Granulomatosis with Polyangiitis Masquerading as Recurrent Tuberculosis and Non-Resolving Pneumonia: A rare case report

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Abstract

Granulomatosis with Polyangiitis is a rare necrotizing granulomatous vasculitis that can mimic infectious or neoplastic diseases. We report a 47-year-old woman who presented with recurrent episodes of fever, cough, and non-resolving pneumonia initially treated as pulmonary tuberculosis. Despite multiple courses of antibiotics and anti-tubercular therapy, her symptoms persisted, and imaging revealed bilateral cavitating nodules. Subsequent rheumatologic evaluation showed strong proteinase-3 ANCA positivity with histological evidence of granulomatous inflammation involving the lungs, parotid gland, and upper airways. A diagnosis of GPA was established, and the patient responded dramatically to intravenous methylprednisolone followed by rituximab therapy. This case highlights the diagnostic challenges of GPA in tuberculosis-endemic regions and underscores the importance of considering vasculitic disorders in patients with recurrent or non-resolving pulmonary infiltrates unresponsive to standard therapy.

Introduction

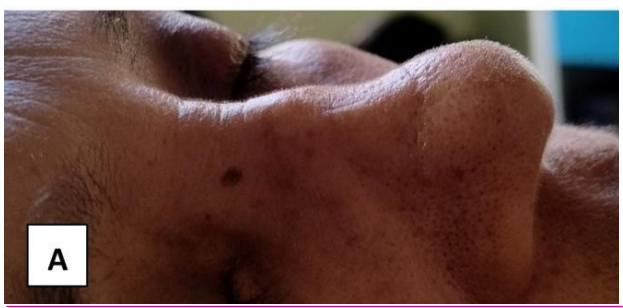
Granulomatosis with Polyangiitis (GPA), formerly known as Wegener's granulomatosis, is an uncommon necrotizing granulomatous vasculitis affecting small- to medium-sized vessels. It primarily involves the respiratory tract and kidneys, although ocular, cutaneous, and neurological systems may also be affected.[1] The disease is closely associated with anti-neutrophil cytoplasmic antibodies (ANCA), especially those targeting proteinase-3 (PR3).[2]

In tuberculosis-endemic regions, GPA often masquerades as pulmonary or disseminated tuberculosis, leading to delayed diagnosis and inappropriate therapy. Both disorders share clinical and radiological features such as fever, cough, weight loss, and cavitating lung lesions, posing significant diagnostic challenges.[3] Early identification is crucial as untreated GPA may progress rapidly to multi-organ failure, while anti-tubercular therapy can worsen vasculitic inflammation.

We report a rare case of GPA in a middle-aged woman initially treated repeatedly for tuberculosis and non-resolving pneumonia, highlighting the importance of recognizing vasculitic mimics in high TB-burden settings.

Case Report

A 47-year-old woman, homemaker, non-smoker, non-alcoholic, with hypothyroidism on thyroxine 75 mcg, presented with 3 weeks of high-grade evening fever (103 °F), chills, dry cough, weakness, chest pain, earache, headache, and arthralgia of small joints, along with one episode of epistaxis. She denied weight loss, hemoptysis, or dyspnea. She had a history of tubercular lymphadenitis treated 12 years earlier and a family history of tuberculosis.



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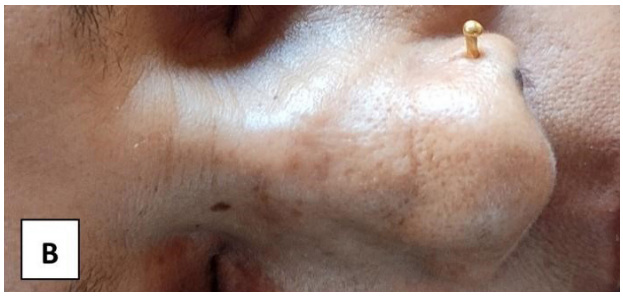


Figure 1 : *Saddle nose: A. Right lateral views B. Front view*

On examination, saddle nose was present (Figure 1) vitals were stable except for fever spikes; bronchial breath sounds were heard in the right infra-axillary region. Investigations showed hemoglobin 9.8 g/dL, elevated CRP, hyponatremia, and stool occult blood positivity with iron deficiency anemia. Sputum AFB, GeneXpert, and cultures were negative. BAL grew MR-CONS sensitive to vancomycin and teicoplanin; KOH mount revealed yeast with pseudohyphae. Paranasal sinus radiograph showing opacity and mucosal thickening of the maxillary sinus with partial bony destruction. Chest radiograph demonstrating bilateral patchy consolidation and cavitary lesions predominantly in the right lung field. (Figure 2)

