DIFFERENTIATION OF CIRRHOTIC Vs IDIOPATHIC PORTAL HYPERTENSION USING ^{99}MTCSfl COLLOID DYNAMIC AND STATIC SCINTIGRAPHY

Pages with reference to book, From **126** To **129**

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ABSTRACT

Thirty-seven cases of portal hypertension with endoscopically proven oesophageal varices underwent liver biopsy to determine the etiology of portal hypertension Of the total, 19 had cirrhosis and 18 idiopathic portal hypertension (IPH). Later all these patients underwent Tc mSn colloid, static and dynamic scintigraphy of the liver and spleen. Ratios of the area and of the integral and slope of the integral for liver and spleen were calculated to see if any of these ratios can differentiate cirrhotics from IPH. Significant difference ($P < 0.001$) was noted in the ratio of the area (L/S) in both patients and controls, but the ratios of the integral and the slope of the integral were not only significantly different ($P < 0.001$) in the patients and controls but also in the two groups of patients (cirrhosis and IPH). The sensitivity of this test when compared with the histology was 58% for both cirrhosis and IPH but when compared with clinical diagnosis it was 76% for cirrhosis and 62% for idiopathic group. Therefore by adding the above mentioned test in the routine study of liver scintigraphy in patients with portal hypertension, further differentiation of cirrhotic group can be done from the idiopathic group (JMPA 41:126, 1991).

INTRODUCTION

Radioactive colloids are universally used for the evaluation of reticuloendothelial cell function of the liver and spleen in various hepatobiliary diseases. For the estimation of liver perfusion and function, apart from performing the static imaging, the dynamic imaging has also been used with good results[1]. Quantitative assessment of hepatic and splenic blood flow by indices derived from the time-activity curves has now been well established in normal and patients with various acute and chronic liver diseases[2-7] . In our preliminary report on the technique, we were able to differentiate the cirrhotic from the idiopathic portai hypertensive (IPH) group using the above mentioned technique[8]. IPH is a clinical disorder of unknown etiology characterized by splenomegaly, anaemia and portal hypertension. Its diagnostic criteria include[9] normal to near normal liver function test, presence of varices, decrease in one or more formed elements of blood, liver scan not suggestive of cirrhosis, patent portal and extra hepatic portal vein, grossly non-cirrhotic liver, slightly elevated WHVP and portal fibrosis not suggestive of cirrhosis. Though all these criteria are not necessary for the diagnosis of IPH but exclusion of cirrhosis is a must. In view of a higher frequency of idiopathic portal hypertension (IPH) in Pakistan, and with the obvious difficulties in differentiating cirrhotics from the IPH group, the present study was done in a larger sample size to confirm our initial findings and to authenticate the introduction of this test in the routine clinical environment for the workup of portal hypertension.

MATERIAL AND METHODS

History and physical findings of clinically suspected cases of portal hypertension were entered in a standard proforma and their blood taken for complete picture, prothrombin time and standard liver function tests. All patients had endoscopically confirmed oesophageal varices, and had ultrasonography and liver biopsy done to determine the etiology of portal hypertension. The diagnosis of idiopathic portal hypertension[9] and cirrhosis[10] was made on histology in all except 4 cases, where only clinical, biochemical and ultrasonographic findings were taken into consideration. Patients were later sent to the nuclear medicine department for scintigraphy, where the examiner (SK) was not informed about their histological diagnosis.

Imaging

Patients were placed supine beneath a LFOV gamma camera (Scintronex 480) so that liver spleen and heart were included in an anterior image. An injection of 4mci (150 MBq) ^{99}mTc tin colloid was administered intravenously as a bolus dose. Using an online computer system (Data General Nova 4x), digital images were recorded in a 64 x 64 matrix at 0.5 sec intervals for 240 seconds after injection. Anterior and posterior images of 1,500k counts each were also recorded at 15 minutes to obtain the static part of the study.

