Computerized Tomographic Findings of Hepatic Fascioliasis Compared with Melioidosis-Caused Liver Abscesses

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Objective: *To compare the computerized tomographic (CT) findings of hepatic fascioliasis (HF) vs. melioidosis-caused liver (ML) abscesses.*

Material and Method: *CT images of 15 patients with hepatic fascioliasis (HF) and 16 patients with melioidosis-caused liver (ML) abscesses were retrospectively reviewed. The authors evaluated and compared HF and ML abscesses (by χ^2 and Fisher exact tests) vis-a-vis their location of liver involvement, size, shape, number, margins, enhancement patterns, subcapsular lesions, internal architecture, dilatation of intrahepatic bile duct and combination with splenic abscesses.*

Results: *Fourteen HF patients had only liver abscesses and 1 had combined liver and splenic abscesses. Four ML patients had liver abscesses alone while 12 had combined liver and splenic abscesses (p = 0.000). Eight of the 15 HF (53.3%) and 2 of the 16 ML (12.5%) patients had subcapsular lesions (p = 0.019). The liver abscesses were round or oval with linear tracts in 8 of the 15 HF (53.3%) and none of the ML patients (p = 0.001). Between the respective HF and ML patients, there was a significant difference in those with round shaped in ML (p = 0.008), multiple and conglomerately distributed in HF (p = 0.050), multiple and discretely distributed in ML (p = 0.001) no (or minimal) peripheral contrast enhancement in HF (p = 0.011) and moderate or mark peripheral enhancement in ML (p = 0.011).*

Conclusion: *The CT findings of liver abscesses that helped to differentiate hepatic fascioliasis from melioidosis liver abscesses were: their number, shape, enhancement pattern, presence of subcapsular lesion (s) and co-occurrence with splenic abscesses. The diagnosis of hepatic fascioliasis by CT is suggested when the following characteristics were seen: (1) multiple, small round or oval (with linear tracts) conglomerates presenting as hypodense lesions; (2) no (or minimal) peripheral contrast enhancement; (3) subcapsular lesions; or (4) less frequent co-occurrence with splenic abscesses.*

Keywords: *Fascioliasis, Liver abscess, Melioidosis, Tomography, X-ray computed*

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Fascioliasis is a zoonosis caused by trematodes family *Fasciolidae*, genus *Fasciola* and has various species; *viz*., *hepatica*, *gigantica*, *buski* and *magna*[1]. *F. hepatica* and *F. gigantica* are two of the most common trematodes that cause disease in humans[2,3]. Fascioliasis can occur worldwide, *F. hepatica* predominantly lives in the temperate zone, and *F. gigantica* mainly found in tropical regions[4]. Epidemiological surveys in Thailand indicate that *F. gigantica* (80%) is the most common trematode found in domesticated grazing animals followed by *F. hepatica* (20%)[1,5].

Fasciola eggs are deposited in the biliary tract of the host and passed through the intestines to the stool. Under suitable conditions ciliated larvae (miracidia) develop from the ova and reach their intermediate host, the snails of family *Lymnaeidea*[4]. Inside the snail, miracidia undergo further metamorphosis into cercariae, which leave the host and encyst as metacercariae on water plants especially, watercress.

Humans represent an accidental host during the life cycle of the parasite infected after ingestion of

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waterplants, contaminated water, infected raw sheep and goat livers[4]. The ingested metacercaria, released from their cysts by digestive juices, penetrate the intestinal wall and migrate through the peritoneal cavity to reach the liver, perforating the Glisson's capsule then entering the liver parenchyma.

The clinical course is traditionally described in two phases[6]. The first phase is the phase of acute or hepatic invasion, when the immature flukes perforate the liver capsule and migrate through the liver parenchyma toward the biliary system. This phase usually lasts 1 to 3 months[6]. This phase is characterized by dyspepsia, weight loss, malaise, fever, pain in the right upper abdomen, hepatomegaly and eosinophilia. The second phase is the biliary or chronic phase in which the parasite penetrates the bile duct, the immature flukes take about 2 months to turn mature in the bile duct and then produce eggs and metabolites which irritate the mucosa of the bile duct[6]. This phase lasts for years to decades[4] with less pronounced symptoms and low-grade eosinophilia. The symptoms of this phase include intermittent right upper quadrant pain with or without cholangitis or cholestasis. Some patients develop symptoms of biliary obstruction, frank cholangitis or pancreatitis. The hepatic and biliary phases can overlap[7].

Complications of hepatic fascioliasis are invasion of the gallbladder, hepatic subcapsular hemorrhage, hemobilia and ectopic infestation. Occasionally, the flukes are found in areas away from their natural hepatobiliary locations, so-called ectopic fascioliasis of the lungs and bronchi, peritoneum, muscles, orbit, brain and subcutaneous tissue[4]. Ectopic fascioliasis may present with respiratory, ocular or focal neurologic symptoms, depending on the location of the larvae[4].

Another atypical anatomic location for fascioliasis is the pharynx, causing a syndrome called "Halzoun" which occurs after the ingestion of infected raw sheep or goat livers. Attachment of flukes to the mucosa of the upper digestive tract causes edema and congestion, which may lead to dysphagia, dyspnea, and even asphyxia[4].

