Liver Scintigraphic Studies on Leukemia

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The purpose of this study is to investigate the usefulness of liver scanning with radiogold in cases of leukemia.

The author has studied the scintigraphic changes of liver and spleen.

A correlation between scintigraphic findings and chemical liver function studies were observed.

METHOD

Patients with leukemia were admitted to the Department of Medicine at the Busan National University Hospital from Octover 1962 to September 1980 for studies.

Liver scanning with ratioactive colloidal gold was carried out in 42 cases of the total 72 patients of leukemia.

Colloidal radiogold ^{198}Au was used as a tracer.

Liver scanning was performed 30 minutes after injection of 4 μc. per kg body weight. The usual dose was 200~300 μc.

Simultaneously routine chemical liver function studies like B.S.P., serum colloidal reaction and enzyme activities tests were done.

RESULTS

The liver scanning using radiogold was carried out in 42 cases of 72 cases, among them 14 cases were acute myelocytic leukemia, 10 chronic myelocytic leukemia, 7 acute monocytic leukemia and 11 acute lymphocytic leukemia. (Table 1, 2).

1) On the scintigraphic studies hypertrophy pattern of the liver was found in 38 cases(90.5%), among them 14 cases were acute myelocytic leukemia, 10 cases chronic myelocytic leukemia, 6 cases acute monocytic leukemia and 8 cases acute lymphocytic leukemia.

Spleen visualization was noticed in 21 cases(50.0%), among them 7 cases were chronic myelocytic leukemia, 6 cases acute myelocytic leukemia, 4 acute monocytic leukemia and 4 acute lymphocytic leukemia(Table 3, 4, 5).

2) On the chemical liver function studies, albumin level less than 3.5 gm% found in 36 cases(50%) out of 72 cases, total protein was less than 6.0 gm % in 27 cases(37.5%), A/G ratio less than 1.2 : 1 noticed in 20 cases(27.8%), serum bilirubin more than 1.1 mg% in 12 cases(16.7%), GOT elevation in 16 cases(22.2%), GPT elevation in 9 cases(12.5%), alkaline phosphatase elevation in 8 cases (11.1%) (Table 6, 7).

As to the clinical pictures, hepatomegaly in 36 cases(50.0%), splenomegaly in 28 cases(38.9%) and other systemic pictures—general weakness(81.9%), fever(80.6%) and pallor(70.8%) were significant.

Table 1. Case Material (Clinical Types of 72 Cases of Leukemia)

Classification	No. Cases (*)
Acute myelocytic leukemia (AML)	33 (14)
Acute lymphocytic leukemia (ALL)	22 (11)
Acute monocytic leukemia (AMOL)	7 (7)
Chronic myelocytic leukemia (CML)	10 (10)

(*) Scintigraphic studies were performed

Table 2. Age and Sex Distribution of 72 Cases of Leukemia

Sex	Age	15~19	20~29	30~39	40~49	50~59	60~69
Male	43(30)*	9(2)	10(10)	12(8)	6(5)	5(5)	1(0)
Female	29(12)*	8(3)	10(5)	5(0)	1(0)	4(3)	1(1)
Total	72(42)*	17(5)	20(15)	17(8)	7(5)	9(8)	2(1)

* : Scintigraphic studies carried out in 42 cases

Table 3. Scintigraphic Findings of 42 Cases of Leukemia

Scan findings*	No. cases(%)	Remarks
Hypertrophy pattern of the liver	38/42(90.5)	14/14(100%) AML
		10/10(100%) CML
		6/ 7(85.7%) AMoL
		8/11(72.7%) ALL
Spleen visualization	21/42(50.0)	6/14(42.9%) AML
		7/10(70.0%) CML
		4/ 7(57.1%) AMoL
		4/11(36.4%) ALL

* : Mottling in AMoL(2 cases) and low uptake in ALL(2 cases)

Table 4. Scan Findings in each Group of Leukemia

	AML(14 cases)	CML(10 cases)	AMoL(7 cases)	ALL(11 cases)	P-value
Hypertrophy pattern of liver	14(100%)	10(100%)	6(85.7%)	8(72.7%)	N.S.*
Spleen visualization	6(42.9%)	7(70%)	4(57.1%)	4(36.4%)	N.S.

* N.S.: Statistically not significant

Table 5. Spleen Visualization in each Group of Leukemia

	AML(11 cases)	CML(15 cases)	AMoL(7 cases)	ALL(11 cases)	Total
Grade 1	5	5	4	2	16(76.2%)
Grade 11	1	2	0	2	5(23.8%)
	6	7	4	4	21(100.0%)

On liver biopsy findings, they showed marked leukemic infiltrates in the liver.

