

# FATAL SUBCUTANEOUS EMPHYSEMA SECONDARY TO PULMONARY NOCARDIOSIS IN AN IMMUNOCOMPROMISED PATIENT

- A Case Report -

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We report a case of necrotizing pulmonary nocardiosis complicated by subcutaneous emphysema in a 54 years old male patient receiving immunosuppressive therapy following renal transplant. The subcutaneous emphysema progressed rapidly and despite intervention, the response was poor resulting in fatal cardiorespiratory failure.

## Case Report

A 54-year-old male patient was admitted through emergency with recent onset of productive cough with hemoptysis and fever which was gradually increasing since the previous 3 days. He also had a small chest wound just under his right nipple. He had undergone renal transplantation 2 years ago due to chronic renal failure secondary to focal segmental glomerulonephritis and was receiving corticosteroids since then. He also had hypertension and acid-peptic disease for which he was taking medications.

Laboratory investigations revealed leucocytosis with neutrophil predominance, high serum creatinine and blood urea nitrogen and low serum bicarbonate levels. Chest X-ray (CXR) revealed right sided homogenous opacity in mid zone extending to invade the skin just below the nipple. Diagnosis of graft rejection and pneumonia secondary to immunosuppression was made and empiric broad spectrum antimicrobial and antifungal were started. For immunosuppression, cyclosporin and mycophenolate mofetil were initiated and prednisolone continued. Sputum and broncho alveolar lavage (BAL) was sent for culture and acid-fast bacilli (AFB) smear. Microbiology report showed growth of methicillin-resistant staphylococcus aureus (MRSA) and escherichia coli (E. coli), following which antibiotics were changed to those sensitive to the organisms.

Until this time patient was able to maintain acceptable arterial blood gases on oxygen therapy, but on the third day of admission he started to become hypoxic despite supplemental oxygen and developed severe respiratory acidosis. He also developed tachypnea and became drowsy which gradually worsened and therefore was electively intubated and shifted to intensive care unit for mechanical ventilation and further management.

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His fever and leucocytosis gradually settled but chest x-ray showed increasing opacities. Ventilatory requirements gradually decreased and weaning was being considered. His chest wound was debrided and daily dressings were done which was also improving. During his intensive care unit stay he remained hemodynamically stable except for two episodes of atrial fibrillation which responded to intravenous amiodarone. Intermittent hemodylisis continued throughout his ICU stay. He also remained neurologically intact.

On 7<sup>th</sup> day of ICU admission, the patient developed subcutaneous emphysema just under right nipple on the margins of the wound. A chest computed tomography (CT) scan was done which revealed cavitary lesions with evidence of pleurocutaneous fistula. Cardiothoracic surgery was consulted. As there was no pneumothorax, subcutaneous emphysema was localized and the ventilatory requirements were minimal, any intervention was deferred. Antibiotic spectrum was broadened to include coverage of gas forming organism like nocardia.

Next day white blood cell count increased and BAL was performed which showed growth of nocardia for which septran was added. His subcutaneous emphysema gradually increased along with worsening chest lesions despite appropriate antibiotics over the following 2 days. Even at this time his ventilatory requirements continued to decrease with consideration of plan for gradual progress to tracheal extubation.

Next morning, his emphysema increased rapidly progressing up to the face and down to the groins. Simultaneously his ventilatory requirement increased and he started to become hemodynamically unstable requiring inotropic support. Chest x-ray at this point showed pneumomediastinum, pneumopericardium and bilateral pneumothorax. Cardiothoracic surgery opinion was sought and a decision of bilateral chest tubes, fasciotomies was made. Possibility of isolation of lung was also discussed. Considering the difficult airway due to severe facial subcutaneous emphysema, it was decided to take the patient to the operating room. While arrangements were being made for the transfer of the patient, multiple chest tube insertions and fasciotomies were performed in the intensive care unit. At this point patient suddenly developed asystolic cardiac arrest and

despite all attempts at cardiopulmonary resuscitation, he could not be revived.

## Discussion

The genus *Nocardia* is a member of the order Actinomycetales, found in soil, plants and decomposing organic material<sup>1</sup>. *Nocardia* is divided into several species of which *Nocardia asteroides* accounts for the vast majority of clinical nocardial infection in humans<sup>2</sup>.

Immunosuppression is a well established risk factor for nocardiosis as was our patient. A compilation of more than a thousand randomly selected cases from the literature showed that more than 60% of all reported cases of nocardiosis are associated with preexisting immunosuppression, with the most common being corticosteroid treatment and immunosuppressive therapy<sup>3</sup>. The incidence of nocardiosis in renal transplant recipients varies from 2 to 20%<sup>4,5</sup>. Beaman comprehensively reviewed the published literature and found 140 (21.8%) cases of nocardiosis in organ transplant recipients, of which 81 (58%) were in renal transplant recipients<sup>3</sup>.

Pulmonary disease is the predominant clinical presentation of nocardiosis, with almost 90% of these caused by members of the *N. asteroides* complex<sup>6</sup>. The incidence of pulmonary nocardiosis is increasing due to a higher degree of clinical suspicion and the increasing number of immunosuppressive factors. Characteristically radiological manifestations may include consolidations, irregular nodules, often cavitary, reticulonodular or diffuse infiltrates, and pleural effusions<sup>7</sup>.

Clinicians should be aware that pulmonary nocardiosis is difficult to diagnose on the basis of clinical and radiological findings. A high level of clinical suspicion is required in patients with risk factors. Growth of *Nocardia* may take from 48 hours to several weeks, but typical colonies are usually seen from 3 to 5 days. In pulmonary nocardiosis, sputum culture is the most frequently used diagnostic test. This patient showed growth of nocardia on second bronchioalveolar lavage approximately fourteen days after his sickness. Successful therapy requires the use of antimicrobial drugs in combination with appropriate

surgical drainage or debridement. The clinical outcome of therapy for nocardiosis is dependent on the site and extent of disease and underlying host factors. Mortality rates between 20-40% are mentioned in different series and may reach 80-100% in disseminated central nervous system disease<sup>8</sup>.

The association of chest wall subcutaneous emphysema is less common with pulmonary infections<sup>9</sup> and not reported with nocardiosis. Extension of air from respiratory tracts may produce pneumothorax, pneumomediastinum, pneumopericardium, or retroperitoneal collections of air. Subcutaneous emphysema can also extend into the soft tissues of the head and neck upwards and up to legs downwards<sup>10</sup>. Although in most instances subcutaneous emphysema is of little clinical importance, it may be fatal if it leads to upper airway obstruction<sup>11</sup>, acute respiratory failure due to chest wall compression<sup>12</sup>, intracranial hypertension<sup>13</sup>, and circulatory collapse in association with tension

pneumomediastinum<sup>14</sup>. It also causes difficulties in the reading of chest radiographs, echocardiography, ultrasound, and electrocardiograms<sup>15</sup>. Prompt diagnosis and treatment is necessary before rapid deterioration may suddenly compromise cardiorespiratory system<sup>16</sup>.

Treatment should not be delayed awaiting further cardiovascular and respiratory compromise. As soon as pneumothorax is suspected, the pleural space should be decompressed. Surprisingly, in our patient mechanical ventilatory parameters were reasonable till the last day when rapid deterioration in subcutaneous emphysema caused a compromise in the delivery of adequate minute ventilation finally resulting in fatal cardiopulmonary failure.

Although the subcutaneous emphysema in nocardiosis is rare, it is important for the clinicians to be aware of this and should intervene early as it may rapidly progress resulting in acute cardio-respiratory failure.

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