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Pulmonary and Hepatic Involvement of Toxocariasis in an Adult: Case Report[1]

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Toxocariasis is known as visceral larva migrans in humans and it is caused by *T. canis* and *T. catis*, especially in children, but it is less commonly reported in adults. Although several cases of toxocariasis in adults have been reported, there have been no descriptions of toxocariasis involving the liver or, the lungs and the pleura. We report here on a case of *T. canis* infection in an immunocompetent adult with peripheral eosinophilia, elevated serum levels of Ig E and CT findings displaying multiple focal air space consolidations in the lungs, bilateral pleural effusion and low attenuated hepatic nodules.

Index words : Liver, diseases
Lung, diseases

Toxocara canis and *Toxocara catis* are worldwide cosmopolitan roundworms that infect dogs, especially puppies, and cats. *T. canis* infection in humans occurs by ingestion of the embryonic eggs, which are shed in the feces of infected dogs. Toxocariasis is manifested in three different syndromes: visceral larva migrans (VLM), ocular larva migrans (OLM), and covert toxocariasis (1, 2).

VLM is usually a disease of children 1 to 6 year old, and it may cause hepatosplenomegaly, lymphadenopathy, fever and pulmonary symptoms (3). Unlike children, VLM is less common in adults where it is, usually a benign and self-limited condition; the pulmonary and hepatic involvement of VLM has rarely been described. We report here on a case of VLM due to *T. canis* in an immunocompetent male patient who presented with cough, pleuritic chest pain, eosinophilia associated with an elevated serum Ig E level, and CT findings including multiple focal air space consolidations in the lungs, bilateral pleural effusion and hepatic nodules.

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Case Report

A previously healthy 48-year-old man was admitted to our hospital presenting with a nonproductive cough and pleuritic chest pain for 2 weeks. He had lost 2 kg of his body weight in 1 month. On his past history, he has eaten raw foods such as liver, muscle and stomach of cattle 2 months ago. The physical examination revealed sign of pleural effusion that manifested as decreased breathing sounds on the right lower chest, but a chest radiograph showed bilateral pleural effusion that was larger on right side and there was a small amount of iatrogenic pneumothorax in the left hemi-thorax due to thoracentesis.

The blood cell count at the time of his admission showed 14,230 leukocytes/mm^3 with the cellular component of 45.1% eosinophils. The blood chemistry findings disclosed mildly elevated LDH and alkaline phosphatase levels. The pleural fluid was serous and contained 108 RBC/mm^3 and 3744 leukocytes/mm^3 with 58% polymorphonuclear cells and 42% lymphocytes.

Contrast-enhanced CT scan revealed multiple focal air space consolidations in both lungs, predominantly in