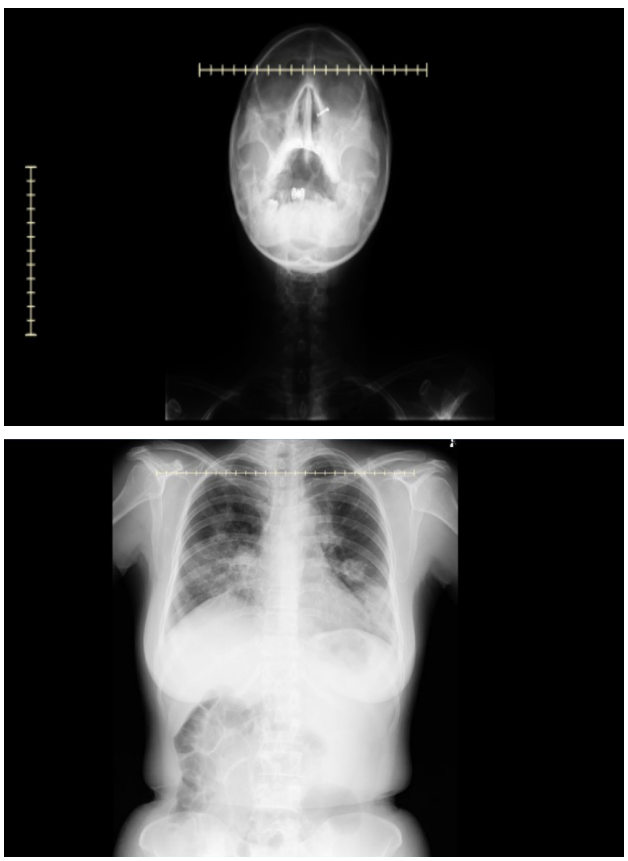
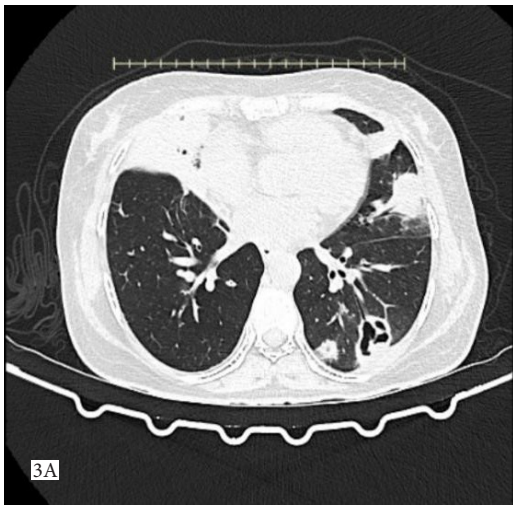


Figure 2:
(A) Paranasal sinus radiograph showing opacity and mucosal thickening of the maxillary sinus with partial bony destruction, consistent with chronic sinus involvement in Granulomatosis with Polyangiitis (GPA).

(B) Chest radiograph demonstrating bilateral patchy consolidation and cavitary lesions predominantly in the right lung field, suggestive of vasculitic pulmonary involvement mimicking tuberculosis.

CT chest showed bilateral dense consolidation with air bronchograms, ground-glass opacities, calcific foci, and mediastinal lymphadenopathy.(Figure 3)



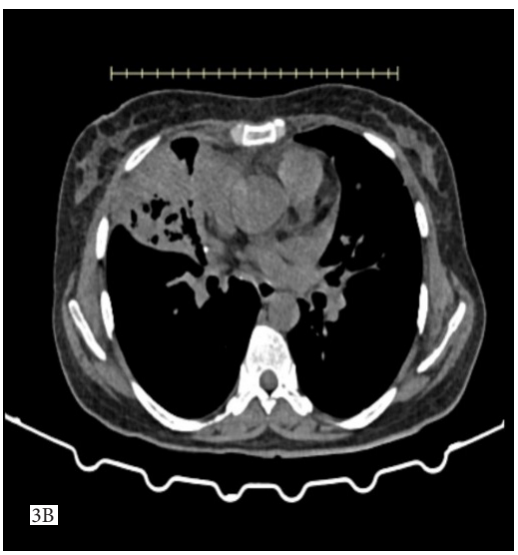


Figure 3: *(A) High-resolution CT (HRCT) thorax showing a large area of heterogeneous consolidation with cavitation and surrounding ground-glass opacities involving the right middle and lower lobes, with adjacent pleural thickening.*

(B) Contrast-enhanced CT (CECT) thorax demonstrating necrotic, mass-like consolidation with cavitating nodules and mediastinal lymphadenopathy, suggestive of vasculitic pulmonary involvement. These findings are consistent with Granulomatosis with Polyangiitis (GPA) and illustrate the characteristic parenchymal destruction and nodular cavitations that can mimic infectious etiologies such as tuberculosis.