Analysis

Thirty-seven portal hypertensives and 15 normal controls were studied. Static anterior and posterior images were evaluated as in routine scan. ROIs (Regions of interest) were drawn around the liver and spleen on the static pictures and the number of pixels encompassed noted to derive the ratio of liver to spleen area (AL/S). Time-activity curves for the liver, spleen and representative portion of heart were generated from the dynamic study by placing suitable ROTs. The total integrated counts of the liver and spleen time-activity curves and the slope of the integral were computed to derive the liver to spleen ratio of integral (IL/S) and ratio of slope of integral (SIL/S). Statistical evaluation was done using student's 't' test and screening test[10] for determining the sensitivity.

RESULTS

Thirty-seven portal hypertensives with endoscopically confirmed oesophageal varices were included in the study. Of the total, there were 16 males and 21 females with a mean age of 55.2 years (range 7-65 years). The cause of portal hypertension on histology was cirrhosis in 16 and IPH9 in 15 cases. In six cases biopsy was either not done or was inclusive; therefore other parameters like biochemical findings and ultrasonography were taken into consideration to make a presumptive diagnosis; of these 3 were thought to have cirrhosis and 3 IPH. With histology taken as the diagnostic test to differentiate cirrhosis from IPH, various parameters like age, sex, history of jaundice, G.I. bleeding, as cites/oedema, splenomegaly, child's grading for the severity of liver disease, variceal gradings were compared in the two groups.

Table I. Demographic profile of patients along with clinical, histological and scintigraphic diagnosis.

S.No	AGE	SEX	H/O Jaundice	H/0 G.I Bleed	Ascites/ Oed.	Splenomegaly	O.V	Child's Grade	Scinitigraphic Ratios A L/S	I L/S	SI L/S	Diagnosis Clinical	Histological	Scintigraphic
1 ZB	45	F	NO	NO	YES	NO	III	A	0.61	0.42	0.31	C	IPH	C
2 S	48	F	NO	YES	YES	YES	III	B	1.4	1.2	0.9	C	C	C
3 MR	14	M	YES	YES	YES	YES	II	C	1.08	0.41	0.26	C	N.D	C
4 IB	25	M	NO	NO	YES	YES	III	B	0.38	0.27	0.24	C	IPH	C
5 S	24	M	YES	YES	NO	YES	II	A	0.69	0.96	0.75	IPH	IPH	C
6 ZK	35	F	YES	YES	YES	YES	III	A	0.55	O.79	0.76	C	IPH	C
7 F	40	F	NO	YES	NO	YES	II	A	1.54	1.1	0.95	IPH	INC	C
8 SK	65	F	YES	YES	NO	YES	III	B	0.8	0.69	0.69	C	N.D	C
9 SA	26	M	NO	YES	NO	YES	IV	A	0.72	1.06	0.75	C	C	C
10 FB	65	F	NO	NO	YES	YES	II	A	2.25	0.73	0.69	C	C	C
11 C	4	F	NO	NO	YES	NO	II	B	1.14	0.91	0.79	C	C	C
12 NO	45	F	YES	NO	NO	YES	II	A	1.4	1.09	0.92	C	C	C
13 B	14	F	NO	YES	NO	YES	II	A	1.06	0.56	0.6	IPH	IPH	C
14 Z	25	M	YES	YES	YES	YES	III	A	0.98	0.51	0.63	C	C	C
15 U	7	M	YES	NO	YES	YES	III	C	1.09	0.68	0.6	C	IPH	C
16 SQ	12	F	NO	YES	NO	YES	III	B	0.66	0.51	0.57	IPH	IPH	C
17 NN	45	F	NO	YES	YES	YES	IV	B	0.87	0.5	0.45	C	C	C
18 AQ	45	F	NO	NO	YES	YES	III	A	0.78	0.54	0.53	C	C	C
19 H	47	F	NO	NO	YES	YES	I	A	0.73	0.68	0.64	C	C	C
20 KF	45	F	YES	YES	NO	YES	II	A	0.83	1.15	0.56	IPH	C	C
21 MA	20	M	NO	YES	NO	YES	II	A	1.06	0.58	0.54	C	C	C
22 MA	40	M	NO	YES	YES	NO	III	B	1.26	1.72	1.97	C	C	C
23 M	20	F	NO	YES	NO	YES	II	A	2.8	3.31	3.6	IPH	IPH	IPH
24 SA	35	M	YES	NO	YES	YES	II	A	0.9	1.36	1.51	IPH	IPH	IPH
25 F	30	F	NO	YES	YES	YES	II	A	1.51	1.9	1.74	C	C	C
26 MS	55	M	NO	YES	NO	NO	II	A	1.45	1.96	1.91	IPH	INC	IPH
27 ZP	52	F	NO	YES	YES	NO	III	B	1.1	1.69	1.76	C	C	IPH
28 MS	55	M	NO	YES	NO	NO	II	A	3	5.9	6.9	IPH	IPH	IPH
29 HZ	16	F	NO	YES	NO	YES	II	A	0.58	1.7	1.9	IPH	IPH	IPH
30 F	35	F	NO	YES	YES	NO	I	B	3.44	4.2	4.47	IPH	N.D	IPH
31 MA	50	M	NO	YES	YES	NO	II	A	2.46	4.07	4.16	C	N.D	IPH
32 AB	45	F	YES	NO	NO	YES	III	A	2.76	3.04	3.1	C	C	IPH
33 AG	60	M	NO	YES	NO	YES	IV	B	1.49	2.84	3.01	IPH	IPH	IPH
34 KA	48	M	YES	YES	YES	YES	II	B	2.71	4.03	4.55	IPH	IPH	IPH
35 RA	16	M	YES	YES	NO	YES	II	A	1	1.35	1.44	IPH	IPH	IPH
36 SA	50	F	YES	YES	NO	YES	II	B	2.11	3.06	2.6	C	C	IPH
37 MF	11	M	NO	YES	NO	YES	III	A	1.52	1.96	2.07	IPH	IPH	IPH

