HA is a true neoplasm, which is composed of sheets of normal or atypical hepatocytes that are frequently vacuolated and lacking Kupffer's cells and bile ducts. The presence of subcapsular feeding arteries accounts for the centripetal blood flow of the

lesion [4]. The most extensive complication of HA is intratumoural or intraperitoneal haemorrhage, which occurs in 50 to 60% of patients [5]. Patients with focal nodular hyperplasia are usually asymptomatic and rarely experience complications [5].

Nuclear Medicine Imaging in FNA and HA

Gallium-67 (^{67}Ga) scan: Hepatic adenomas demonstrate decreased uptake compared with healthy liver tissue, which can be explained by the benign nature of the cells. FNH may show uptake of ^{67}Ga possibly due to binding of ^{67}Ga-tranferrin complex to transferrin receptors [6].

^{99m}Tc Sulphur Colloid Scan: As HAs usually have few or absent Kupffer's cells, the lesions show focal defects on sulphur-colloid liver-spleen scans. However, an occasional hepatic adenoma contains enough Kupffer cells to demonstrate normal uptake of sulphur colloid. FNH contains Kupffer's cells and usually demonstrates uptake of sulphur colloid. Therefore, radiocolloid uptake strongly favours a diagnosis of FNH. While reduced or absent uptake of sulphur-colloid is not specific for HA and can be attributed to hepatoma and metastases [7].

^{99m}Tc HIDA Scan: HAs usually demonstrate early uptake with subsequent retention of the radiotracer because hepatic adenomas do not contain bile ducts; thus, the radiotracer is not excreted by the lesion, which remains "hot" on delayed images. A fair uptake and clearance of ^{99m}Tc-HIDA is seen in FNH due to the presence of normal bile channels [8].

PET Imaging: Imaging with ^{18}FDG is a sensitive but non-specific as malignant tumors usually show enhanced uptake of ^{18}FDG, whereas benign tumours like HA and FNH are supposed to have normal or reduced uptake. Although a case has been reported of ^{18}FDG uptake in a hepatic adenoma [19]. However, Mohsen *et al.* used ^{11}C-acetate and ^{18}FDG to differentiate between HA and FNH. They reported abnormal uptake of both tracers in HA while FNH showed normal ^{18}FGD but enhanced ^{11}C-acetate uptake [9].

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