



ARE HUMANS LOSING THE RACE AGAINST THE SUPERBUGS?? A CASE SERIES OF COMMUNITY ACQUIRED PNEUMONIA WITH CARBAPENEM RESISTANT ACINETOBACTER BAUMANNII!!

Pulmonary Medicine

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ABSTRACT

Antibiotics are considered as wonder discoveries, but the real wonder at present is the Rise of Antibiotic resistance in the community. Multidrug resistant and Extreme drug resistant *Acinetobacter baumannii* strains have complicated the treatment regimen for treating the organism's infections, hence confirming the phrase "turning an old friend into an enemy" with certainty. The outstanding ability of *A. baumannii* to acquire antibiotic resistance has gripped the hands of medical therapy. With the advent of Carbapenem Resistant *Acinetobacter baumannii* (CRAB), carbapenems which were formerly an effective antibiotic of choice, are now nearly considered a departing therapy. CRAB isolates were once considered as hospital organisms especially the Intensive Care units, but the emergence in the community, brings us closer to the Global dilemma of severe antibiotic resistance, questioning our efficacious use of antibiotics, an important aspect of addressing antibiotic resistance and promoting responsible antibiotic use. We report a Case series of clinico-radiographic profile and treatment outcomes in patients with respiratory isolates of CRAB from the community. Our objective is to draw attention to the growing emergence of CRAB in the community, thereby paving way for urgent need of antimicrobial stewardship programs and strict infection control measures.

KEYWORDS

Antibiotic Resistance, CRAB, CAP, Antimicrobial stewardship, Strict Infection control.

Case Background:

A retrospective case study was conducted in our hospital between March 2022 and November 2023. Our case series includes six patients who presented with Respiratory isolates CRAB from the community as follows and our search continues to grow.

A 55 year old Diabetic male, with past history of Pulmonary Tuberculosis who presented with High grade fever, productive cough, left pleuritic chest pain and respiratory distress. Chest imaging revealed Necrotising Pneumonia in left upper lobe with Rib erosions and subcutaneous emphysema (Figure: 1). CRAB was isolated from Sputum and BAL. Patient required prolonged course of antibiotics with Colistin and Tetracycline but eventually underwent Left upper lobectomy due to the furious nature of the organism.

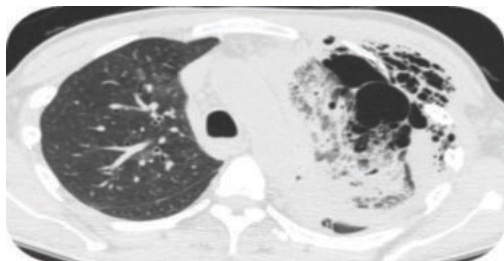


Figure 1: Chest imaging showing Necrotising Pneumonia in left upper lobe with Rib erosions and subcutaneous emphysema.

A 41 year old male diagnosed with Bilateral Bronchiectasis evaluated as alpha 1 Antitrypsin deficiency presented with fever, productive cough and dyspnoea. Chest imaging showed Multiple ill defined patchy consolidation with Bilateral cystic bronchiectasis (Figure:2). CRAB was isolated from sputum and patient recovered after receiving antibiotics with Colistin and Carbapenem.



Figure 2: Chest imaging showing Multiple ill-defined patchy consolidation with Bilateral cystic bronchiectasis.

A 44 year old male, Known case of Left Lung Bronchiectasis – Post Pulmonary Tuberculosis sequelae and known *Pseudomonas* Coloniser 2 years ago presented with Fever, Productive Cough and Dyspnoea. Chest imaging revealed Cystic Bronchiectasis with Volume loss and Extensive Ground glass attenuation in Left lung fields (Figure:3). CRAB was isolated from sputum and BAL. Patient recovered with antibiotics consisting of Colistin and Tetracycline.

