

Case Report**Diffuse alveolar hemorrhage and reactive airway disease induced by 1, 1-Difluoroethane.****Amro Alastal^{*}**

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A 19 year old male nonsmoker presented to our Emergency Department with a one day history of cough, and hematemesis, with no previous history of gastrointestinal bleeding use of medication, or drug abuse.

His initial Hemoglobin was 13.2 g/dl, blood pressure 130/65, heart rate 100, with no orthostatic changes, O₂ sat 95% on room air, Temp/taure 36.9. The patient has no fever, chills or any other signs of infection. The rest of his physical exam was normal. Upper Gastro-intestinal Endoscopy was unremarkable with no site of active bleeding identified.

Pulmonary consultation was sought to exclude other sources of bleeding. Upper airway exam did not disclose any bleeding site and the initial chest X-ray was normal. Fiber-optic bronchoscopy revealed diffuse hyperemia and multifocal slow oozing observed. Sequential bronchoalveolar lavage (BAL) samples from the right middle lobe were progressively more blood stained. The BAL showed numerous hemosiderin laden macrophages. BAL stains (GS, AFB, PCP, Fungus), cultures (routine, AFB, Fungus) and Cytology (for Viral bodies) all were negative. Repeat hemoglobin at 6 hours dropped

to 9.8 gm/dl and oxygen saturation dropped to 88% on room air.

A diagnosis of diffuse alveolar hemorrhage was made and the patient was started on high dose methylprednisolone (methylprednisolone-500 mg/d for 3 days) and antibiotics. Chest CT was done, showed diffuse micronodular/ alveolar opacities. (Fig 1, 2, 3). Urine analysis was normal. Erythrocyte sedimentation rate 32, INR, PTT wnl, Platelets count 350000/ml, Antinuclear Antibody, Anti-neutrophil cytoplasmic antibody (p-ANCA, c-ANCA) and Antiglomerular basement membrane antibody all negative. Pulmonary function studies showed an FEV1 of 62% predicted (85% post bronchodilator), FVC of 89% predicted and DLCO of 98% predicted.

On further questioning the patient admitted to a progressive cough over the previous few months coinciding with excessive use of a computer cleaning spray containing 1, 1-Difluoroethane at home, he denied any other exposure. The patient's condition improved significantly following initiation of treatment and 4 days later he was discharged home on oral prednisolone 40 mg/day. Repeat Chest CT done 2 weeks later showed complete clearing of his lung fields. (Fig 4,5) and pulmonary

function studies (on tapering doses of prednisone) and 12 weeks (off prednisone) revealed a stable DLCO, but continued response to bronchodilators.

Final Diagnosis: Diffuse alveolar hemorrhage and reactive airway disease induced by 1, 1-Difluoroethane.

Discussion:

1, 1-Difluoroethane is a organofluorine compound with the chemical formula C₂H₄F₂. This colorless gas is used as a refrigerant, where it is often listed as R-152a or HFC-152a. As an alternative to chlorofluorocarbons, it has a low global warming potential. (1). In addition to serving as a refrigerant, 1,1-difluoroethane is also commonly found in electronic cleaning products, and many consumer aerosol products.(1).

The practice of huffing "Duster" can be extremely dangerous or fatal. The intentional inhalation of 1, 1-difluoroethane caused a fatal cardiac arrhythmia in a 42 year-old man (1). Some other reports of fatal car crashes have been linked to drivers huffing 1, 1-difluoroethane (2). Prolonged exposure to difluoroethane has been linked in humans to the development of coronary heart-disease and angina. It also can cause lower abdominal cramps (3).

According to the MSDS data potential health effects listed regarding inhalation that it may cause irritation of the eyes, skin and respiratory tract. High concentrations may cause dizziness, drowsiness, fatigue, headache and fainting, but exposure to 1,1-difluoroethane causing diffuse alveolar hemorrhage or reactive airway disease has not been previously reported. (4).

To my knowledge this is the first case of diffuse alveolar hemorrhage and reactive airway disease related to 1, 1-Difluoroethane overuse at home for computer cleaning.

