

Fatal foreign body pulmonary embolism and granulomatosis in intravenous drug addict : A case report

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Tawevisit M, Phumsuk U, Upariwong N. Fatal foreign body pulmonary embolism and granulomatosis in intravenous drug addict : A case report. Chula Med J 2004 Dec; 48(12): 829 - 36

The authors hereby report an exceedingly rare case of foreign body embolism and its granulomas of both lungs of a prisoner, who had been using several types of illicit intravenous drugs on top of her hepatic cirrhosis. The patient was brought to hospital because of her dyspnea for 2 days with detectable cyanosis and clubbing of fingers. We also demonstrate a unique microscopic character under polarized microscope of each foreign body. In addition, there were many interesting histological pulmonary vascular consequences, including recanalization, angiomatoid formation, and scattered fibrin thrombi. These evidences provoked pulmonary hypertension and disseminated intravascular coagulopathy, which deteriorated the clinical status of the patient who finally passed away. Physicians should be aware of the condition of foreign body pulmonary embolism and its complications in the management of drug abusers presenting with hypoxia.

Keywords: *Intravenous drug abuse, Pulmonary foreign body embolism.*

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Received for publication. August 17, 2004.

มานะ ทวีวิศิษฐ์, อุบล พุ่มสุข, น้ำอ้อย อุปรวิงศ์. ภาวะสิ่งแปลกปลอมอุดหลอดเลือดปอดใน
ผู้ใช้สารเสพติดทางเส้นเลือด : รายงานผู้ป่วย 1 ราย. จุฬาลงกรณ์เวชสาร 2547 ๕.ค; 48(12):
829 - 36

รายงานผู้ป่วย 1 ราย ผู้ป่วยเป็นนักโทษหญิงและใช้สารเสพติดทางเส้นเลือดจนเกิดผลข้างเคียง
มีสิ่งแปลกปลอมและแกรนูโลมาอุดกระจายตามเส้นเลือดของปอด ซึ่งเป็นภาวะที่พบได้ไม่บ่อยนัก
ผู้ป่วยถูกนำส่งโรงพยาบาลเพราะมีอาการหอบเหนื่อยมา 2 วัน ร่วมกับโรคตับแข็ง แพทย์ตรวจพบ
นิ้วมือปวมและรอยเข็มนาตามขาทั้งสองข้าง ในเนื้อหาจะแสดงลักษณะเฉพาะของสิ่งแปลกปลอมแต่ละ
ชนิดจากกล้องจุลทรรศน์ จากการตรวจศพยังพบพยาธิสภาพพร้อมอื่นของหลอดเลือดในปอดที่น่าสนใจ
ได้แก่ การสร้างหลอดเลือดขึ้นใหม่, ลักษณะคล้ายเนื้องอกหลอดเลือด, และลิ่มเลือดที่กระจายทั่วไป
ในหลอดเลือด ซึ่งสิ่งเหล่านี้ทำให้เกิดความดันโลหิตของปอดสูงและผลแทรกซ้อนจากการที่มีลิ่มเลือด
อุดหลอดเลือดอยู่ทั่วไปจนทำให้ผู้ป่วยเสียชีวิต ดังนั้นแพทย์จึงต้องคำนึงถึงภาวะที่วุ่นวายรวมทั้งผล
แทรกซ้อนในผู้ป่วยที่ใช้สารเสพติดที่มีภาวะดังกล่าว

คำสำคัญ: การใช้สารเสพติดทางเส้นเลือด, สิ่งแปลกปลอมอุดหลอดเลือดปอด

Nowadays, widely used debased agents or intravenous injection of pulverized tablets in drug abusers tends to increased various medical complications such as pulmonary edema and severe infection.⁽¹⁾ However, its unusual sequelae are pulmonary embolism and granulomatosis, resulting from foreign materials that are passed intravenously.⁽²⁾ In severe cases, the complication produces pulmonary hypertension and hypoxia, mainly from vascular obstruction and increased vascular dead space.⁽³⁾ Several types of foreign body are usually compounded in most tablets and capsules, which are prepared by abusers for their intravenous injections. These foreign substances can be easily detected under polarized light microscope, showing birefringent with typical characters.⁽⁴⁾ We hereby report a rare autopsy case of foreign body embolism of both lungs together with granulomatosis. The patient was a 40-year-old prisoner with a history of many intravenous drug addictions and liver cirrhosis. She presented with a history of dyspnea for 2 days. Cyanosis and clubbing of fingers were documented as well as needle marks on both legs.

