Unusual Ca(U) Se of Lung Cavities

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Abstract: Granulomatosis with polyangitis (previously called Wegener’s granulomatosis) is a rare cause of lung cavity that has high morbidity and mortality. Early diagnosis and initiation of treatment contributes substantially to the prognosis. This case was taken to explore the clinical profile of the granulomatosis with polyangitis when presented late during the course of illness. Case: A 46-year-old Indian woman presented to our emergency department with history of shortness of breath and cough with minimal expectoration which progressively worsened. She developed large lung cavitation and respiratory failure and was successfully treated with high dose steroids and pulse cyclophosphamide therapy. Her clinical course was complicated with scleritis on right eye-loss of vision, oral ulcers. Conclusion: The recognition of multisystem involvement in wegener’s vasculitis is critical. Respiratory involvement can be fulminant in wegeners’s granulomatosis, in which case aggressive treatment with steroids, cyclophosphamide can be life saving.

Key words: Large cavitation · Granulomatosis with polyangitis · P-ANCA

INTRODUCTION

Lung cavities are one of the most common clinical problems encountered in a tertiary care centre. India being the capital of tuberculosis we tend to treat every cavity as tuberculosis. We must keep our eye open to unusual causes of cavity also. Systemic necrotizing vasculitis represents a major challenge in critical care units, thus, early and accurate diagnosis and aggressive treatment are essential to improve outcome. We report this unusual case of Wegener’s granulomatosis presented with multisystem involvement, bilateral large lung cavities with unusual P-ANCA positivity.

Wegener’s granulomatosis (WG) is an antineutrophil cytoplasmic antibody (ANCA)-associated small vessel vasculitides. The clinical manifestations of vasculitides are diverse and this is reflected in the manner of their presentation in patients in an intensive care unit (ICU). The major systems involved are the lungs or kidneys.

Case Presentation: A 46 year old female came with complaints of breathlessness-grade 2 for 20 days aggravated for past 4 days to grade 3. No history of Paroxysmal Nocturnal Dyspnoea/Orthopnea. She had complaints of cough - predominantly dry with minimal expectoration, no hemoptysis There was no history of chest pain. She had complaints of ear discharge on and off for 2 yrs. She also had complaints of pricking pain diffusely in the lateral aspect left leg for 4 days. She had history of loss of weight and loss of appetite There was no history of palpitation, leg swelling, decreased urine output, change in urine colour, puffiness around the eyes. She denied history of arthralgia, photosensitivity, cognitive mood disorder and fever.

She had history of gradual and painless loss of vision in the right eye before and also a history of similar neuropathic symptoms in past in legs and forearm. No history of respiratory symptoms in the past. On examination patient’s vitals were stable mildly dyspnic, she was pale and she was found to have half and half nails, hirsuitism and scleromalacia. Respiratory system examination revealed right ear otomycosis, Right side – cavernous type of bronchial breathing in inter and infrascapular areas, end inspiratory creps not altered by cough (velcro crackles) in right infra axillary area. other system examination was found to be normal. Lab investigations revealed a total count of 21000, ESR count of 150 and the urine routine showed minimal protenuria, renal function test revealed elevated creatinine level of 2.6 with normal urea level. Sputum examination showed gram positive culture in chains acid fast bacilli and fungal growth was negative. The chest x ray revealed large
cavities on both the lungs. CT chest also showed reticular ground glass opacities apart from large cavitation. Special test like anca revealed P-anca positivity and C-anca was negative. Ultrasound abdomen showed normal sized kidney and corticomedullary differentiation was maintained we proceeded to renal biopsy which revealed necrotizing glomerulonephritis. Nerve conduction study revealed mononeuritis multiplex of all four limbs. We had started the patient with oral prednisolone and pulsed intravenous cyclophosphamide, patient responded well with and her symptoms were alleviated for an extent.