N. : Note done
INC : Inconclusive

Table I gives the demographic profile of patients with portal hypertension alongwith clinical, histological and scintigraphic ratios. Although a significant difference ($P< 0.001$) was found in the ratio of the area (AL/S) in patients than in controls but no difference was found between the two groups of patients i.a, cirrhotics and IPH. However, the ratio of the integral (I L/S) and the slope of the integral (SI L/S) were not only significantly different ($P <0.001$) between patients and controls but also between cirrhotics and 1PM (Table II).

Table II Evaluation of results

	No.	Range Ratio of area (L/S)	Mean + S.D Ratio of area (L/S)	Range Ratio of integral (I L/S)	Mean + S.D Ratio of integral (I L/S)	Range Ratio of slope of integral (SI L/S)	Mean + S.D Ratio of slope of integral (SI L/S)	P-Value
Clinical & Histological diagnosis								
Healthy Controls (A)	15	2.92-6.05	4.79+1.00	4.82-10.59	7.56+ 1.98	4.87-14.18	8.42+2.52	A1 Vs D1 Vs E1 < 0.001
Cirrhosis (B)	19	0.72-2.76	1.32+0.60	0.41-4.07	1.34+0.99	0.26- 4.16	1.24+1.02	A1 Vs B1 Vs C1 < 0.001
Idiopathic portal hypertension (C)	18	0.38-3.40	1.42+0.90	0.27-5.90	1.86+1.52	0.24- 6.90	1.97+1.78	A2 Vs B2 Vs C2 < 0.001
SCINTIGPAPHIC DIAGNOSIS								
Cirrhosis (D)	21	0.38-2.25	0.98+0.40	0.27-1.2	0.73+0.26	0.24- 0.97	0.62+0.19	A2 Vs D2 Vs E2 < 0.001
Idiopathic portal hypertension (E)	16	0.85-3.44	1.89+0.82	1.35-5.9	2.75+1.25	1.44- 6.9	2.91+1.45	A3 Vs D3 Vs E3 < 0.001