In the hepatic phase, a definite diagnosis is based on histopathology, serology and eosinophilia; in the biliary phase, diagnosis is enabled by identification of flukes or eggs in stool, or in duodenal or biliary drainage.

The liver abscess is a common focal liver lesion, which may be either pyogenic, amoebic, fungal, tuberculosis, hydatid cysts, fascioliasis, ascariasis or schistosomiasis[8]. A previous study of ultrasonograpic features of liver abscesses by Kitiwanwanich et al[9] on 19 patients at Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, revealed 8 patients with melioidosis, 4 with fascioliasis and 7 with non-melioidosis. This study revealed specific ultrasonographic findings of melioidosis, non-melioidosis and fascioliasis.

The previous CT imaging findings of hepatic fascioliasis[4,6-8,10-19] were case reports. Han et al[6] reported the characteristic radiological features of 5 patients with hepatic fascioliasis and 1 with biliary fascioliasis. The findings for hepatic fascioliais included: (1) cluster (s) of micro-abscess (es) arranged in rack-like (burrow) fashion; (2) a subcapsular location of the hepatic lesions; and (3) a very slow evolution of the lesion on follow-up examinations. Pulpeiro et al[7] reported the CT findings of 15 fascioliasis patients; in which small nodules and linear tracks within the liver parenchyma were hypodense on non-enhanced scans, remaining hypodense or becoming isodense with normal liver after contrast medium administration. Takeyama et al[12] reported two cases of hepatic fascioliasis, with findings of multiple, low-density areas located in the center and periphery of the liver. The differentiation between pyogenic amoebic liver abscess and metastasis would be difficult by CT findings alone[12].

Although ultrasonography is the first choice for diagnostic evaluation of most liver abscesses, CT scan may offer more specific information regarding the nature of certain lesions such as enhancement patterns and internal architectures (*i.e.,* septation, calcification or gas formation). CT scan is more sensitive in the hepatic phase of fascioliasis[18,19]. Conversely, ultrasonography is more sensitive than CT in the biliary phase since thickening of the major bile ducts and motile or dead parasites within the ducts or gallbladder[18,19]. In clinical practice, the clinical presentation of melioidosis and hepatic fascioliasis mimic each other in such non-specific symptoms as fever, abdominal pain and hepatomegaly. A definite diagnosis of either condition is based on time-consuming serology, histopathology and/or culture sensitivity. Since it is necessary to distinguish hepatic fascioliasis from melioidosis liver abscesses for effective treatment and prognosis, it would be valuable if CT image findings could be used to differentiate the two diseases. The purpose of the present study is to compare the CT findings of liver abscesses caused by hepatic fascioliasis vs. melioidosis.

Material and Method

The authors retrospectively reviewed CT images and medical records of 15 HF and 16 ML patients at Srinagarind Hospital between June 1989 and August 2006. The present study was approved by the Institutional Review Board of Srinagarind Hospital.

Hepatic fascioliasis was diagnosed by histopathological findings; of *Fasciola* liver abscess with or without positive serology in 7 patients, positive serology with clinical response to anti-parasitic medication in 7 patients and identification of *Fasciola* worms by endoscopic retrograde cholangiopancreatography (ERCP) in 1 patient.

The diagnosis of melioidosis was made by positive bacterial culture from blood, or pus from the liver or spleen or other organ with or without positive serology in 10 patients. The remaining 6 ML patients were diagnosed by an indirect haemagglutination antibody test (antibody titer $\geq$ 160) combined with clinical response to antimicrobial drug relatively specific for melioidosis.

Imaging protocol

CT scanning was performed using a multislice CT scanner (Somatom Plus 4 Volume zoom: Siemens, Forkheim, Germany) in 23 patients. The scan included liver and both kidneys or the whole abdomen with 2.5-mm collimation, a pitch of 0.25 with 8 mm reconstruction. The scanning parameters were 120 kV and 140 mA. The scanning time was 0.5 seconds.

A single slice helical CT scanner (Exvision/EX: Toshiba cooperation medical system division, Tokyo, Japan) was used on 7 patients. The scan included the liver and both kidneys or the whole abdomen with 10-mm collimation and a pitch of 1. The scanning parameters were 120 kV and 100 mA. The scanning time was 1 second.

The contrast-enhanced scans were obtained after intravenous injection of 100 mL non-ionic water soluble contrast media at a rate of 2.5-3 mL/sec. A 35- and 70-second delay, after initiation of contrast material injection, was used for arterial and portovenous phases of the abdominal images using a soft tissue window (width of 300 HU; level of 40 HU). One patient underwent CT examination at another hospital.

Image evaluation

The CT images from both the HF and ML groups were evaluated in a blinded and retrospective manner by two staff radiologists. In the status of disagreement, the final interpretation was reached by consensus.

The locations of liver involvement were classified as right, left or both lobes. Abscess size was classified as < 3, ≥ 3 cm in diameter or variable sizes. Abscess shapes were classified as round, irregular, oval, or round or oval with linear tracts. Abscess margins were classified as well-defined, ill-defined, lobulated, well-defined and lobulated.