Scleromalacia

![Scleromalacia](image1)

Fig. 1:

Half and Half Nails

![Half and Half Nails](image2)

Fig. 2:

Chest X-ray

![Chest X-ray](image3)

Fig. 3:

Hrct Chest

![Hrct Chest](image4)

Fig. 4:

Large thickwalled cavities in both lungs
Ground glass opacity seen in basal segments of right lower lobe-

HRCT Chest

![HRCT Chest](image5)

Fig. 5:

Cavity in Pulmonary Tuberculosis

![Cavity in Pulmonary Tuberculosis](image6)

Fig. 6

Invasive Aspergilosis

![Invasive Aspergilosis](image7)

Fig. 7:
Typical Wegeners thickness of 4 mm or less were usually (30/32 [94% of the time]) caused by nonmalignant processes. Cavities with a maximum wall thickness of 5 to 15 mm were mixed, with 33/55 (60%) being nonmalignant and 22/55 (40%) being malignant cavities. Cavities with a maximum wall thickness of >15 mm were usually (35/39 [90%]) malignant.

**Infections Associated with Lung Cavities**

**Common Bacterial Infections:** Cavitation is more frequently reported among patients with concurrent *S. pneumoniae* pneumonia and bacteremia, which may reflect the greater severity of disease among bacteremic patients. [4]

*Klebsiella pneumoniae* is a common cause of severe, necrotizing pneumonia. While older literature described alcoholism and smoking as important risk factors for community-acquired *Klebsiella* pneumonia, more recent studies demonstrate that a growing proportion of patients are immunocompromised and acquire infection in the hospital.

**Mycobacterial Infections**

*Mycobacterium Tuberculosis:* *Mycobacterium tuberculosis* is classically associated with cavitary pulmonary disease. Although tuberculosis case rates have declined in many developed countries, the human immunodeficiency virus epidemic has led to a tremendous increase in tuberculosis cases in the developing world, particularly in sub-Saharan Africa. In addition to human immunodeficiency virus infection, other risk factors for tuberculosis include exposure-related factors such as birth in a country where tuberculosis is endemic and immunologic deficits that increase the risk of progression from latent to active tuberculosis, such as diabetes, hematologic and head and neck malignancies organ transplantation, corticosteroid use and tumor necrosis factor antagonist use. Pulmonary tuberculosis generally presents subacutely, with weeks to months of productive cough, fever, night sweats, weight loss and, occasionally, hemoptysis. The chest radiograph typically reveals pulmonary infiltrates in the apical and posterior segments of the upper lobe or the superior segment of the lower lobe, often associated with cavitation. The prevalence of cavities on plain radiographs varies widely by series, but most series report cavitation in 30 to 50% of patients. Multiple cavities are often present and frequently occur in areas of consolidation. Cavities can vary widely in size and have been reported to have both thick and thin walls [5, 6, 7]. The presence of cavitation is associated with a greater degree of infectiousness, likely due to higher organism burden.
**Mycobacterium Avium Complex:** Organisms belonging to the *Mycobacterium avium* complex are the nontuberculous mycobacteria most frequently implicated in pulmonary disease. The *M. avium* complex includes two major species, *M. avium* and *M. intracellulare*, as well as a third group of organisms, many of which do not belong to named species [8]. In more recent years, the spectrum of lung disease caused by the *M. avium* complex has expanded. Probably the most common manifestation of *M. avium* complex pulmonary disease is the nodular/bronchiectatic form. This entity usually afflicts thin women over 50 years of age who have otherwise normal immune systems and no previous diagnosis of lung disease.