The patient died a few days later. During her autopsy, she was found to have bilateral pulmonary embolism and granulomatosis, dispersedly. Additional vascular features consist of recanalization, angioma-like change, and fibrin thrombi, clinically compatible with pulmonary hypertension and disseminated intravascular dissemination.

Case Report

The 40-year-old female prisoner was taken to King Chulalongkorn Memorial Hospital due to her chief complain of dyspnea for 2 days. She had a medical

history of heavy alcohol consumption and multiple drug addicts. Physical examination revealed dyspnea, agitation with cyanosis, and needle marks on both legs. Pulmonary auscultation demonstrated mild wheezing of both lungs.

The abnormal laboratory investigations included leukocytosis with a leukocyte count of 16,200 cell/mm³, with differential count of 60 neutrophils and 40 lymphocytes per 100 leukocytes, thrombocyte count of 345,000 cell/mm³. The liver function test gave abnormal results due to hepatic cirrhosis, with aspartate aminotransferase (SGOT) of 301 U/ml, alanine aminotransferase (SGPT) of 109 U/ml, alkaline phosphatase of 99 mg/dl, total bilirubin of 1.24 mg/dl, and directed bilirubin of 0.28 mg/dl. A test for anti-HIV yielded negative result. A chest roentgenogram showed bilateral interstitial infiltration and cardiomegaly (Fig. 1). The endotracheal tube was placed because of hypoxia together with other supportive measures.



Figure 1. Bilateral pulmonary interstitial infiltration and cardiomegaly.

However, it turned out that the treatment was not successful. A few days later her blood pressure profoundly dropped. Disseminated intravascular coagulopathy (DIC) sequentially developed which was recognized by hemoglobinuria, thrombocytopenia, prolonged prothrombin time and activated partial thromboplastin time. Finally, the patient expired 5 days after admission.

Autopsy was done 1 day after death. The right and left lungs weighed 550 and 500 g, respectively. Their external surfaces and cut sections showed deep-red discoloration. Microscopic examination under polarized light microscope displayed several foreign materials in various features, both intra and

peri-vascular deposition, dispersedly. Birefringent crystalline needles, ranging from 5.75 to 23 microns in length, histologically were consistent with talc. The crystalline celluloses were characterized by large, 10 to 250 microns, pale gray, birefringent, diastase resistant crystals. Cotton fibers were also demonstrated, showing long and slender shape (Fig. 2). Some foreign bodies were engulfed by foreign body giant cells (Fig. 3). Moreover, scattered thromboemboli, intravascular recanalization of thrombus, and angiomaoid formations were seen together (Fig. 4). The liver, weighing 1,150 g, macroscopically and histologically revealed mixed micro and macronodular cirrhosis.