Abscess numbers were classified as single or multiple. Multiple abscesses were sub-classified as having conglomerate, discrete, conglomerate and discrete or single and discrete distribution. A discrete distribution was defined as multiple scattered lesions separated by intervening normal parenchyma; a conglomerate lesion as multiple lesions located close together; a conglomerate and discrete distribution as one or multiple areas of conglomerate abscesses combined with small discrete abscesses; and a single and discrete distribution as a large solitary abscess combined with multiple small discrete abscesses.

The enhancement pattern was classified as no or minimal peripheral enhancement, moderate or marked peripheral enhancement, or heterogeneous enhancement. The internal architecture was referred to internal septation, calcification and gas formation. An internal septa which arranged orderly and/or radially, like the wheel of a cart, was designated a cart-wheel appearance. The occurrence of subcapsular lesions, dilatation of the intrahepatic bile duct and combined splenic abscesses were noted.

The demographic data were presented using means and ranges. The findings of the HF and ML groups were compared and analyzed using the χ^2 and Fisher exact tests. A p-value ≤ 0.05 was considered statistically significant.

Results

The authors had hard copy images of 15 patients with HF (4 males, 11 females; mean age 49) and 16 patients with ML (all males; mean age 50) (Table 1). Fourteen of the HF patients had liver abscesses, while only 1 had combined liver and splenic abscesses. In comparison, 4 ML patients had liver abscesses alone and 12 had combined liver and splenic abscesses ($p = 0.000$).

Table 2 summarizes the present findings on liver abscesses. In HF, the liver involvement of 6 of 15 (40%) cases occurred in the right lobe vs. 9 of 16 (56.3%) in ML. Three of 15 (20%) HF cases occurred in the left lobe vs. 2 of 16 (12.5%) in ML. Both lobes were affected in 6 of 15 (40%) HF cases and 5 of 16 (31.3%)

Table 1. Number and age of patients with liver abscesses caused by hepatic fascioliasis vs. melioidosis

Patients	Number of patients	Mean age (range) yrs
HF	Total 15	49 (27-66)
	Male 4	56 (49-66)
	Female 11	46 (27-66)
ML	Total 16	50 (24-70)
	Male 16	50 (24-70)
	Female 0	0

HF = hepatic fascioliasis; ML = melioidosis

ML cases. There was, therefore, no statistically significant difference in location of liver involvement between the 2 groups.

Similarly, there was no statistically significant difference in the sizes of abscesses between the HF and ML groups. The abscess size was: < 3 cm in 9 of 15 (60%) HF cases (Fig. 1) and 9 of 16 (56.3%) ML cases (Fig. 2); ≥ 3 cm in 1 of 15 (6.7%) HF cases (Fig. 7) and 3 of 16 (18.8%) ML cases; and variable in size in 5 of 15 (33.3%) HF cases (Fig. 4-6, 8) and 4 of 16 (25%) ML cases.

The margins of the abscesses in both groups were not statistically different (Table 2). Interms of shape, eight of 15 (53.3%) abscesses were round or oval with linear tracts in HF cases (Fig. 1), but in no cases of ML, a statistically significant difference (p = 0.001). Moreover round abscesses were seen in 6 of 15 (40.0%) HF cases compared to 14 of 16 (87.5%) ML cases (p = 0.008).

Conglomerately distributed abscesses were seen in 8 of 15 (53.3%) HF cases (Fig. 6) over against 3 of 16 (18.8%) ML cases (p =0.050). A discrete distribution was seen in 9 of 16 (56.3%) ML patients (Fig. 2) vs. zero HF patients (p-value = 0.001) (Table 2).

Conglomerate and discrete distributions were seen in 33.3% of HF patients (Fig. 1, 4, 5) and 12.5% of ML patients (p = 0.170). A single lesion was seen in 2 of 15 (13.3%) HF patients (Fig. 7) and 2 of 16 (12.5%) ML patients (p = 0.675). There was no statistically significant difference in single and conglomerate and discrete distributions between the HF and ML groups.

Subcapsular lesions were seen in 8 of 15 (53.3%) HF cases (Fig. 3-5) in 2 of 16 (12.5%) ML cases (Fig. 2) (p = 0.019) (Table 2).

For characteristics of enhancement, there were no or minimal peripheral enhancement in 15 of 15 (100%) of HF cases (Fig. 1, 3-8) and in 10 of 16 (62.5%) ML cases (Fig. 2). Moderate or marked peripheral enhancement was seen in 37.5% of ML cases and in none of the HF cases (p = 0.011).

There was no statistically significant difference in the frequency of internal septations, calcifications, gas formation and dilatation of the intrahepatic bile duct between groups (Table 2).

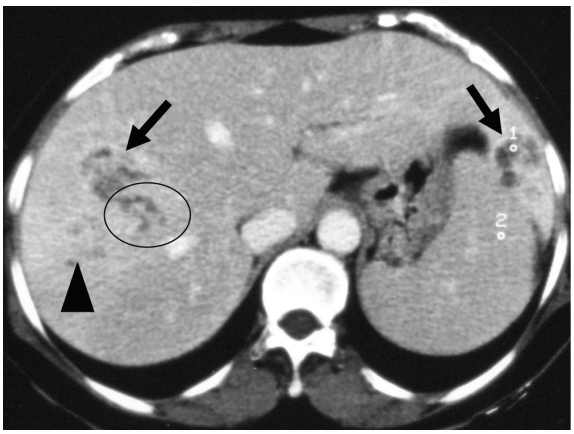

Fig. 1 A 66-year-old woman with hepatic fascioliasis has multiple, conglomerate of small round shaped (arrow), size ≤ 3 cm, with linear tracts (circle), and minimal peripheral enhancing hypodense lesions at both lobes of liver, suggestive of burrow tracts created by the migration of immature flukes in the liver. Few small discrete hypodense lesions are present (arrow head)