**Fungal Infections**

**Aspergillosis:** *Aspergillus* species are environmental molds that cause a wide range of pulmonary disease in humans. Pulmonary disease is most commonly caused by *Aspergillus fumigatus*, although it can be caused by other species such as *A. flavus*, *A. niger* and *A. terreus* and can manifest as one of four distinct clinical entities, ordered by increasing pathogenicity and tissue invasion: (i) allergic bronchopulmonary aspergillosis, which afflicts patients with long-standing asthma; (ii) aspergilloma, which afflicts primarily patients with preexisting lung cavities; (iii) chronic necrotizing aspergillosis or semi-invasive aspergillosis, which afflicts patients with a history of chronic lung disease; and (iv) invasive aspergillosis, which afflicts immunocompromised and critically ill hosts [9]. An aspergilloma, also referred to as a mycetoma or fungus ball, represents growth of aspergillus (usually *A. fumigatus*) within a preexisting lung cavity. Classically, the most common cause of the cavity was pulmonary tuberculosis and one older study reported radiographic evidence of aspergilloma formation in 11% of 544 patients with tuberculous pulmonary cavities. In areas where tuberculosis is endemic, tuberculosis is still the most common condition predisposing subjects to aspergilloma formation.

**Blastomycosis:** Blastomycosis most commonly afflicts immunocompetent hosts, although persons with diabetes mellitus seem to be disproportionately affected. The lungs are the most common site of disease, with pulmonary involvement reported in 60 to 93% of cases. Acute illness frequently presents with a relatively sudden onset of fever and cough, accompanied by alveolar infiltrates and occasionally nodular densities detected by plain chest radiography. Cavitation is uncommonly (11% in one study) noted in acute disease. Chronic pulmonary blastomycosis most commonly appears as an infiltrate on plain chest radiographs, although appearance as a lung mass is also frequently encountered.

**Parasites**

**Echinococcus:** *Echinococcus granulosus*, causes cystic echinococcosis where the infection occurs when humans ingest soil contaminated with dog feces that contain *E. granulosus* eggs. Lung cysts usually appear as homogeneous masses by plain chest radiography, but if air penetrates between the cyst walls or into the cyst, a cavitary appearance may result. This appearance has been given a number of names in the radiology literature (e.g., “crescent sign,” “meniscus sign,” and “water lily sign”), but these signs are not specific for echinococcal disease.

**Noninfectious Diseases Associated with Lung Cavities**

**Malignancies:** Cavitation detected by plain radiography has been noted in 7 to 11% of primary lung cancers [10, 11, 12, 13], while cavitation detected by computed tomography has been reported for up to 22% of primary lung cancers; cavitation is more frequently found among cases of squamous cell carcinomas than other histological types. Furthermore, the presence of cavitation in a lung tumor has been associated with a worse prognosis [14].

**Rheumatologic Diseases:** Many autoimmune diseases can affect the lung, but cavitation is relatively uncommon in most of these diseases. Sarcoidosis is a relatively common inflammatory disorder of unknown etiology that frequently affects the lungs [15]. Plain chest radiographic findings are often nonspecific; conventional and high-resolution computed tomography are better modalities for showing characteristic features of pulmonary sarcoidosis [16]. Hilar and mediastinal lymphadenopathy are usually present, with or without concomitant parenchymal abnormalities. Lung nodules are frequently observed and tend to be distributed along the bronchovascular bundles, interlobular septa, major fissures and subpleural regions.
Cavitation occasionally occurs within these nodules; for example, one study demonstrated cavitation in 3/44 (6.8%) patients with pulmonary sarcoidosis [17].

**Septic Pulmonary Emboli:** Septic pulmonary emboli, although relatively rare, typically appear as nodules located in the lung periphery, although wedge-shaped peripheral lesions and infiltrates are also seen. Cavitation is seen in 23 to 47% of cases using plain radiography and in up to 85% of cases using computed tomography.

**Granulomatosis with Polyangitis:** It is characterised by classical triad of granulomatous vasculitis of upper and lower respiratory tract together with necrotising glomerulonephritis. Incidence is 3 per 1 lakh population. Histopathological hallmark of the disease is necrotising vasculitis of small vessels and granuloma formation.

Wegener's granulomatosis, an uncommon disorder in which cavitary lung disease is frequently encountered. Pulmonary nodules and infiltrates are a frequent manifestation of Wegener's granulomatosis in the lung and cavitation may accompany both of these manifestations Pulmonary cavities have been observed by computed tomography in 35 to 50% of patients with Wegener's granulomatosis involving the lung.