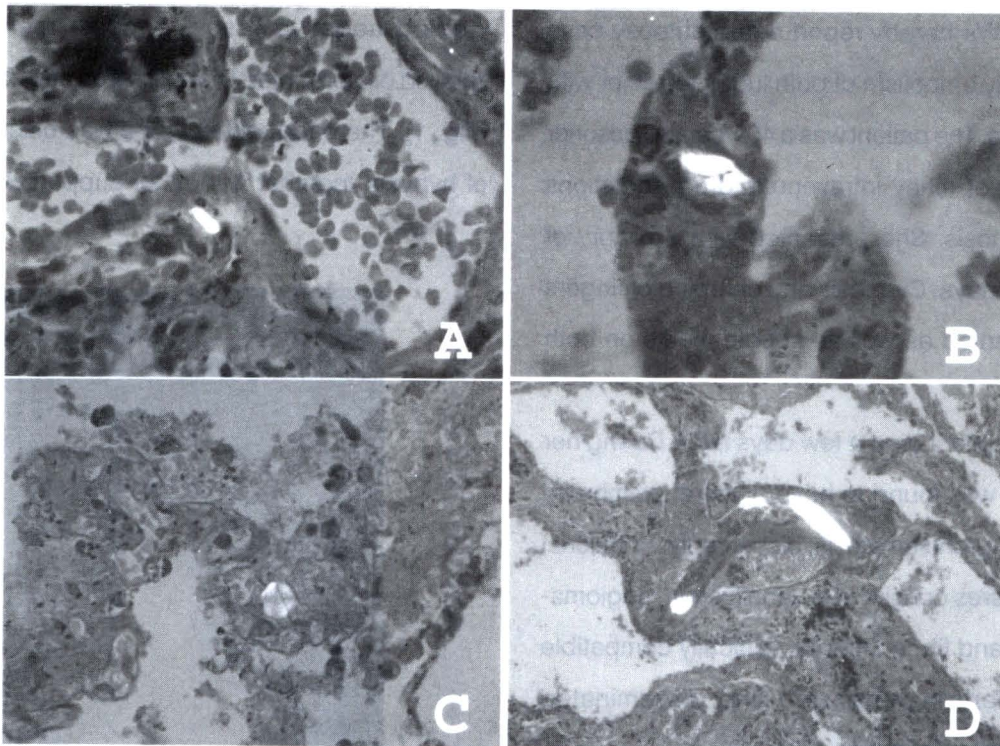


Figure 2. Several types of pulmonary foreign materials consists of perivascular deposition of cellulose spicule (A), interstitial talc granuloma (B), pathognomonic morphology of starch granule along interstitium (C), and slender filament of cotton fiber embolism (D). (H&E stain under polarized, x400).

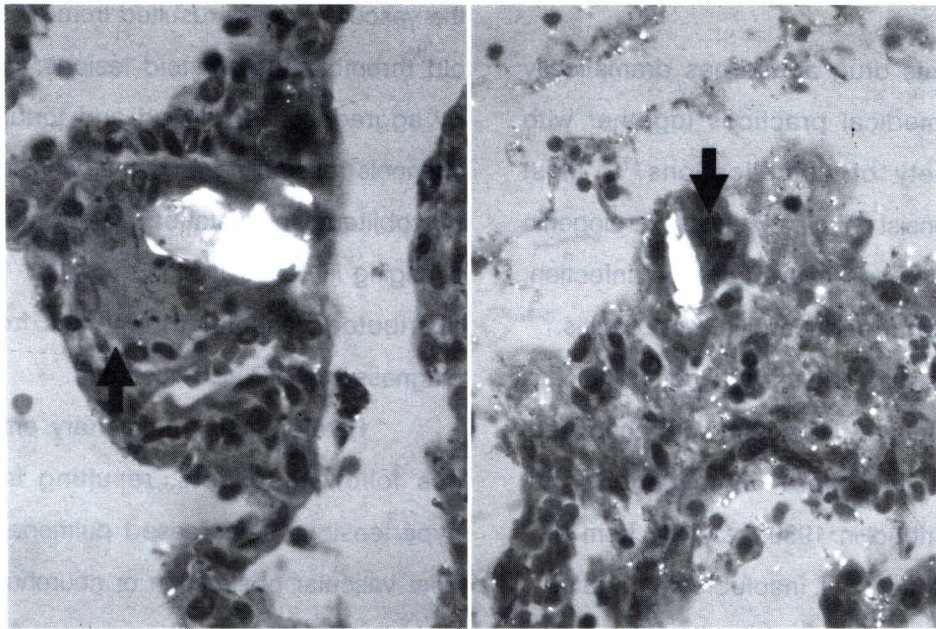


Figure 3. Foreign body granulomas within capillary (A) and alveolar septum (B). The foreign substances are engulfed by multinucleated giant cells (arrows). (H&E stain under polarized, x400).