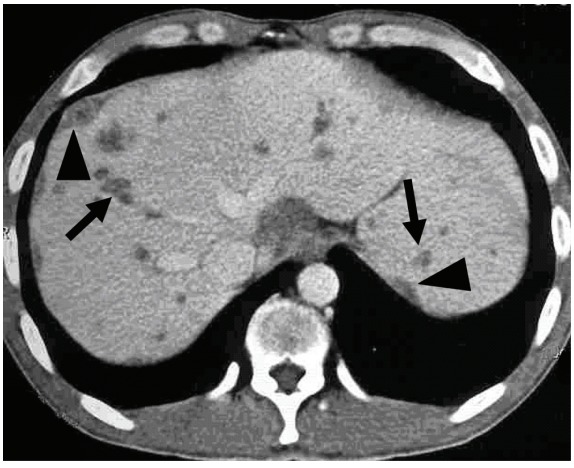

Fig. 2 A 36-year-old man with melioidosis has multiple discrete liver abscesses size ≤ 3 cm, with no contrast enhancement (arrow). There are small subcapsular lesions at the liver and spleen (arrow head)

Table 2. Comparing the CT findings of hepatic fascioliasis (HF) vs. melioidosis liver abscesses (ML)

Findings			HF (n = 15)		ML (n = 16)		p-value	
			No.	%	No.	%		
Lobes		Right	6	40.0	9	56.3	0.293	0.651
		Left	3	20.0	2	12.5	0.468	
		Both	6	40.0	5	31.3	0.447	
Sizes		< 3	9	60.0	9	56.3	0.561	0.583
		≥ 3	1	6.7	3	18.8	0.325	
		Variable sizes	5	33.3	4	25.0	0.454	
Margins		Ill-defined	0	0.0	1	6.3	0.516	0.061
		Well-defined	15	100.0	11	68.8	0.026	
		Lobulated	0	0.0	0	0.0	-	
		Well-defined and lobulated	0	0.0	4	25.0	0.058	
Numbers	Single	Single	2	13.3	2	12.5	0.675	0.006
	Multiple	Discrete	0	0.0	9	56.3	0.001	
		Conglomerate	8	53.3	3	18.8	0.050	
		Conglomerate and discrete	5	33.3	2	12.5	0.170	
		Single and discrete	0	0.0	0	0.0	-	
Enhancement		No or minimal peripheral	15	100.0	10	62.5	0.011	0.011
		Moderate or mark peripheral	0	0.0	6	37.5	0.011	
		Inhomogeneous	0	0.0	0	0.0	-	
Shape		Round	6	40.0	14	87.5	0.008	0.003
		Irregular	0	0.0	0	0.0	-	
		Oval	0	0.0	0	0.0	-	
		Round and oval	1	6.7	2	12.5	0.525	
		Irregular and oval	0	0.0	0	0.0	-	
		Irregular and round	0	0.0	0	0.0	-	
		Round or oval with linear tract	8	53.3	0	0.0	0.001	
Septation		Absent	8	53.3	9	56.3	0.578	0.578
		Present	7	46.7	7	43.8	0.578	
Calcification		Absent	15	100.0	14	87.5	0.258	0.258
		Present	0	0.0	2	12.5	0.258	
Gas formation		Absent	15	100.0	15	93.8	0.516	0.516
		Present	0	0.0	1	6.3	0.516	
Dilatation of intrahepatic bile duct		Absent	11	73.3	15	93.8	0.416	0.416
		Present	4	26.7	1	6.3	0.416	
Subcapsular lesion		Absent	7	46.7	14	87.5	0.019	0.019
		Present	8	53.3	2	12.5	0.019	
Combined splenic abscesses		Absent	14	93.3	4	25.0	0.000	0.000
		Present	1	6.7	12	75.0	0.000	

Discussion

In the present study, the diagnosis of fascioliasis was based on histopathology, serology and identification of *Fasciola* worm in biliary drainage. Histological diagnosis correspond to necrotic debris, track-like destruction of the parenchyma, inflammatory infiltration with abundant eosinophils, Charcot-Leyden crystals, and granulomas. Rarely, ova or parasite are found inside the granuloma or bile duct[20]. The presence of granulomas with abundant eosinophils is suggestive, but not specific, of fascioliasis[15]. In the presented 7 cases of histopathological confirmed hepatic fascioliasis, there was a definite diagnosis of *Fasciola* abscess.