She was treated with IV antibiotics, steroids, bronchodilators, and discharged with partial improvement. Eighteen days later, fever and cough recurred. ESR, CRP, and procalcitonin were markedly elevated; sputum culture grew non-albicans Candida. Autoimmune and vasculitis workup was negative except borderline anti-PM-Scl positivity. She was again managed as non-resolving pneumonia. (Table 1)

Table 1: Summary of Investigations by Admission Timeline

Timeline / Admission	Key Laboratory Findings	Microbiology & Immunology	Radiological Findings	Impression / Diagnosis
First Admission (Week 0–3)	• Hemoglobin: 9.8 g/dL • CRP: Elevated • Hyponatremia present • Stool occult blood: Positive • Iron studies: Iron deficiency anemia	• Sputum AFB (I & II): Negative • Sputum culture/Gram stain: Negative • GeneXpert: Negative • BAL: MR-CONS sensitive to vancomycin, teicoplanin • KOH mount: Budding yeast with pseudohyphae • HIV, HBsAg, Anti-HCV: Negative • Tropical fever panel: Negative	• CT Chest: Dense consolidation with air bronchogram and breakdown areas • Ground-glass opacities involving multiple lobes • Calcific foci in both upper lobes • Mediastinal pleural extension, enlarged paratracheal nodes (16×9 mm) • Thickening of right bronchus intermedius	Right-sided chronic acquired pneumonia with hypothyroidism and iron deficiency anemia
Second Admission (After 18 days)	• ESR: 79 mm/hr • hsCRP: 94 mg/L • Procalcitonin: 0.53 ng/mL • Serum albumin: Low • Potassium: 3.0 mEq/L (corrected)	• Sputum culture: Candida (non-albicans) • Autoimmune workup: ANA, ENA, RF, CCP – Negative • Anti-PM-Scl: Borderline positive • Vasculitis panel: c-ANCA, p-ANCA negative	• Chest X-ray: Persistent right-sided opacity suggestive of non-resolving pneumonia	Non-resolving pneumonia with iron deficiency anemia and hypothyroidism
Third Admission (One month later)	• WBC: 12,100/µL (Leukocytosis) • Hb: 12.1 g/dL • ALP: 213 U/L (elevated)	• CT-guided lung biopsy: Granulomatous lesion (suggestive of tuberculosis) • Sputum culture: Klebsiella pneumoniae (sensitive to doxycycline) • Repeat GeneXpert, blood/urine cultures: Negative for Mycobacterium tuberculosis	• CT Chest: Necrotic mass-like consolidation with cavitating nodules • Mediastinal and hilar lymphadenopathy • Feeding vessel sign suggestive of septic emboli/metastasis	Empirical tuberculosis (ATT started); later differential—septic emboli vs GPA
Final Diagnostic Work-up (After Rheumatology Review)	• Persistent inflammatory markers • Normal renal function, corrected electrolytes	• PR3-ANCA: >200 U (strongly positive) • MPO-ANCA: Negative • ACE levels: Normal • ENT: Saddle nose deformity, otitis media, hearing loss • Ophthalmology: Bilateral dry eyes, corneal opacity	• CT Neck/Chest/Abdomen: Necrotic cavitating nodules, mediastinal lymphadenopathy • Parotid ultrasound: Heterogeneous parenchyma with intraparotid lymphadenopathy	Granulomatosis with Polyangiitis (GPA) – Multisystemic vasculitis confirmed

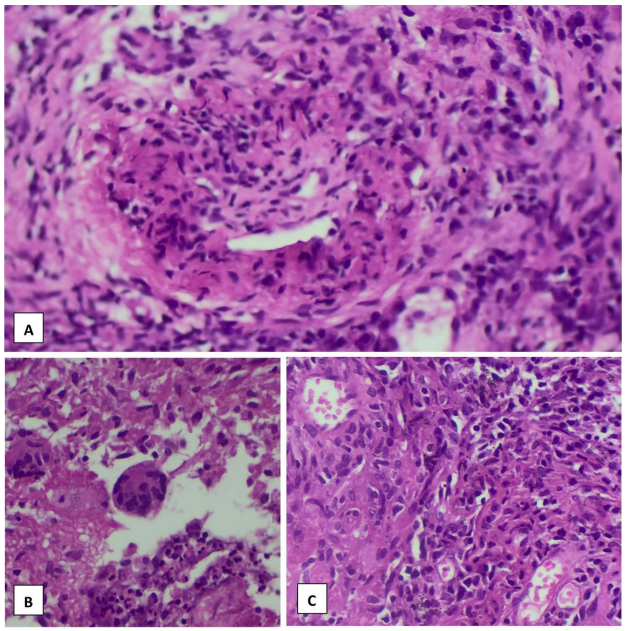


Figure 4: A. *Granuloma composed of epithelioid histiocytes. Fibrinoid necrosis is observed. Thick-walled blood vessels with inflammation and histiocytes in the vessel wall and perivascular tissue.* ***B.*** *Multinucleated giant cells.* ***C.*** *Collection of epithelioid histiocytes*