Patients having a ratio of slope of the integral of less than or equal to one were mostly cirrhotics and those having a ratio of over one had 1PM. 99mTc-Sn colloid dynamic and static time activity curves were drawn in all these cases. Typical variations were seen in the uptake of the isotope by liver and spleen in cirrhosis and idiopathic portal hypertension making the differentiation rapid and easy. The static and dynamic time activity curves in cirrhosis, IPH and a normal control are shown in Figures 1,2 and 3.

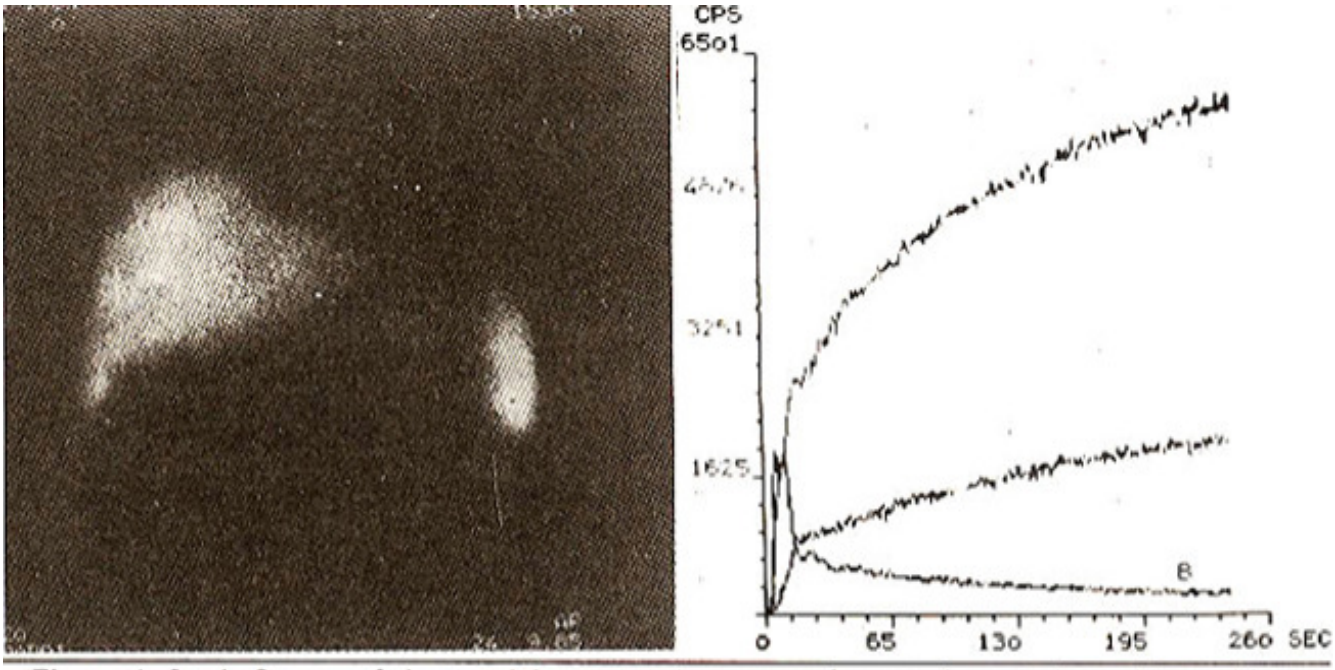

Figure 1. Static Scan and time activity curves in a normal control. static Scan. Normal liver Scintigraphy, no cold area seen in liver, time activity curves. L-Liver; S-Spleen; H-Heart.