References:

1. Retrieved from Wikipedia: "<http://en.wikipedia.org/wiki/1,1-Difluoroethane>".
2. Broussard LA, Brustowicz T, Pittman T, Atkins KD, Presley L (November 1997). "Two traffic fatalities related to the use of difluoroethane". *Journal of Forensic Sciences* 42 (6): 1186–7. PMID 9397568.
3. "1,1-Difluoroethane". *National Library of Medicine HSDB Database*. 1994.
4. MSDS Information: <http://www.msdsonline.com>

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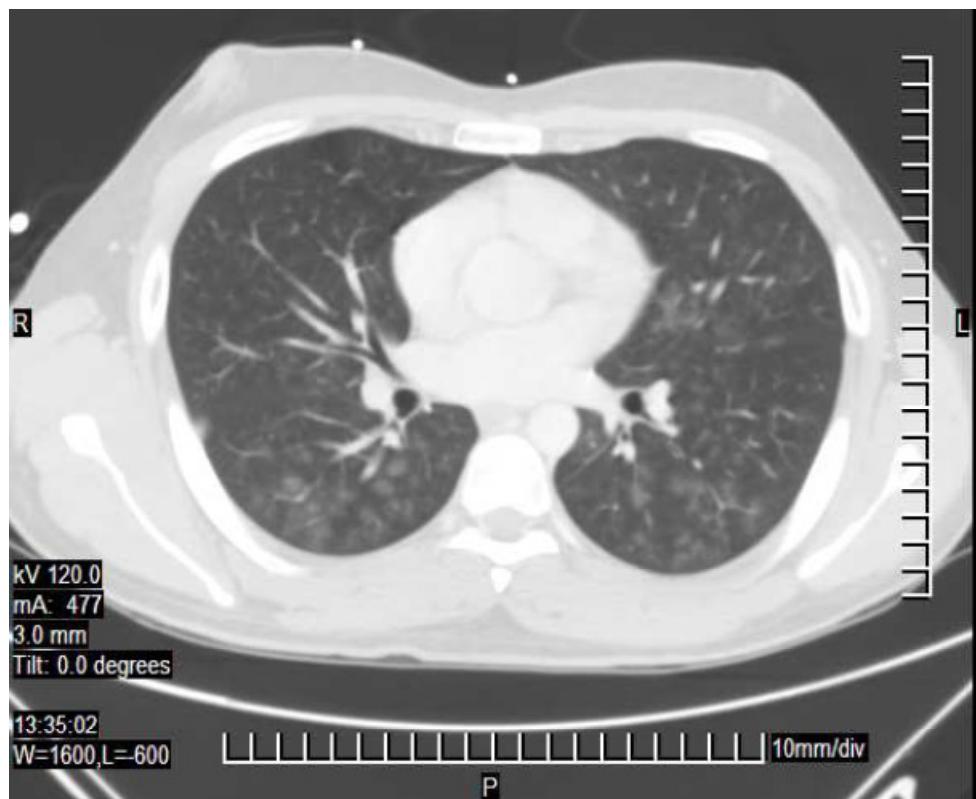


Fig 1: Diffuse micronodular/alveolar opacities.



Fig 2: Diffuse micronodular/alveolar opacities.



Fig 3: Diffuse micronodular/alveolar opacities.

