

Observations on Pathosis on the Surface of Liver and Spleen in Chronic Schistosomiasis Japonica

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Introduction

It is well known that the liver surface of patients with chronic schistosomiasis japonica are remarkably uneven and have mixed nodules which show hexagonal patterns some times, but there are few reports about the observation of the liver and the spleen in lived persons.

The authors have observed the liver surfaces by laparoscopy and the excised spleen in case of splenomegaly for these twelve years. The findings observed were discussed.

Methods

Examinations were carried out on patients at the internal medicine in Kofu City Hospital for twelve years (1965-1976). At first, patients were examined on anamnesis of schistosomiasis japonica by skin tests using Melcher's antigen (1:1,000), fecal examinations, liver biopsies and rectal biopsies. The observations on the liver surfaces of 197 patients having previous history of infection

were made by laparoscopy. Simultaneously, the liver biopsies were also carried out, the tissue lesions and the distribution of *Schistosoma japonicum* eggs in the liver tissues were examined. Moreover, the transformation of the liver was measured by scintiscanning methods.

On the other hand, surface of the excised spleens in 82 patients with splenomegaly having snamnesis this disease were examined after laparotomy in a surgery. Moreover, the portal tension was measured through the superior mesenteric veins and the relationship between the weight of the spleen and the tension was discussed. The membrane-like deposit, colored white or yellowish white and containing fibrin, was observed on the surface of liver and spleen (Iuchi *et al.*, 1978). Authors called it "fur" for convenience. The fur size observed on the liver and spleen expressed as follows; (+): the fur occupied more than one-third on the surface, (+): less than one-third, (-): no fur was observed.

Results

1. The changes of the liver surfaces in schistosomiasis japonica were characterized by the fur and hepatatrophia in the right lobe (Fig. 1). The fur on the liver surfaces was found in all of 197 patients. The fur was spotty and ribbon-like in the young

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a



b

Fig. 1 The changes of liver surface in chronic schistosomiasis japonica.

- a) The photo of the excised liver.
- b) The observation by laparoscopy.

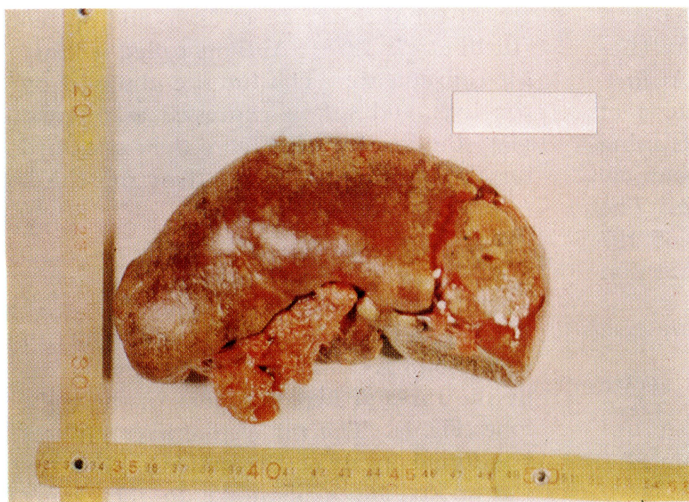


Fig. 2 The change of spleen surface in chronic schistosomiasis japonica.

people and was observed broadly on liver surfaces in the aged people. The liver biopsies were carried out in all cases, and the ova were found in 154 cases (78.2%). Moreover, the biopsies of the liver tissues under the fur were performed in 56 out of them and numerous ova were found in each case.

This disease is characterized by the hepatopathy remarkably in the right lobe. The intense atrophy of the tissues was observed in right lobe of the liver.

2. The fur on the spleen (Fig. 2) was observed in 59 out of 82 cases (70.2%). On the other hand, no *Schistosoma* egg from the spleen was found in our case.

(1) Relationship between liver tissue lesions and the fur on the spleen:

As shown in Table 1, in the group of the liver cirrhosis the fur on the spleen was observed in 15 out of 30 cases (50%) and in the group of non-cirrhosis that was observed in 41 out of 52 cases (78.5%). Of

those cases the fur (++) was found in 5 out of 30 cases (17%) in the group of the liver cirrhosis and in 24 out of 52 cases (46%) in the other group.

