

Dramatic consequences of waterpipe use following lung transplantation

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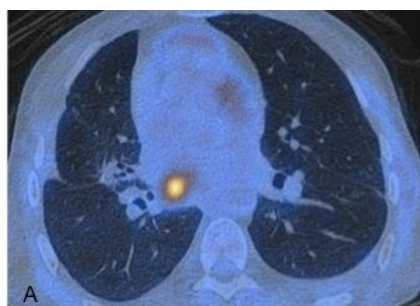
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An adolescent male with end-stage cystic fibrosis (CF) and chronic pulmonary infection with *Pseudomonas aeruginosa* underwent bilateral lung transplantation in 2016 without complications. Early postoperative course was uneventful.

3 months following transplantation, he was admitted to the hospital with fever and sepsis with *Pseudomonas aeruginosa*. Antibiotic treatment was initiated for 10 days after CT scans of lungs, paranasal sinuses and transthoracic echocardiogram showed no pathology. 3 weeks later, he presented again with fever and strongly elevated CRP. Again, blood cultures showed *Pseudomonas aeruginosa* and antibiotic treatment with Meropenem and Colistin was re-installed. PET-scan showed a highly FDG-avid lesion in the right lower lobe close to the hilus. Bronchoscopy with endobronchial ultrasound and needle biopsy showed only blood cells without tissue. Microbial cultures showed *Pseudomonas aeruginosa*. 2 days after bronchoscopy the patient complained about impaired vision. Ophthalmic examination revealed bilateral subretinal abscesses. Brain MRI showed multiple embolic lesions. Transoesophageal echocardiography then revealed thrombosis of the right lower lung vein with extension of a free floating thrombus into the left atrium. Left lower lobectomy and partial left atrium resection and reconstruction were performed under CPB. Postoperatively, treatment was done with meropenem, colistin, and subretinal amikacin injections. The patient was discharged 2 weeks later. Ciprofloxacin was given for another 2 months until the subretinal abscesses disappeared. Luckily, vision improved and glasses with a minor correction was prescribed.



- A PET-CT scan showing a highly metabolic active lesion at the right lower hilum
- B Fundoscopy showing multiple embolic lesions with subretinal abscess and subretinal hemorrhage
- C Resected lower allograft lobe. Vein completely filled with thrombus

Pathological examination revealed a large thrombus in the right lower lung vein with transmural inflammation of the surrounding lung tissue. Cultures showed infection with *Pseudomonas aeruginosa*. Further examination of the lung tissue showed titanium particles in the bronchioli, which could not be found in samples of the donor lung. The patient admitted to have smoked waterpipe 2 months following lung transplantation. Titanium can indeed be found in tobacco products and waterpipe accessories. Further mineralogical analysis of the waterpipe tobacco and smoke for comparison with the particles found in the resected lung are pending.

We hypothesize that the inhalation of titanium via tobacco and waterpipe equipment might have caused a local inflammation in the allograft leading to superinfection with *Pseudomonas aeruginosa* and ultimately to infectious thrombosis of the right lower lung vein with sepsis and embolism. The diagnosis was delayed because the lesion was not visible on initial CT scan and transthoracic ultrasound. Despite adequate antibiotic treatment, the infection could not be controlled and surgery remained the only therapeutic option to prevent further damage and ultimately to save the patient's life and vision.