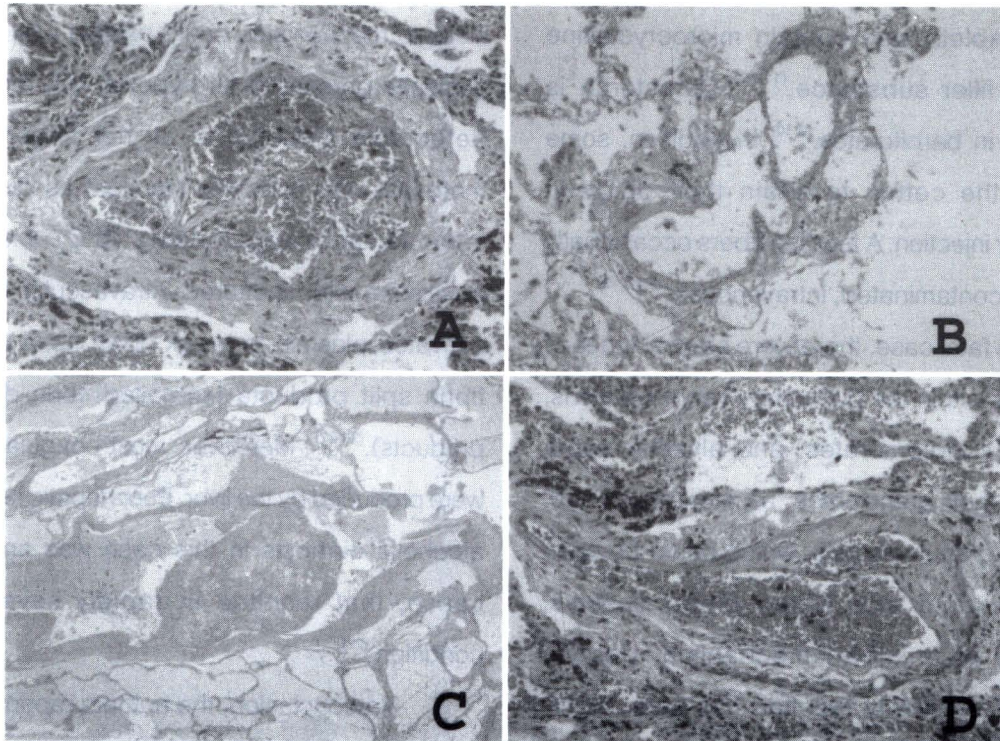


Figure 4. Pulmonary vascular changes includes web-like recanalization of muscular arteries (A), angioma-like lesion (B), thrombin partially occluded the blood vessel (C), and another vessel showing recanalization. (H&E stain, x400)

Discussion

Intravenous drug abuse has dramatically widespread in medical practices together with increasing variety of complications.^(1,5) Most consequences consist principally of non-cardiogenic pulmonary edema and severe bacterial infection, such as pneumonia, endocarditis, and sepsis.⁽⁶⁻⁸⁾ However, an interesting and unusual complication is foreign body pulmonary embolism with concurrent granulomatosis. These are complications that were firstly described in 1950, resulting from illicit intravenous injections of insoluble materials.^(7,9) These insoluble fillers are usually mixed with pharmacologically active agent for oral administration. Talc, is generally used in the preparations of several drugs, such as methylphenidate (Ritalin), methadone, and tripeleminamine hydrochloride (pyribenzamine).⁽¹⁰⁾ Pentazocin tablets also contain microcrystalline cellulose as filler substance.⁽¹¹⁻¹²⁾ Cornstarch is compounded in barbiturates.⁽⁹⁻¹⁰⁾ In addition, some people use the cotton to strain their drugs in preparation for injection. A few fine fibers occasionally are shed and contaminated, intravenously.^(2,4,9,13)

In this fatal case, there were several types of foreign bodies within the pulmonary venous lumens, perivascular conglomerates, and alveolar septa together with their granulomas, as aforementioned. Foreign body granulomatosis, which could be seen in the interstitium and within blood vessels, were results of unknown mechanism, despite delayed hypersensitivity reaction has been highly preferred.⁽¹³⁻¹⁴⁾ In addition, there were many histopathologic pulmonary vascular changes, that confirm secondary pulmonary hypertension from embolic phenomenon.⁽¹⁵⁻¹⁶⁾ Web-like changes within

the vascular lumens resulted from recanalization of old thrombi. Angiomatoid lesions, characterized by aggregation of dilated and tortuous vascular channels resembling angioma, were suggestive of postobliterative dilatation by thromboemboli and changing in vascular blood flow.^(9,13,17) Generalized distributed vascular thrombosis from clinically diagnosed as DIC also illustrated.

Foreign body pulmonary embolism itself has following effects, resulting in pulmonary hypertension: 1) increased pulmonary resistance from vascular obstruction or neurohumoral agents including serotonin; 2) impaired gas exchange because of increased alveolar dead space; 3) alveolar hyperventilation due to reflex stimulation of irritant receptors; and 4) bronchoconstriction with secondary increased airway resistance.⁽¹⁸⁻²⁰⁾ These pathophysiologic mechanisms could explain why the patient clinically presented as hypoxia with dyspnea and detectable clubbing of all her fingers. Foreign materials also clinically manifest as disseminated intravascular coagulopathy (DIC), histologically consistent with scattered intravascular thrombi, by activated plasmin to break down fibrin polymers to fibrin split products (so-called fibrin degradation products).⁽²⁰⁻²¹⁾ Moreover, most coagulation factors were produced by the liver. Poor hepatic function from alcoholic cirrhosis in this case was an additional cause, that resulted in rapidly severe clinical condition.⁽²²⁾

In conclusion, the authors report a very rare case of pulmonary foreign body embolism and granulomatosis in a patient who used several adulterated intravenous drugs. Pulmonary hypertension secondarily developed accompanying DIC,

microscopically supported by blood vessel changes in varying features and scattered intravascular fibrin thrombi.

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