(2) Relationship between non-cirrhosis lesions of the liver and the fur on the spleen:

As described above, the fur on the spleen

Table 2 Relationship between age and the splenic fur in non-cirrhosis of the liver

Age	No. of observed	Fur		
		(++)	(+)	(-)
60~	8	4 (50)*	2 (25)	2 (25)
50~	21	10 (48)	7 (33)	4 (19)
40~	12	5 (42)	4 (33)	3 (25)
30~	9	4 (44)	3 (33)	2 (22)
20~	2	1 (50)	1 (50)	0
Total	52	24 (46)	17 (33)	11 (21)

* The values of the parentheses represent the percentage.

Table 1 Relationship among liver tissue lesions, the weight of spleen and the appearance of splenic fur

a) Cases of non-cirrhosis of the liver.

Weight of spleen (g)	No. of observed	Fur		
		(++)	(+)	(-)
1,000 ↑	13	9 (69)*	2 (16)	2 (16)
750 ↑	15	9 (60)	5 (33)	1 (7)
500 ↑	16	6 (38)	8 (50)	2 (13)
500 ↓	8	0	2 (25)	6 (75)
Total	52	24 (46)	17 (33)	11 (21)

b) Cases of cirrhosis of the liver.

Weight of spleen (g)	No. of observed	Fur		
		(++)	(+)	(-)
1,000 ↑	6	3 (50)*	1 (17)	2 (33)
750 ↑	3	1 (33)	5 (67)	2 (25)
500 ↑	7	1 (14)	3 (43)	3 (43)
500 ↓	9	0	1 (11)	8 (89)
Total	50	5 (17)	10 (33)	15 (50)

* The values in parentheses represent the percentage.

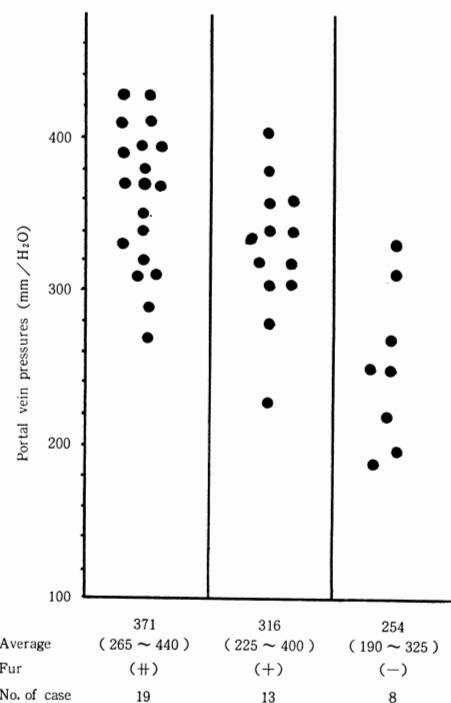


Fig. 3 Relationship between the portal vein pressures and the splenic fur.

had tendency to appear in the non-cirrhotic group rather than in the liver cirrhotic group. As shown in Table 2, no relation between the age and the fur appearance rate of the spleen in the non-cirrhotic group was observed. On the other hand, as shown in Fig. 3, the relationship between the portal vein pressure and the fur appearance rate was as follows: the fur (++) 371 mm/H₂O (265~440 mm/H₂O) (the average portal vein pressure in 19 cases), the fur (+): 316 mm/H₂O (225~400 mm/H₂O) (13 cases), and the fur (-): 254 mm/H₂O (190~325 mm/H₂O) (8 cases). The relationship between the spleen weight in the group of the non-cirrhotic lesions of the liver and the portal vein pressure was shown in Table 3: in 5 cases each spleen weight less than 500 g, the portal vein pressure did not exceed 400 mm/H₂O involving 2 cases showing under 200 mm/H₂O in 11 cases, each spleen weight more than 1,000 g, each of them exceed 200 mm/H₂O, especially, 3 out of 11 cases (27%) showed more than 400 mm/H₂O.