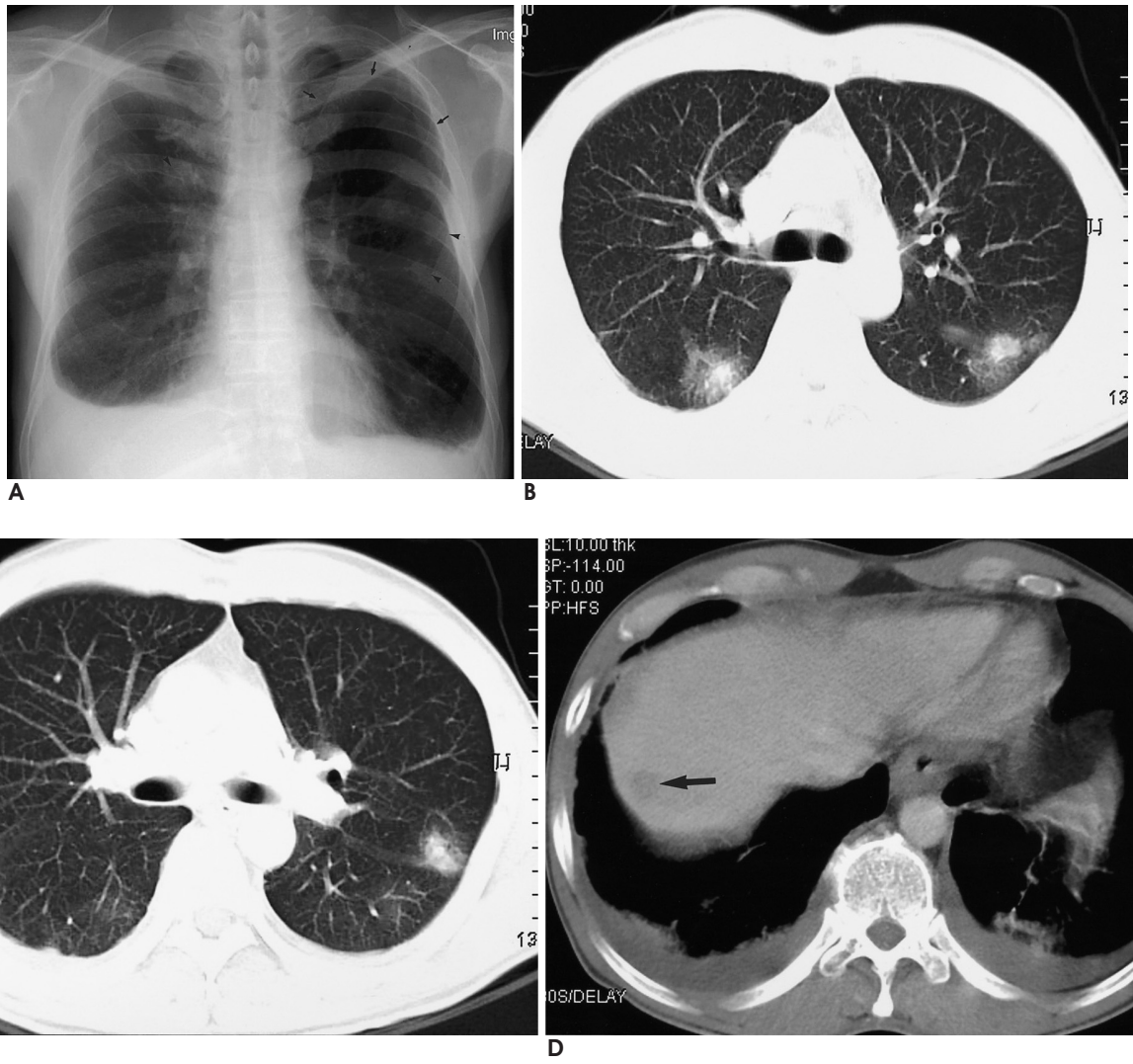

Fig. 1. 48-year-old male with toxocariasis involving the lungs, both pleura, and the liver.

A. Chest radiograph shows multifocal ill defined opacities in the right upper lung zone and left mid-lung zone (arrowheads). Note the bilateral pleural effusion and the small amount of pneumothorax in apical portion of left hemi-thorax due to a previous thoracentesis (small arrows).

B. CT scan obtained at the level of the carina of the lung shows focal wedge-shaped consolidation in subpleural portion of the left upper lobe with surrounding ground glass attenuation, and there is patchy ground glass attenuation in the superior segment of the right lower lobe.

C. CT scan obtained at the level of left upper lobar bronchus shows focal consolidation in the posterior segment of the left upper lobe, and a small amount of right pleural effusion.

D. Enhanced CT scan obtained at the level of hepatic dome shows small, round, low attenuated lesion in the right hepatic lobe with poor enhancement (arrow). Patchy infiltration in the left lower lobe and the subpleural area, and bilateral pleural effusions are also seen.

E. Enhanced CT scan obtained at the level of celiac axis shows an ill-defined linear low attenuated lesion in segment 6 of the liver, in the subcapsular area (arrow). The lesion disappeared on follow-up liver US after treatment (Liver US not shown).

subpleural area, and this was associated with the bilateral pleural effusion. An ill-defined ground-glass attenuation (GGA) halo was seen. Multiple low attenuated nodular or elongated lesions with poor margins in right hepatic lobe were noted. The hepatic lesions were poorly enhanced after the injections of contrast media.

On the seventh day after his admission, a fiberoptic bronchoscopy was done and bronchoalveolar lavage (BAL) was performed in the left lower lobe. The WBC count of BAL was 208/mm^3 with a differential cell count that showed 18% eosinophils, 62% macrophages, 9% polymorphonuclear cells and 9% lymphocytes. Serum Ig E (PRIST) and eosinophil cationic protein (ECP) were elevated to 530.33 IU/ml and 200 (㎍/L, respectively. The methacholine provocation test was positive. Serologic tests for parasites such as *Cysticercus*, *Sparganum*, *Paragonimus* and *Clonorchis* were all negative. However, a significant positive reaction was observed by ELISA (enzyme-linked immunosorbent assay) testing using an excretory-secretory *Toxocara canis* antigen (TES-Ag) obtained from the serum, pleural fluid and BAL.