The serology of the presented cases before 1997 were based on enzyme-linked immunosorbent assay (ELISA) that detected antibody to the excretory-secretory antigen (ES), with 100% sensitivity and 99.3% specificity[21]. Since 1997 to the present, serology was based on immunoblotting analysis (Western blot)

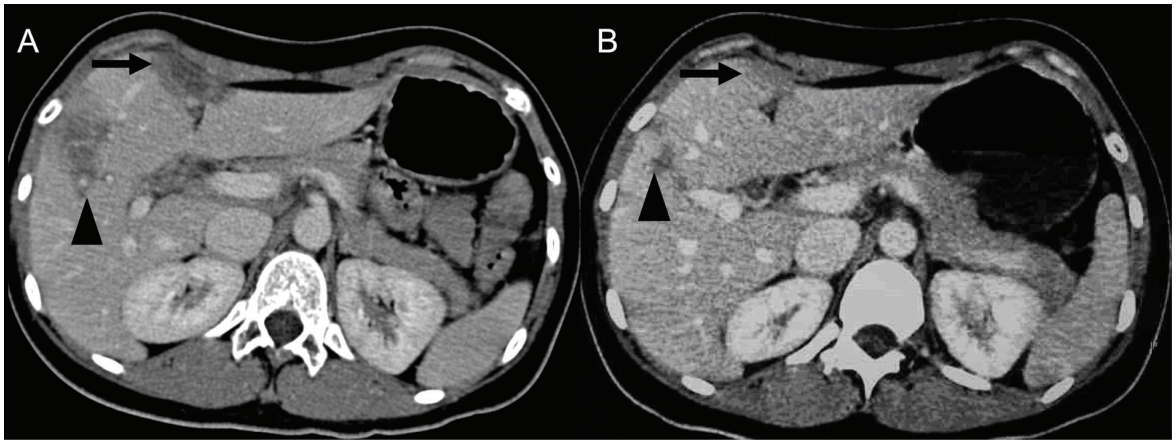

Fig. 3 A 27-year-old woman with hepatic fascioliasis. A) Initial enhanced CT shows a subcapsular lesion near the falciform ligament (arrow). Also demonstrated are minimally-enhanced, hypodense lesions at segment 8/4 of the liver represents liver abscess, size ≤ 3 cm (arrow head). B) Follow-up enhanced CT 1 year after anti-parasitic drug treatment. Most lesions have disappeared. Resolution of the subcapsular lesion is noted (arrow). Small residual hypodense lesions are observed (arrow head)

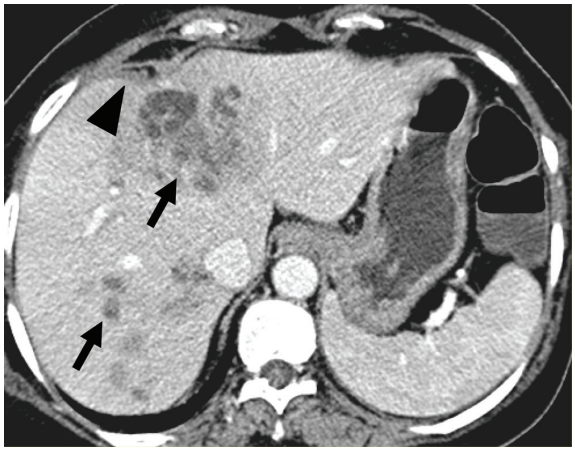

Fig. 4 A 57-year-old woman with hepatic fascioliasis with multiple small abscess, size ≤ 3 cm, conglomerate and discrete, small, round, non-enhancing, hypodense lesions at both liver lobes (arrow). Also presents a minimal subcapsular collection at segment 4A of the left liver lobe (arrow head)

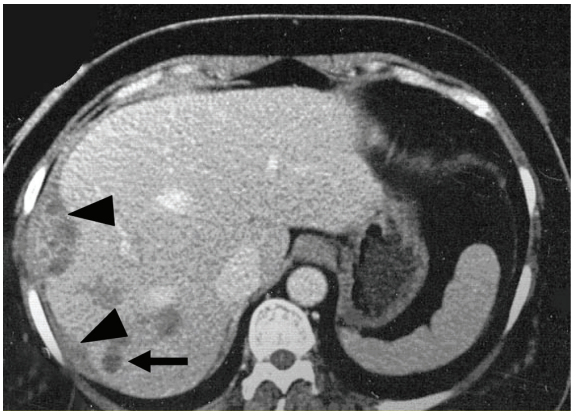

Fig. 5 A 57-year-old woman with hepatic fascioliasis with multiple, conglomerate and discrete, small, round, non-enhancing, hypodense lesions at segment 7 of the right liver lobe (arrow). Also demonstrates adjacent subcapsular lesions represent liver abscess, size ≤ 3 cm (arrow head)

that detected excretory-secretory antigen (ES) with a molecular mass of 27 kilodaltons (kDa), with 100% sensitivity and 98% specificity[22].

Imaging techniques of fascioliasis are requested mainly for evaluation of hepatic invasion. The findings are different from the invasive and biliary stages[11]. However, the stages overlap and findings of invasive and biliary fascioliasis may coexist in the same patients[7]. Hepatic lesions, caused by *Fasciola,* resemble clusters of small microabscesses on contrast-enhanced CT. Unlike the usual clusters of micro-abscesses by pyogenic organisms which coalesce into a larger abscess cavity[16], hepatic lesions do not coalesce and slowly evolve over several months. This difference might be caused by the fact that hepatic lesions of fascioliasis are mainly coagulation necrosis[10,12,13] and