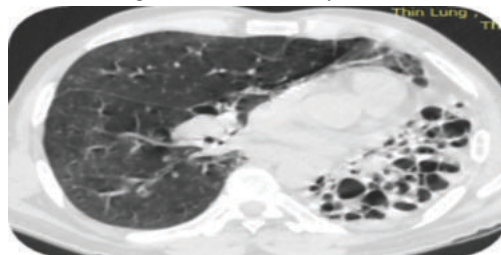


Figure 3: Chest imaging showing Cystic Bronchiectasis with Volume loss and Extensive Ground glass attenuation in Left lung.

A 62 year old Diabetic male, an active smoker presented with Fever, Productive cough and Respiratory distress. Chest imaging revealed Bilateral Multilobar consolidation (Figure:4). Sputum Culture flared positive for CRAB. Patient was started on dual antibiotics with Colistin and Ceftazidime + Avibactam. During course of hospital stay, patient developed Severe sepsis with septic shock and MODS. In spite of top tier measures, patient succumbed to his illness.

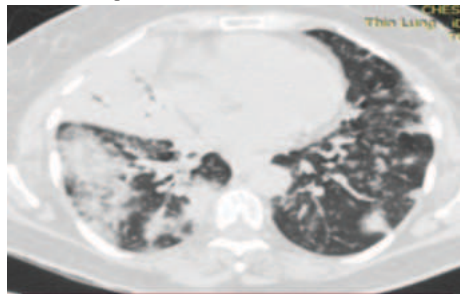


Figure 4: Chest imaging showing Bilateral Multilobar consolidation

A 78 year old Diabetic female, with Left Breast carcinoma who underwent MRM of left breast with 6 cycles of Chemotherapy and 15 cycles of Radiotherapy 1 year back, presented with Fever and Dyspnoea. Chest imaging showed Centrinodular and perifissural nodules with patchy consolidation in Bilateral lung fields and fibrotic bands in left subpleural region (Figure:5). CRAB was isolated from sputum and she recovered with course of antibiotics with Colistin and Tetracycline.

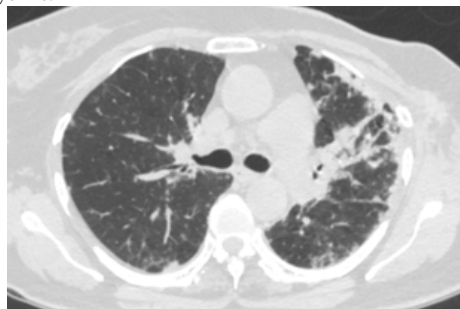


Figure 5: Chest imaging showing Centrinodular and perifissural nodules with patchy consolidation in Bilateral lung fields and fibrotic bands in left subpleural region.

A 82 year old diabetic female, with cervical carcinoma on Alternate treatment presented with Fever, loose stools and shortness of breath. Tropical fever workup flared positive for Scrub typhus but sputum culture grew CRAB. Chest imaging revealed No gross lung parenchymal abnormalities. Patient recovered completely with combination antibiotics of Colistin and Tetracycline.

DISCUSSION:

The global impact of antibiotic resistance is potentially devastating, threatening to set back progress against certain infectious diseases to the pre-antibiotic era⁽¹⁾. Although most antibiotic-resistant bacteria first appeared in hospitals, drug-resistant strains are becoming increasingly prevalent in the community due to inappropriate use of antibiotics, ineffective infection control and hygiene practices with increase in antibiotic use in food industry⁽²⁾.

A study by Ryan K Shields et al on the available treatment options for CRAB infections, concluded that combination treatment is preferred for CRAB infections. The justification for combination therapy is based on the poor effectiveness and significant toxicities or PK limits of each individual treatment option with expected in vitro activity⁽⁴⁾. In vitro synergy studies of various combinations provide supporting evidence, as does its potential advantage in reducing the establishment of additional antibiotic resistance in CRAB⁽³⁾. Furthermore, it is widely acknowledged that patients with CRAB infections are at risk of poor clinical outcomes. Thus, the potential benefits of antibiotic combination therapy appear to exceed the dangers of possibly ineffective single-agent treatment. Indeed, the AMR treatment guidance document of the IDSA and ESCMID both recommend combination therapy with at least two agents for severe CRAB infections with few of them to state as combination antibiotics of

Colistin with Carbapenems or Tetracyclines. Both treatment options showed considerable efficacy with good treatment outcomes in managing patients with respiratory isolates of Carbapenem resistant *Acinetobacter baumannii* infections⁽⁵⁾.