3) As to the correlation between scintigraphic findings and chemical liver function abnormalities including clinical pictures, incidence of hypertrophy pattern of the liver on scintigram(90.5%) was more significant than the occurrence of hypoalbuminemia(50.0%), hyperbilirubinemia(16.7%) and palpable liver(50.0%).

Incidence of spleen visualization on radioisotope scan(50.0%) was rather significant than the occurrence of palpable spleen(38.9%), and slight

Table 6. Chemical Liver Function Studies of 72 Cases of Leukemia

L.F.T.	Values	No. Cases(%)
Total protein(gm%)	<6.0	27(37.5)
Albumin	<3.5	36(50.0)
Globulin	<2.5	9(12.5)
A/G ratio	<1.2 : 1	20(27.8)
T.T.T.(M-u)	>5	12(16.7)
C.C.F.(/24 hrs)	>++	12(16.7)
Total bilirubin(mg%)	>1.1	12(16.7)
Direct bilirubin	>0.4	10(13.9)
Indirect bilirubin	>0.7	12(16.7)
SGOT(S-F u)	>40	16(22.2)
SGPT(S-F u)	>35	9(12.5)
Alk. phosphatase(S.J. u)	>8.2	8(11.1)

Table 7. Clinical Pictures of 72 cases of Leukemia

Symptoms & Signs	No cases(%)
General weakness	59(81.9)
Fever	58(80.6)
Pallor	51(70.8)
Hepatomegaly(Palpable liver)	36(50.0)
Splenomegaly(Palpable spleen)	28(32.9)
Bleeding	22(30.6)
Abdominal pain	19(26.4)

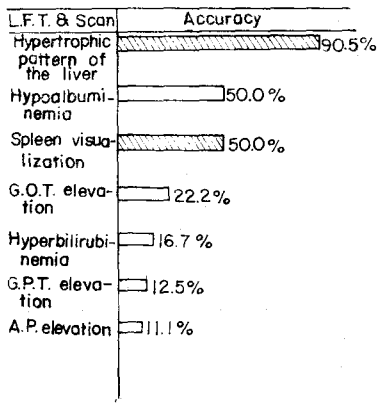

Fig. 1. Correlation between scintigraphic findings and chemical liver function abnormalities of leukemia.

grade of spleen visualization on scan in majority cases of leukemia(76.2%) was also characteristic.

DISCUSSION

It has been emphasized that hepatic scanning with radiogold is one of the most useful diagnostic method of space-occupying lesions and diffuse hepatopathies, however, diagnostic value of diseases of hematopoietic system has not been fully evaluated.[1~3] Under normal conditions most of the material is trapped in the Kupffer cells of the liver, therefore minimum spleen uptake and bone marrow uptake except portal circulation or reticuloendothelial function of the liver is impaired. Practically no spleen visualization in the radiogold liver scanning were reported in normal person.[1~4].

Diagnosis of liver diseases by radioisotope scanning is recently applied not only to the space-occupying lesion, parenchymal diseases and malposition of the liver but quantitative measurement of hepatic size and differential diagnosis of abnormal mass.[2,3] As to the scintigraphic changes of the liver, hypertrophy pattern of the liver and cold area are emphasized in space-occupying lesion and hypertrophy or atrophy, mottling and spleen visualization in chronic diffuse hepatopathies.[5~10]

Scintigraphic findings of leukemia were summarized as hypertrophy pattern of liver and spleen visualization in this study. It was characteristic that the scintigraphic findings are more sensitive than chemical liver function abnormalities which reflect the pathological findings of leukemic infiltrates in the liver and spleen[11~16].

As to the incidence of spleen visualization on radioisotope scan, it has been reported that high incidence of marked spleen visualization 100.0% in Banti's syndrome, 66.6~70.0% in liver cirrhosis, 53.3% in chronic hepatitis, 37.5% in hepatoma, 13.3% in amebic liver abscess[5~9,17~25].

Incidence of spleen visualization on radioisotope scan in leukemia was 50.0% which is significant

than the occurrence of palpable spleen(38.9%) but the grade of spleen visualization on scan was so mild, whereas huge splenomegaly was present.

CONCLUSION

The diagnostic value of liver scanning with radioactive colloidal gold in leukemia is recognized.

The author emphasizes the hypertrophy pattern of liver and mild spleen visualization in the liver scintigram with radiogold of leukemia. The correlation between scintigraphic findings and chemical abnormalities including clinical pictures was also emphasized.

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