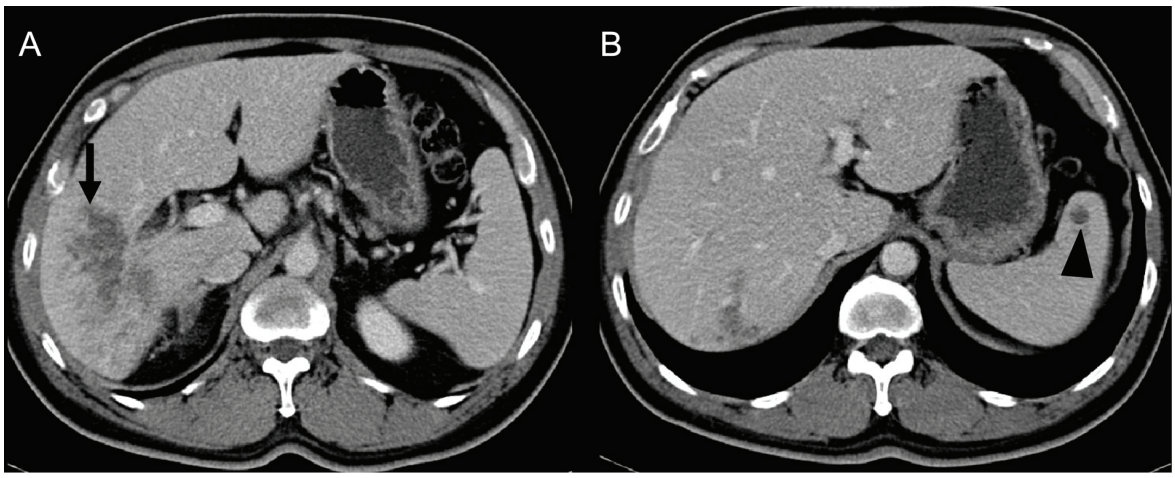

Fig. 6 A 53-year-old man with hepatic fascioliasis. A) Multiple, conglomerate of small minimal enhancing hypodense lesions at segment 7 of the right lobe liver represents conglomerate small abscesses size ≤ 3 cm (arrow). B) A small, round, non-enhancing hypodense lesion at the spleen is demonstrated (arrow head). Right hepatectomy and splenectomy were performed. Histopathological diagnosis of *Fasciola* based on a migration tract with necrotic tissue and granulomatous reaction

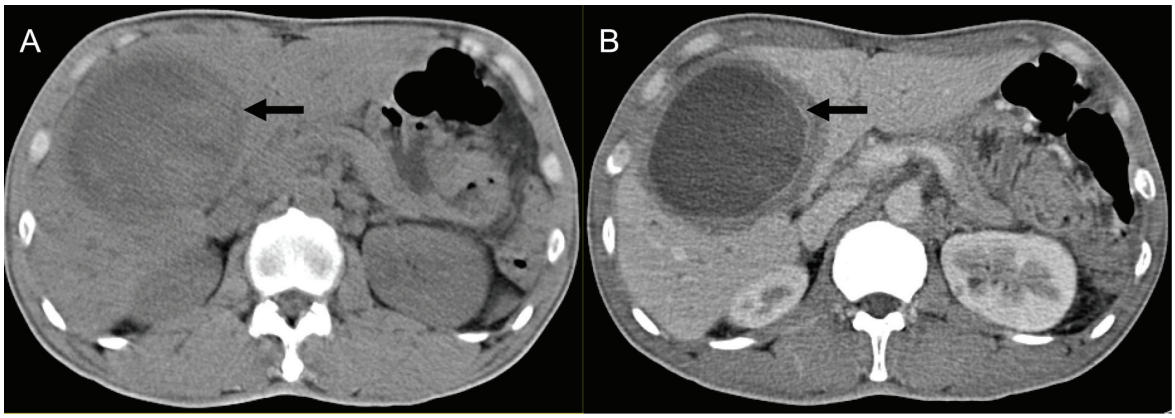

Fig. 7 A 49-year-old man with hepatic fascioliasis. A) Non-enhanced CT shows a large hypodense lesion, size ≥ 3 cm, with hyperdense content, possibly pus or hemorrhage, at segment 8/5 of liver (arrow). B) Enhanced CT shows well-defined, minimal peripheral enhancement (arrow)

are not abscesses caused by infection. In addition, these lesions are arranged in a linear tract, which is quite unusual for usual pyogenic abscesses.

There are several reports of CT findings of hepatic fascioliasis[4,6-8,10-19]. In the present study, half (53%) of the CT findings of hepatic fascioliasis were demonstrated as multiples of conglomerate, small hypodense lesions and one-third (33.3%) as conglomerate and discrete lesions. The difference in numbers (Fig. 1, 2) were statistically significant between the 2 groups, similar to reports from prior studies[6,7,10,12,17,18].

The melioidosis liver abscess commonly presents in a discrete distribution (56.3%) as indicated from ultrasonographic findings[23]. The shape of HF was predominantly (53%) round or oval with linear tracts which is not reported among the cases of ML. The difference in these shapes between HF and ML was statistically significant (p = 0.001) as shown in previous studies[6,7,10,13,14,17,18].