Ocular larva migrans induced symptoms such as visual disturbances or strabismuses were not noted on his physical examination.

His respiratory condition and the chest radiologic findings were improved after treatment with albendazole, and high dose corticosteroid was then started. Moreover, his hepatic lesions disappeared on follow-up abdominal ultrasound (US).

Discussion

Toxocara canis is the most common etiologic agent of visceral larva migrans (VLM), a parasite that is mostly reported in temperate areas of the world (2, 4). *T. canis* infection occurs in an aberrant host such as human following the ingestion of embryonic eggs from contaminated hands, soil or fomites (4). Adults and children are infected by *T. canis* by eating contaminated raw food (2). In human, the larvae penetrates the gut wall and begin a prolonged tissue migration; however, *T. canis* larvae cannot complete their life cycle (4), and the majority of infections are clinically inapparent or there is covert toxocariasis, especially in adults. Symptomatic human toxocariasis, known as VLM or OLM, is more common in children. Diagnosis of VLM is best made by ELISA test using the excretory-secretory *T. canis* antigen, and this testing shows an excellent sensitivity of 91%, and a specificity of 98%.

In children with VLM (1, 3), bilateral pulmonary infiltrations are observed in 40 to 50% of patients' pulmonary symptoms; however, multiple non-cavitating pulmonary nodules or focal consolidations are unusual, and the hepatomegaly with multiple nodules are seen in 72.7% of patients. Unlike children (2, 5, 6), only several cases have been described in adults with VLM manifestations of diffuse pulmonary infiltration, multiple pulmonary nodules without cavitation, large amount of pleural effusion, tamponade and mediastinal lymphadenopathy, and hepatic involvement seen as multiple low-density nodules (7). However, to the best of our knowledge, pulmonary and hepatic involvement of VLM due to *T. canis* on the CT findings in immunocompetent adults has not been previously reported.

In our case, pulmonary involvement was shown as multiple ill-defined focal air space consolidations with a GGA halo in both lungs, and this was predominantly displayed in the subpleural areas on CT. Bilateral pleural effusion was associated with these findings. In addition, poorly enhanced low attenuated nodules in the liver were also revealed. These CT findings were occasionally described in hypereosinophilic syndrome with multiple organ involvement (8); however, unlike toxocariasis, an elevated serum Ig E level and ECP level are not generally observed for hypereosinophilic syndrome, and bilateral pleural effusion rarely occurs.

Humans are infected with *T. canis* by swallowing embryonic eggs. The eggs then release larvae into the upper small bowel where most of the larva penetrate the wall of the gut and gain access to the portal venous circulation and hepatic tissue. Lungs, skin, eyeballs and nervous systems are rarely involved through systemic circulation (7). It is well known that the larvae release excretory-secretory *T. canis* antigen (TES-Ag) during their prolonged tissue migration. Considering that previous reports of larvae found in biopsy specimens from the involved organs, and especially liver, were rare (3, 7), it seems that the released TES-Ag causes an Ig E mediated immune reaction in the involved organs. And so, we may presume that pulmonary and hepatic infiltration observed on CT may be a result of a hypersensitive reaction due to TES-Ag rather than to a tissue reaction to just the larvae.

We suggest that if a patient has eosinophilia in peripheral blood, multiple focal air space consolidations or nodules with GGA halo, and multiple hepatic lesions in adults, the differential diagnosis should include toxocari-

asis, as well as hypereosinophilic syndrome.

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성인에서의 폐와 간을 침범한 개회충증: 증례 보고[1]

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최수진 · 김지은 · 박철희 · 양달모

개회충증(Toxocariasis)은 개회충(*Toxocara canis*)과 고양이회충(*Toxocara catis*)에 의해서 인간에게 발생되는 장내 유충 이행증(visceral larva migrans)으로, 특히 어린 소아에 흔한 것으로 알려져 있다. 그러나, 드물게 성인에서도 개회충증이 보고된 적이 있으나, 그 동안 보고되었던 예들에 폐와 흉막, 그리고 간이 함께 침범 된 예는 없었다. 저자들은 말초 호산구 증가증, 혈청 Ig E증가와 함께 CT상 다수의 국소적 폐 침윤과 동반된 양측의 흉막 삼출, 그리고 간에 몇 개의 결절성 병변을 보인 성인에서의 개회충증 1예를 보고 하고자 한다.