



Polymicrobial Infection in COPD Exacerbation

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Case Vignette

A middle-aged, thinly built woman who smokes beedi and has a history of biomass exposure, has been suffering from COPD for the last 4 years. She has been taking inhaled betamethasone and tiotropium. Additionally, she had uncontrolled diabetes for a few months. She presented with fever, productive cough, shortness of breath, and chest pain for 5 days. Chest X-ray and CT confirmed pneumonia, cavities, and abscesses in both lungs. Repeated sputum and bronchoalveolar lavage confirmed *Pseudomonas aeruginosa* and *Aspergillus fumigatus*. Along with supportive therapy, she was treated with tablet levofloxacin and injection amikacin for 6 weeks based on culture sensitivity reports, and capsule itraconazole for 6 months. She recovered completely to her baseline COPD and diabetes status.

Host
Polymicrobial synergy
Or
Polymicrobial antagonism

Mutualism
(Both species benefit)

Parasitism
(One species benefits while the other species is harmed)

Commensalism
(One species benefits while the other species is not affected)

Symbiosis Or Frenemies

Co-infections Or Polymicrobial infections

Host
Polymicrobial synergy
Or
Polymicrobial antagonism

Host
Polymicrobial synergy
Or
Polymicrobial antagonism

Host
Polymicrobial synergy
Or
Polymicrobial antagonism

Host
Polymicrobial synergy
Or
Polymicrobial antagonism

Ques. What is this polymicrobial diagnosis (figure) in this patient?

A) Polymicrobial - Synergy
B) Polymicrobial- Antagonism
C) Polymicrobial- Mutualism
D) Polymicrobial- Commensalism

Answer: B. Polymicrobial antagonism

Comments:

While *Pseudomonas* inhibits fungal growth and biofilm production, the interaction between *Pseudomonas* and *Aspergillus* is complex, with both organisms inhibiting each other's growth. *A. fumigatus* not only endures the antifungal effects of *P. aeruginosa* but also protects itself. Phenazines, the quorum sensing system, iron competition, bacteriophages, and small colony variants of *A. fumigatus* inhibit fungal biofilm formation. Conversely, *A. fumigatus*'s siderophores, phenazine metabolic transformation, gliotoxin production, and reduced antibiotic sensitivity inhibit bacterial biofilm formation. *Pseudomonas* can inhibit the growth of *Aspergillus* conidia but cannot inhibit preformed hyphae, likely due to the gliotoxin production by the hyphae.

References:

1. Das D, Panda PK. BMJ Case Rep 2024;0:e259285. doi:10.1136/bcr-2023-259285