A month later, she developed productive, blood-streaked cough, high-grade fever, weight loss (5 kg in 4 months), and dyspnea (MMRC III). Lung biopsy suggested granulomatous inflammation (Figure 4); anti-tubercular therapy was started empirically. Subsequently, she developed right parotid swelling; cultures remained negative for Mycobacterium. Sputum grew Klebsiella pneumoniae sensitive to doxycycline.

CT neck and chest showed necrotic mass-like consolidation in right upper and middle lobes with multiple cavitating nodules and mediastinal lymphadenopathy. Given granulomatous lesions and prior Candida growth, she received oral voriconazole. Rheumatology review revealed strongly positive PR3-ANCA (>200 U), negative MPO-ANCA, and clinical features including saddle-nose deformity, otitis media with hearing loss, sinus opacity, dry eyes, and corneal opacity.

Based on PR3-ANCA positivity, granulomatous histology, and multiorgan involvement (ENT, pulmonary, ocular, parotid), a diagnosis of Granulomatosis with Polyangiitis (GPA) was made. She received IV methylprednisolone (500 mg BID × 5 days), followed by Rituximab 1000 mg after ruling out tuberculosis and hepatitis. Symptoms resolved gradually, and she was discharged with planned Rituximab maintenance every six months.

Discussion

GPA is characterized by necrotizing granulomatous inflammation of the respiratory tract, systemic vasculitis, and glomerulonephritis.[2] However, its early presentation may be limited to pulmonary or upper respiratory symptoms, delaying diagnosis. The present case illustrates a classic example of how GPA can mimic recurrent pulmonary infection or tuberculosis. The patient presented with persistent fever, cough, and radiological consolidation, leading to repeated empirical treatments for infection.

The coexistence of granulomatous inflammation on biopsy further reinforced the suspicion of tuberculosis. Yet, the absence of microbiological confirmation, poor response to anti-tubercular therapy, and progressive systemic manifestations—including parotid swelling, sinus disease, otitis media, and ocular dryness—suggested an alternative etiology. Strong PR3-ANCA positivity (>200 U) ultimately established the diagnosis of GPA.[4] This sequence underscores the diagnostic pitfall common in endemic regions where tuberculosis is prevalent, and granulomatous pathology is often misinterpreted as mycobacterial infection.[5] Radiologically, the presence of multiple cavitating nodules with a feeding vessel sign and mass-like consolidation involving multiple lobes are typical of GPA. These lesions result from vasculitic destruction of pulmonary vessels and parenchyma.[6,7] In contrast, tuberculosis usually presents with upper-lobe predominance, tree-in-bud opacities, or lymph node calcification with caseation.[8] In this case, radiological patterns, though initially inconclusive, later aligned with systemic vasculitis when correlated with multisystem findings. The strong PR3-ANCA positivity was both diagnostic and prognostic. PR3-ANCA is seen in approximately 80–90% of classic GPA cases, compared with MPO-ANCA predominance in microscopic polyangiitis. Serological confirmation together with histopathological and clinical correlation remains the gold standard for diagnosis.[2]

Therapeutically, early initiation of immunosuppression dramatically alters prognosis. The patient responded favorably to high-dose intravenous methylprednisolone followed by rituximab, consistent with current EULAR and ACR recommendations. Rituximab offers efficacy comparable to cyclophosphamide with a superior safety profile and reduced relapse risk, especially in female patients of reproductive age.[9,10] The patient's symptomatic improvement and radiological resolution after immunotherapy validated the diagnosis and highlighted the reversibility of disease when treated early.

This case emphasizes the importance of multidisciplinary evaluation—radiological, rheumatological, and ENT collaboration was essential for identifying multisystem involvement. It also underscores the critical need for clinician awareness regarding vasculitic mimics of tuberculosis. Misdiagnosis not only delays definitive therapy but may aggravate immune-mediated injury through inappropriate antimicrobial or steroid use. Ultimately, GPA should always be considered in patients with recurrent or non-resolving pneumonia, sinus or ear involvement, and systemic inflammation unresponsive to antibiotics or anti-tubercular therapy. Timely recognition and targeted immunosuppression can prevent irreversible organ damage and improve survival outcomes.

Conflict of Interest

None

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