In our case series, all 6 patients had acute presentation with Productive cough and high-grade fever being the most predominant symptom followed by dyspnoea. We observed Pneumonia Severity Index score of Class V in 83.33 % of patients and Class IV in 16.66% of patients pointing towards the aggressive nature of the organism (Figure:6).

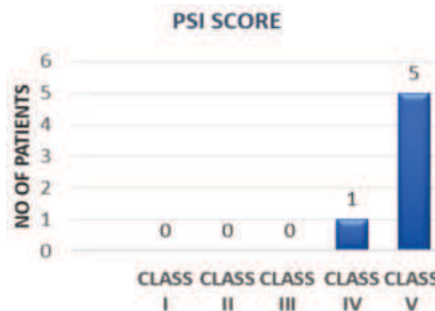


Figure 6: Distribution of Pneumonia Severity Index score among patients of Community acquired Carbapenem resistant *Acinetobacter baumannii*

All six patients were immunosuppressed with overlapping comorbidities (Figure:7) with four patients requiring ICU admission with a recovery rate of 75% and two patients required hospital ward admission with a recovery rate of 100% (Figure: 8).

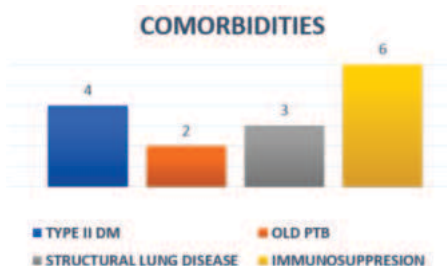


Figure 7: Distribution of Co-morbidities among patients of Community acquired Carbapenem resistant *Acinetobacter baumannii*

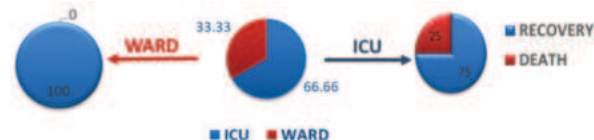


Figure 8: Clinical outcome of patients of Community acquired Carbapenem resistant *Acinetobacter baumannii*

Acinetobacter baumannii is a notorious organism in causing multidrug resistant infections. On navigating through the evolution of treatment options available, Combination antibiotics are preferred over single antibiotics in managing Carbapenem resistant *Acinetobacter baumannii* infections⁽⁵⁾.

In our case series, we observed a recovery rate of 66.66 % with Colistin-Tetracycline combination antibiotic in patients with Community acquired Carbapenem resistant *Acinetobacter baumannii* pneumonia. A recently published article by Si-Ho Kim et al stated that the use of Tetracycline containing regimens were independently associated with decreased 30-day mortality compared to other regimens like colistin alone or in combination with Meropenem. Their findings proposed that tetracyclines may be a valuable option for treating CRAB infections, particularly when combined with other antibiotics in specific, the tetracycline-colistin combination which tended to have a higher 30-day survival rate than either antibiotic used alone⁽⁶⁾.

CONCLUSION:

In summary the emergence of Carbapenem resistant *Acinetobacter baumannii* in the community is a serious health threat, what we see

now the “Tip of an Iceberg” calls for urgent infection control measures and strict antibiotic stewardship programs essential for assuring optimum and sensible use of antimicrobial agents, as each has unique strengths and limitations.

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The authors would like to acknowledge our Institute for granting us access to the medical record database crucial to the completion of this research study. The authors ascertain that there are no conflicting interests pertinent to this research and no financial aid for sought for completion of this research study. We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

Conflict Of Interest:

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