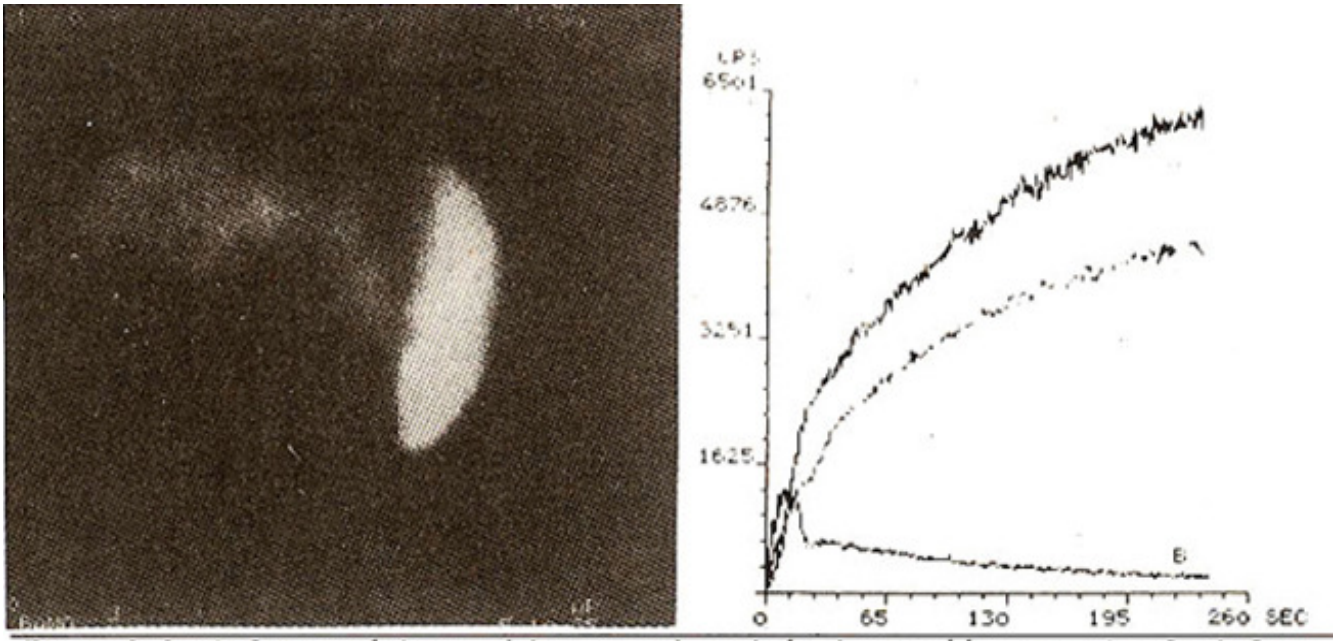

Figure 2. Static Scan and time activity curves in a cirrhotic portal hypertensive. Static Scan. Liver shows decreased and patchy distribution of Isotope. No cold area seen. Spleen good Concentration. Bone Marrow uptake also noted. Time activity curves. L-liver; S-spleen; H-heart.