After successful treatment, lesions decreased in number and size and finally disappeared or calcified[7,10]. The round or oval lesions were non-specific, but the

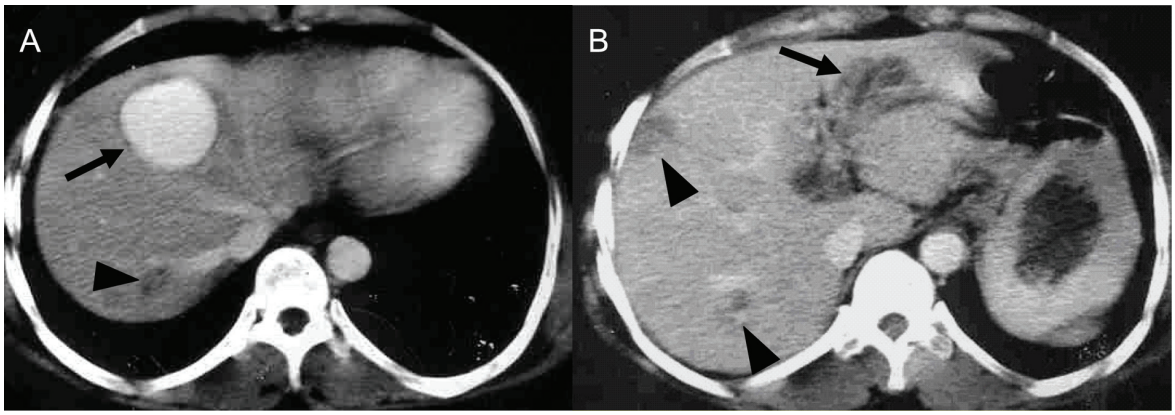

Fig. 8 A 43-year-old woman with hepatic fascioliasis. A) Enhanced CT shows a large pseudoaneurysm at segment 4A of the left lobe liver (arrow). A small, hypodense, lesion at segment 7 of the right lobe liver is observed (arrow head). B) Enhanced CT shows minimal intrahepatic bile duct dilatation at left lobe liver (arrow). A small, hypodense, subcapsular lesion at segment 8/4 of liver represents small liver abscess size ≤ 3 cm is also noted (arrow head)

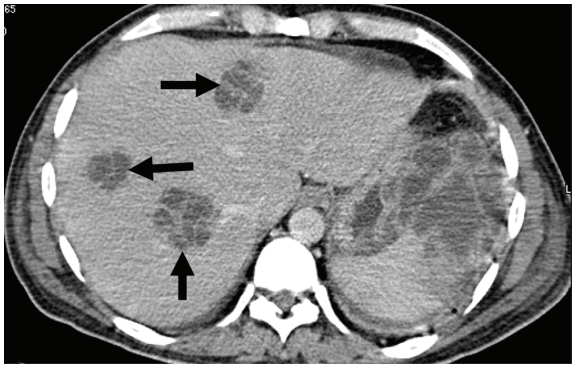

Fig. 9 A 32-year-old man with positive pus culture for *Burkholderia pseudomallei* has multiple discrete liver abscesses that appear like cartwheels (arrow)

presence of linear tracts prompted serological confirmation. In the present study, subcapsular lesions (Fig. 2-5) between HL and ML patients were statistically significant difference (53.3% and 12.5%, respectively, p = 0.019), as shown in prior studies[6,10,14,18]. Han et al[6] reported the subcapsular location of hepatic lesions; the majority of migrating immature flukes were trapped in the immediate subcapsular tissue of the liver where they die leaving a cavity filled with necrotic debris. Most hepatic lesions, therefore, were confined to a depth of < 2 cm beneath the capsule[20]. These subcapsular lesions may appear on the CT as small areas of decreased density located in the periphery of the liver as previous studies[10]. Both HF and ML abscesses are commonly < 3 cm in size and were seen in 60.0% and 56.3%, respectively, these findings are similar to prior studies[6,7,18,23] which are not statistically significant difference. Pulpeiro et al[7] reported that small nodules (≤ 1 cm) were found in all 15 patients and tortuous linear tracts present in 6 of 15 patients with hepatic fascioliasis. Kabaalioglu et al[18] reported that ultrasonographic findings in the initial hepatic phase may easily be overlooked since the lesions may occasionally present as isoechoic or hardly depictable hypoechoic nodules of 1-3 cm in diameter. Wibulpolprasert et al[23] found that the most common ultrasonographic appearance of ML was small discrete lesions (< 2 cm).

Regarding enhancement patterns, there was a statistically significant difference between the HF and ML groups. There was no or minimal peripheral enhancement in 100% HF and 62.5% ML cases (p = 0.011) and none of the HF cases had moderate to marked peripheral enhancement (p = 0.011), which correlated with prior studies[6,14,17,18]. Aksoy et al[14] reported that the CT findings of hepatic fascioliasis were nodular masses without prominent enhancement and branching low attenuated tubular lesions.

The portal venous phase CT is more sensitive because the lesions do not enhance and show up better surrounded by enhanced liver parenchyma[6,18].

The difference between HF and ML cases vis-a-vis combined splenic abscesses was statistically significant (p = 0.000). There were 6.7% of HF cases (Fig. 6) and 75% of ML cases (Fig. 2) had combined splenic abscesses (Table 2).

About one-quarter (26.7%) of HF and 6.3% of ML patients had intrahepatic bile duct dilatation, which is not a statistically significant difference and similar to previous studies[10,11]. The biliary duct dilatation and irregular wall thickening may also be demonstrated by ultrasonography and CT but these findings are non specific[11].