(3) Relationship between the liver tissue lesions and the spleen weights:

In cases of non-cirrhotic lesions of the liver the increase of the spleen weight was shown in 13 men (25%) and 39 women (75%) out of 52 cases. Especially, the spleen weighing more than 1,000 g could be found

Table 3 Relationship between the weight of spleen and portal vein pressures in non-cirrhosis of the liver

Weight of spleen (g)	No. of observed	Portal vein pressures (mm/H ₂ O)			
		200 ↓	200 ↑	300 ↑	400 ↑
1,000 ↑	11	0	3 (27) *	5 (46)	3 (27)
750 ↑	15	0	5 (33)	8 (54)	2 (13)
500 ↑	9	0	3 (33)	5 (56)	1 (11)
500 ↓	5	2 (40)	2 (40)	1 (20)	0
Total	40	2 (5)	13 (33)	19 (48)	6 (40)

* The values in parentheses represent the percentage.

Table 4 Relationship between the weight of spleen and sex of patients in non-cirrhosis

Weight of spleen (g)	No. of observed	Male	Female
1,000 ↑	13	1 (8) *	12 (92)
750 ↑	15	2 (13)	13 (87)
500 ↑	16	7 (44)	9 (56)
500 ↓	8	3 (38)	5 (62)
Total	52	13 (25)	39 (75)

* The values in parentheses represent the percentage.

Table 5 Relationship between the weight of spleen and sex of patients in the liver cirrhosis

Weight of spleen (g)	No. of observed	Male	Female
1,000 ↑	6	2 (33) *	4 (67)
750 ↑	8	1 (13)	7 (87)
500 ↑	7	4 (57)	3 (43)
500 ↓	9	7 (78)	2 (22)
Total	30	14 (47)	16 (53)

* The values in parentheses represent the percentage.

in 12 women out of 13 cases (92%) (Table 4).

In the group of liver cirrhosis, in 30 cases showing the increase of the spleen weights, men were 14 cases (47%) and women were 16 cases (53%). Particularly, the spleen weighing more than 1,000 g could be found in 2 men (33%) and 4 women (67%) out of 6 cases (Table 5).

Discussions

The observation on the liver surfaces was carried out on 197 patients with chronic schistosomiasis japonica. It is remarkable that the liver surfaces were uneven, the right lobe was atrophied and the fur was attached to them.

There are many reports about the causes of liver disorders in schistosomiasis japonica. According to them, it is seemed that the hepatatrophia, liver cirrhosis, and the

cancerous changes are caused by nodular hypertrophy of liver cells through following process: the portal vein obstruction arised from toxic actions or mechanical stimulations by ova, the portal vein inflammation and periphlebitis. In the viral hepatitis the liver surfaces are not uneven but smooth though the liver is thickened after the inflammation of liver cells. In this point, the hypertrophy of the liver by viral hepatitis is remarkably different from that by this disease. In general, *Schistosoma japonicum* eggs are not evenly distributed in the liver and their presence is limited in each portal vein branch in which adult worms are living, and moreover, the eggs often concentrated in the subcapsular area. It is seemed that these facts are caused of non-diffusive liver lesions, especially in the right lobe (Iuchi *et al.*, 1974), and an unevenness of the liver surfaces.

The atrophy of the right lobe in this disease has been observed by liver scintiscanning methods (Iuchi *et al.*, 1970; Okuda *et al.*, 1970), hepatic angiography (Iwadare *et al.*, 1971) and so on. These findings as described above, were agreed with the facts that the ova had been often concentrated in the liver, especially, most of them had been present in the right lobe. It was reported that the hepatatrophia was due to the presence of the ova in the liver promoting the collapse and falling of cells. However, it is not always precise. The discussions are demanded about this point from now forward.

This disease was characterized by the fur and in this report it was found in all of 197 cases whether the lesions of liver tissues were found or not. No report has been published about the fur. The fur owes its origin to fibrin. It is considered that exudative lesions originated from portal vein branches extend capsules on the liver surfaces from results that the egg distribution was limited in each portal vein branch, that the concentration of eggs was higher

in the capsular area, especially under the fur. The fur often appeared diffusively in old people and spottedly or ribbon-likely in young people, because the old men has been infected heavily and repeatedly for many years but the young men were lightly infected because of success in the eradication plans.

The fur of the spleens was observed in 52 out of 82 cases whose enlarged spleens had been excised (70.2%). The appearance of the fur was not concerned with age but with the portal vein pressure and the spleen weight respectedly. That is to say, as the portal vein pressure rised, the spleen weight and the fur appearance rates increased. As described below, it is of great interest that no ovum was detected in the spleen tissues in all cases.