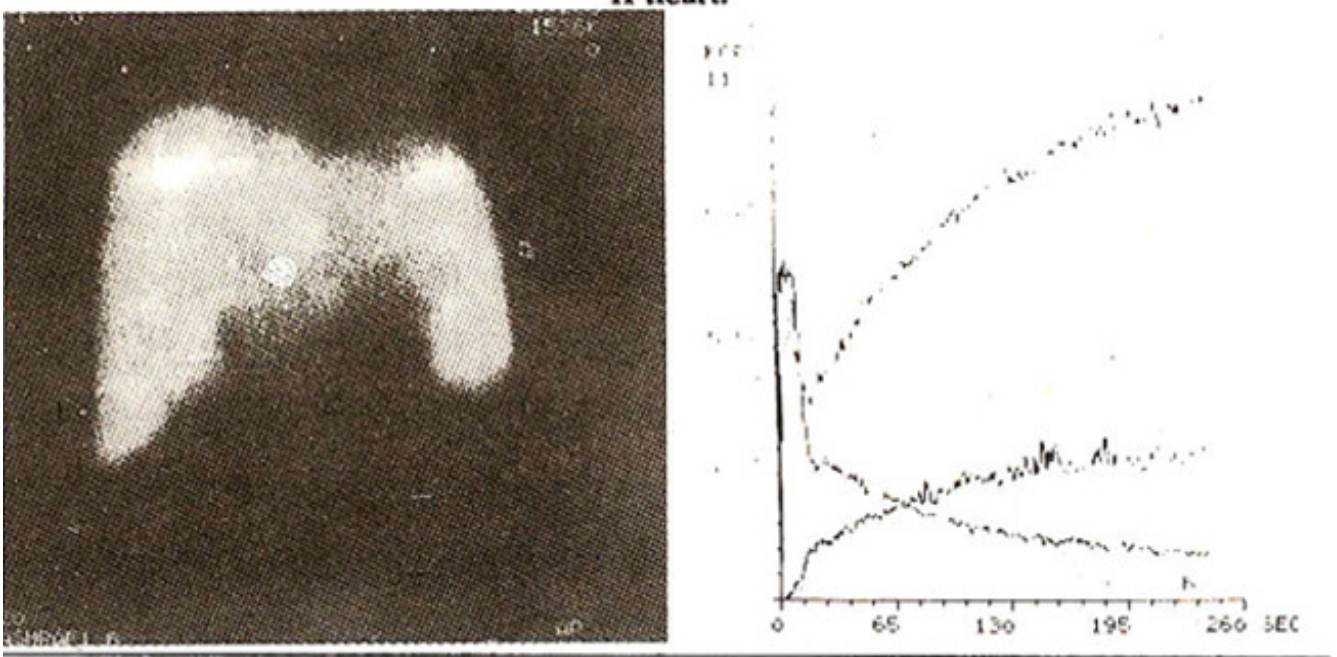

Figure 3. Static Scan and time activity curves in Idiopathic portal hypertension. Static Scan. Liver patchy uptake, No cold area seen. Spleen good uptake of Isotope. Time activity curves. L-liver; S-spleen; H-heart.

When the diagnostic sensitivity of this method was compared with the histology in differentiating cirrhoucs from 1PM, a sensitivity of 58% was achieved for both cirrhosis and IPH, giving a high diagnostic yield for histology. But in cases in whom biopsy is contraindicated or who refuse to get a histology done, the sensitivity of this method when compared with clinical diagnosis was 76% for cirrhosis and 62% for 1PM, showing a good diagnostic yield.

DISCUSSION

^{99}mTc-Sn colloid scintigraphy was found to be a simple and rapid method of differentiating cirrhosis from IPH. The results of the present study are in accordance with our previous findings[8]. Being a comparatively less invasive test than liver biopsy, its usefulness would be enhanced in cases where liver biopsy is contraindicated or difficult to perform (Massive ascites, altered coagulation profile, small shrunken liver and patient's reluctance to undergo biopsy). 1PM is a very well recognized clinical entity in Japan[9] and India[11] but is very infrequent in the western countries[12]. Although the actual frequency of IPH is not known in Pakistan but with the increasing awareness of this disease entity, lot of new patients are being diagnosed. Unlike cirrhosis where liver is diseased, liver in 1PM is almost normal, therefore the disease runs a protracted course with good prognosis[13-16] and has a high survival rate (87%)[17] following leinorenal shunt and sclerotherapy (100%)[15]. In view of good prognosis in IPH there is a need to diagnose and treat these cases as early as possible; this further accentuates the need to properly identify these cases, for which scintigraphy technique may be used initially to differentiate cirrhosis from noncirrhotic group and once diagnosed, patients with 1PM may be subjected to further tests to confirm the diagnosis. Of the various pathophysiological parameters evaluated, histology followed by clinical diagnosis showed a good correlation to the ratio of the slope of integral.

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