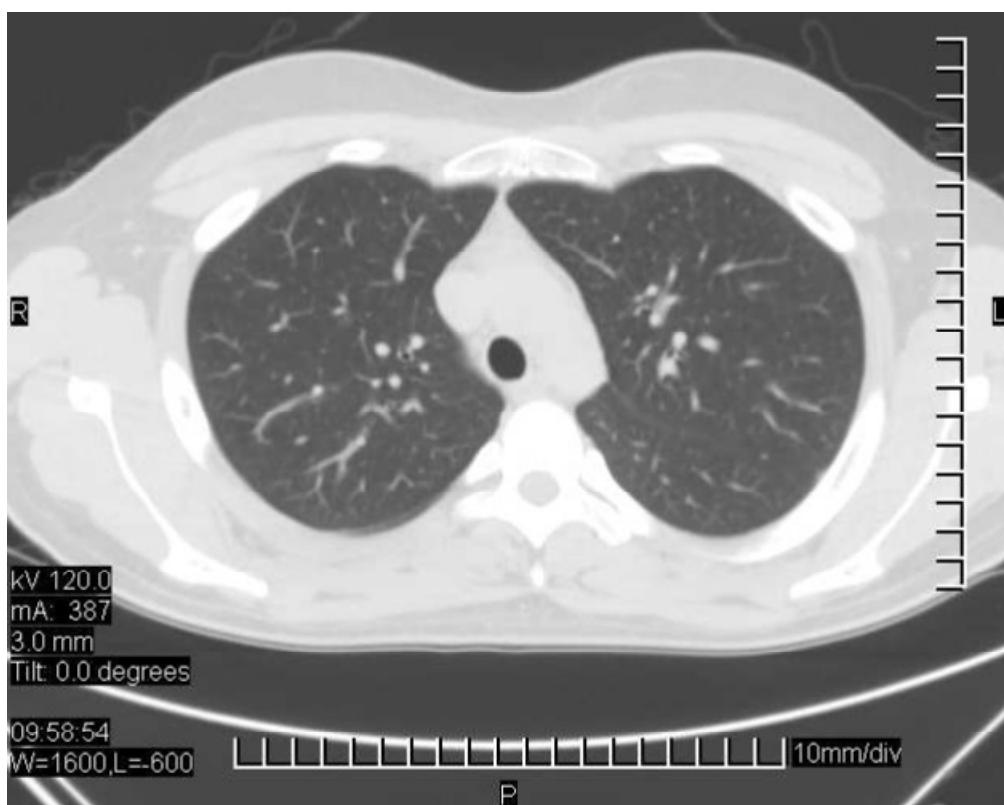


Fig 4: Complete clearance of the micronodular/alveolar opacities.

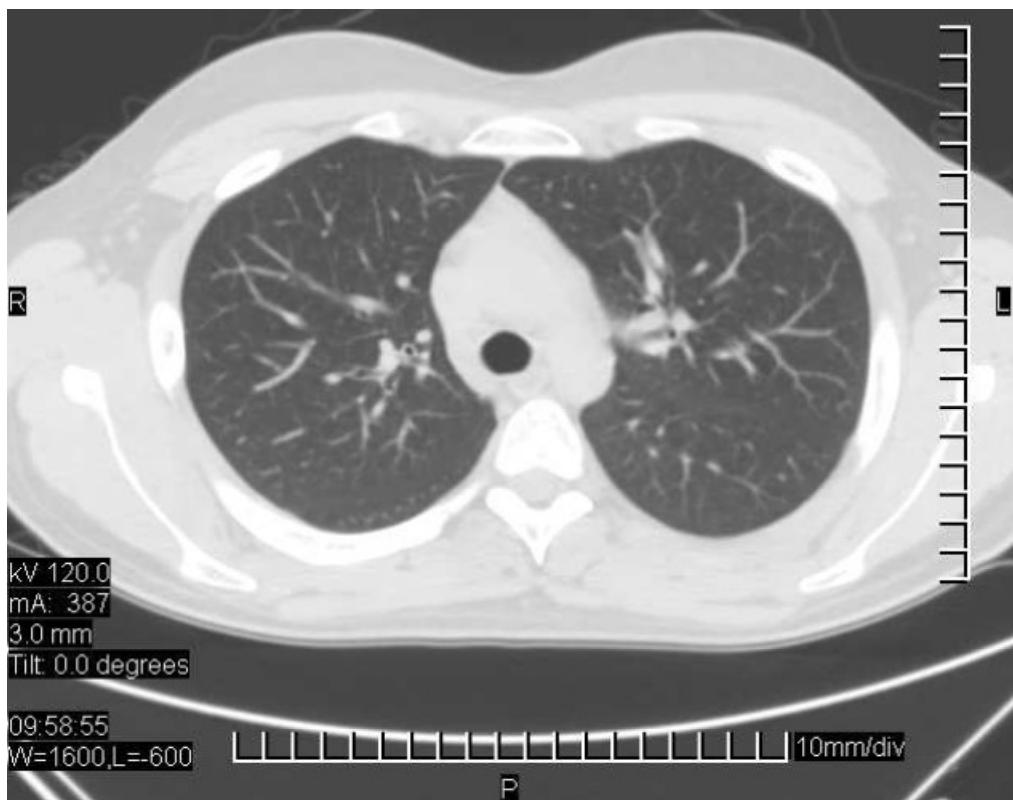


Fig 5: Complete clearance of the micronodular/alveolar opacities.