There were no statistically significant differences between HF cases and ML cases regarding the location of liver involvement, abscess size, margin, internal architecture or dilatation of intrahepatic bile duct. Pulpeiro et al[7] reported that the right lobe liver was more common, whereas in the present study hepatic lesions from hepatic fascioliasis in the right, left and both lobes of the liver were 40, 20 and 40 percent, respectively.

Laopaiboon et al[24] described a cart-wheel appearance abscess as the most specific finding in melioidosis. The authors found the cart-wheel appearance abscesses in 2 ML patients (Fig. 9) and in none of the HF patients.

One HF patient had a pseudoaneurysm at the left liver lobe (Fig. 8) but there are no previous reports of this finding. It could possibly be coexisting or an accidental finding in hepatic fascioliasis. One HF patient had a single large minimal peripheral enhancing hypodense lesion with hyperdense content, which could possibly be pus or hemorrhage (Fig. 7).

The present study had 15 HF patients which was a large sample compared to previous studies, lending credibility to the present results; not with standing, the authors' was a retrospective review which limited clinical diagnosis to two causes of liver lesions (*viz.,* from hepatic fascioliasis or melioidosis) and did not include others causes liver abscesses or tumors.

Conclusion

In conclusion, the CT findings of liver abscesses which are helpful for differentiating hepatic fascioliasis from melioidosis including number, shape, enhancement pattern, presence of subcapsular lesion(s) and co-occurrence with splenic abscesses. The diagnosis of hepatic fascioliasis by CT is suggested when the following characteristics were seen: (1) multiple, small round or oval (with linear tracts) conglomerates presenting with hypodense lesions; (2) no (or minimal) peripheral contrast enhancement; (3) subcapsular lesions; or (4) less frequent co-occurrence with splenic abscesses.

The differentiation of fascioliasis from melioidosis liver abscesses may be difficult with CT findings alone; thus, a proper knowledge of human fascioliasis in combination with CT findings will help to achieve the correct diagnosis and treatment.

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การศึกษาเปรียบเทียบลักษณะภาพเอกซเรย์คอมพิวเตอร์ ระหว่าง hepatic fascioliasis กับ melioidosis

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วัตถุประสงค์: *เพื่อศึกษาเปรียบเทียบลักษณะภาพเอกซเรย์คอมพิวเตอร์ ระหว่าง hepatic fascioliasis (HF) และ melioidosis-caused liver (ML) abscesses*

รูปแบบการศึกษา: *แบบสังเกตการณ์เปรียบเทียบ (Observation: analytical study)*

วัสดุและวิธีการ: *เป็นการศึกษาลักษณะภาพเอกซเรย์คอมพิวเตอร์ ย้อนหลังในผู้ป่วย hepatic fascioliasis (HF) 15 ราย และผู้ป่วย melioidosis (ML) ที่ทำให้เกิดฝีในตับ 16 ราย โดยเปรียบเทียบตำแหน่ง ขนาด รูปร่าง จำนวน ลักษณะขอบ และลักษณะภายในของพยาธิสภาพลักษณะ enhancement การมี subcapsular lesions การขยายของท่อน้ำดีในตับ และการเกิดฝีในม้ามร่วมด้วยโดยใช้สถิติ χ^2 และ Fisher exact tests*

ผลการศึกษา: *ในผู้ป่วย HF พบ เป็นฝีในตับอย่างเดียว 14 ราย เป็นทั้งฝีในตับ และในม้าม 1 ราย ในผู้ป่วย ML เป็นฝีในตับอย่างเดียว 4 ราย ในขณะเป็นทั้งฝีในตับ และในม้าม 12 ราย (p = 0.000) 8/15 (53.3%) ของ HF และ 2/16 (12.5%) ของ ML มี subcapsular lesions (p = 0.019) ใน HF พบ ฝีรูปร่างกลมหรือรูปไข่มี linear tracts 8 ราย ซึ่งไม่พบใน ML (p = 0.001) นอกจากนี้ยังพบความแตกต่างอย่างชัดเจนของลักษณะต่อไปนี้ คือ ฝีรูปร่างกลมใน ML (p = 0.008), multiple และ conglomerately distributed ใน HF (p = 0.050), multiple และ discretely distributed ใน ML (p = 0.001) และไม่มี peripheral contrast enhancement หรือมีเล็กน้อยใน HF (p = 0.011)*

สรุป: *ลักษณะภาพเอกซเรย์คอมพิวเตอร์ที่ช่วยวินิจฉัยแยกโรคระหว่างฝีจาก HF และ ML ได้แก่ จำนวน รูปร่าง ขนาด ลักษณะ enhancement การมี subcapsular lesion และการมีฝีในม้ามร่วมด้วย การวินิจฉัยจากลักษณะภาพเอกซเรย์คอมพิวเตอร์ที่ทำให้นึก HF คือ (1) จำนวนของฝีมีหลายตำแหน่งขนาดเล็กมี รูปร่างกลมหรือรูปไข่ อยู่เป็นกลุ่มมี linear tracts และ density น้อย (2) peripheral contrast enhancement มีน้อยหรือไม่มี (3) มี subcapsular lesions หรือ (4) เกิดร่วมกับ ฝีในม้ามน้อย*