**Pathogenesis:** Antiprotinase-3 (anti-PR 3) is associated with 70 -80% of cases. Antimyeloperoxidase (anti-MPO) is present in 10% of cases. Role of T cells - CD 4 T cells response, monocyctic activation, high levels of TH-1 cytokines (TNF _α_, INF _γ_). B cell activation.

**Newer Anca in Granulomatosis with Polyangitis:** Autoantibodies directed against lysosomal associated membrane protein -2 is found in almost all patients of necrotising glomerulonephritis. Recent hypothesis of disease Human lamp-2 epitope has 100% homology with bacterial adhesion molecule fimH of gram neg bacteria[e. coli, proteus, klebsiella]. 69 % of patients are affected by bacterial expressing fimH before 12weeks of acquiring FGN’S.

**Clinical Features [18]:** Weight lossMalaise, Fever, Arthralgia, Myalgia, Upper respiratory disease-sinusitis, ASOM, nasalperforation, hearingloss, Mouthulcers, Episcleritis, scleritis, dacryocystitis, visualloss, CNS manifestations Glomerulonephritis progressing to renal failure in 70 to 80% of patients. Lunginvolvement-pulmonary haemorrhage (hemoptysis), pleuritis and granulomas.

**ACRcriteria [19]**
- Nasal or oral inflammation
- Abnormal CXR findings
- Abnormal urine sediments
- Granulomatous inflammation on biopsy specimen or hemoptysis if biopsy not available.

Presence of 2 or more features was reported to have sensitivity of 88% and specificity of 92%.

**Differential diagnosis**
- Goodpasture syndrome
- Relapsing polychondritis
- tumours of upper airway and lung
- Histoplasmosis
- Midline granuloma
- Newer Treatment In Management
- Rituximab – anti CD20 monoclonal antibody for relapse
- Plasmapheresis for severe pulmonary haemorrhage

**Comparison of cavities in T. B and Granulomatosis with polyangitis**

**Cavity in Wegener**

Wegener's granulomatosis, an uncommon disorder in which cavitary lung disease is frequently encountered. One study of 77 persons with Wegener's granulomatosis found that 26/53 (49%) persons with pulmonary nodules had cavitation (on plain radiograph or computed tomography) within one or more nodules and that 7/41 (17%) persons with infiltrates had cavitation within an area of infiltrate (subjects could have both nodules and infiltrates, so numbers do not equal 77). Another study found cavitary nodules in 7/19 (37%) subjects with Wegener's granulomatosis detected by plain chest radiographs (3). The clinical picture was frequently complicated by infection in these subjects, as 3/19 (16%) subjects had subsequent bacterial superinfection of a lung cavity. They show no zonal predilection, are usually multiple, are rounded or oval in shape and when two centimeter, cavitate in at least 25%[20]. Pulmonary cavities have been observed by computed tomography in 35 to 50% of patients with Wegener's granulomatosis involving the lung.

Usually cavity in this disease will be well circumscribed, smaller in size, variable in number and location, thinwalled, may be associated with nodules, consolidation and hilarlymphadenopathy. In our case the lung cavity was much larger in size say 6*6 cms in Rt lung involving upper and middle lobe.
Cavity in pulmonary T. B: Cavities are large, preferring apical and upper lobe, moderately thick walled, associated with consolidation, lymphadenopathy. It is certain that cavity size reflects on the prognosis of the patient. Large sized cavity in Wegener’s disease carry a poor prognosis.

CONCLUSION

Cavities are seen in many conditions and tuberculosis is the main cause of cavity in tropical countries.

Cavities do occur in Wegenersgranulomatosis, but they are small in size usually. In WegenersGranulomatosis C-ANCA is positive in 80% of cases. We are reporting this case because granulomatosis with polyangitis with large, thick wall cavities with P-ANCA positivity is rare. Only 20% of granulomatosis with polyangitis present with P-ANCA positivity. Early diagnosis and treatment is associated with better prognosis.

REFERENCES