The fur of the spleen, that is connective tissue, appears to be caused by the partial deposition of fibrin attended by the spleen inflammation. Therefore, it has implications for the enlargement of the spleen.

It is considered that the Banti's syndrome, the unexplained splenomegaly, is responsible for the intrahepatic portal vein obstruction (Imanaga *et al.*, 1962) or the splenic blood flow (Ueda *et al.*, 1968). The increase in the splenic blood flow appears to be caused by the allergic changes (Okayabashi, 1954), inflammations, estrogen changes of spleen (Numano *et al.*, 1968), and change in splenic blood vessels. No established theory, however, has been proposed.

On the other hand, in general, it is speculated that the splenomegaly in schistosomiasis japonica is mainly caused by the portal vein obstruction by the direct or indirect action of the ova. The splenomegaly and esophageal varices which are the lesions in the portal hypertension in this disease are generally observed in case of the cirrhotic changes of the liver. These lesions are attended by non-cirrhotic changes in only a few percents of cases (Iuchi *et al.*, 1971-a). In addition, the splenomegaly is

frequently found in women, especially, in pregnant people (Iuchi *et al.*, 1971-b). It is seemed that the estrogen in the blood indicates a high value in case that non-cirrhotic lesions and the splenomegaly are observed simultaneously in the young people (Maeda *et al.*, 1976). Furthermore, it is reported that the patients with splenomegaly (+) have higher rates of HBs-antigen positive than ones with splenomegaly (-) in case of non-cirrhotic lesions of the liver (Iuchi *et al.*, 1976).

This report is in agreement with above description as to following points; the increase in splenomegaly was in proportion to the portal hypertension in the group of non-cirrhotic lesions of the liver; the splenomegaly was frequently found in women, especially, who had enlarged spleen weighing more than 1,000 g, and in circumoval precipitin tests the case of splenomegaly (+) had higher positive rates than splenomegaly (-) in the same group.

As described above, no ovum of the flukes was detected in the spleen tissues whether the fur was present or not. This result suggests that the hypertrophy of the spleen should be caused by non specific factors rather than by the direct infection of this fluke or the presence of the ova.

In conclusion, then, it appears that the inflammation around the spleen added by above factors causes portal hypertension and the hypertrophy of spleen. With respect to this point, however, more investigations are required.

Moreover, few number of fur was found in case of the liver cirrhosis in this examination. It is considered that in schistosomiasis japonica the portal hypertension is caused by liver disorders, which are added by various factors mentioned above, rather than by the spleen.

Summary

Observations were made on the lesions

of the liver surfaces of 197 cases by the laparoscopy and of the splenic surfaces of 82 cases by dissection in chronic schistosomiasis japonica in Yamanashi Prefecture.

The results obtained were as follows.

1. It was remarkable that the liver surface was uneven and that the fur was attached to it. The right lobe was remarkably atrophied. *Schistosoma* eggs situated in the liver tissue had high density under the fur.

2. The fur was also attached to the spleen, but no ovum of the fluke was detected. Rates of attachment of the fur to splenic surface were high in case of non-cirrhosis of the liver, especially in case of portal hypertension. And the fur had a tendency to be of frequent occurrence in women. There was no correlation between rates of attachment and the age.

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慢性日本住血吸虫症における肝・脾の表面の病変像について

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1965-1976年の間の甲府市立病院の入院患者のうち、慢性日本住血吸虫症の197名を対象に、肝・脾表面の病変像の観察を行なった。

1. 肝表面は凹凸・不平で、白苔の附着が特徴的であった。白苔は若年者では点状から線状が多く、高齢者では瀰慢性を呈した。また、肝右葉の萎縮が顕著であった。白苔部下の肝組織内の虫卵の分布密度が高かった。

2. 脾にも同様の白苔の附着が観察されたが、虫卵は検出されなかった。脾白苔の附着率は肝の非硬変例に高率であり、この場合、特に、門脈圧亢進例および脾重量の大きい例に高率に認められた。また、白苔は女性に多発する傾向が認められた。年齢との相関関係は認められなかった。