

## Navigating laboratory investigations for an accurate assessment of community-acquired pneumonia: Case report

Yamini Sivakoti <sup>1,\*</sup> and Aleena Roy <sup>2</sup>

<sup>1</sup> Pharm. D student, Department of Pharmacy Practice, Aditya University, Surampalem, Andhra Pradesh, India.

<sup>2</sup> Assistant Professor, Department of Pharmacy Practice, Aditya University, Surampalem, Andhra Pradesh, India.

World Journal of Biology Pharmacy and Health Sciences, 2024, 20(02), 494–498

Publication history: Received on 29 September 2024; revised on 11 November 2024; accepted on 14 November 2024

Article DOI: <https://doi.org/10.30574/wjbphs.2024.20.2.0881>

### Abstract

According to recent findings, demographic characteristics, seasonal fluctuations, and geographic regions are factors for the community-acquired pneumonia. Community acquired pneumonia is a non-hospital acquired lung parenchymal infection caused by gram-negative bacteria "*Pseudomonas aeruginosa*" which is transmitted through inhaling infected droplets. Here, we are reporting a case of geriatric patient with chief complaints of cough in the past 20 days, shortness of breath, tachycardia, tachypnoea, fever, and chest pain from 10 days. physician was suggested go for further investigations and lab reports like complete blood picture count, ESR test, sputum culture test and radiographic findings like Chest X-ray, chest computed tomography. Standard treatment includes antibiotics like Levofloxacin, Azithromycin and antihypertensive like Telmisartan, and mucolytics like Ambroxol syrup and other medications like N-Acetyl Cysteine, levocetirizine. If early diagnosis and early treatment were initiated, then the progression of diseases would have been stopped and then the Patient was discharged with stable condition, but she must come for the follow-up sessions like OP sessions. If the patient follows the life-style modifications and precautions like practice good hygiene, take enough rest, consume healthy diet, the quality of life will be improved.

**Keywords:** Community-Acquired Pneumonia; Chest Computed Tomography; Chest X-ray; Antibiotic therapy

### 1. Introduction

In the recent developments, the research of the scientists found that Geographical locations, seasonal variations, and demographic traits are factors for the community-acquired pneumonia, which develops from 1.5 to 14.0 cases per 1000 persons [1]. Community-acquired pneumonia is an acute infection of pulmonary parenchyma, which is one of the leading causes of hospitalization [2].

pneumonia that is developed outside of a hospital is known as community-acquired pneumonia (CAP). Community-acquired pneumonia is caused by *Pseudomonas aeruginosa*, which is transmitted through inhaling infected droplets [3]. *Pseudomonas aeruginosa* is a gram-negative, rod-shaped, aerobic bacterium that can cause serious respiratory tract infections, it is usually seen in patients who have immunocompromised, or other specific risk factors [4].

Here we report a geriatric patient with symptoms of fever with chills and shivering in the past 10 days, coughing in the past 20 days, right side chest pain while coughing and abdomen pain from 10 days. Physician suggested go for the further investigation and lab reports to identify the patient condition, which provided a valuable direction for early clinical diagnosis and guided the therapy [5].

\* Corresponding author: Yamini Sivakoti

---

## 2. Case presentation

A geriatric patient presented to the private hospital with chief complaints of coughing in the past 20 days, fever with chills and shivering, shortness of breath, right side chest pain while coughing, abdomen pain with nausea, palpitations, and headache from 10 days. The patient was apparently healthy, and she had no definite epidemiological history of community-acquired pneumonia. Patient past medical history shows that she is hypertensive from the past one year and she was prescribed with amlodipine 5mg. Patient using Mucolite syrup for cough, paracetamol for fever.

On her admission to the hospital, patient was instructed for vital check-up, and she was found that she is conscious and coherent. She found to be febrile, and Blood pressure got elevated, respiratory rate 20 breaths per minute, pulse rate 90 beats per minute. A regular heart rhythm was observed. Oxygen saturation levels maintained at 85-90% by pulse oximetry while breathing room air. A regular heart rhythm was observed, and her blood sugar levels found to be normal (Table 1). There was no pallor, icterus, cyanosis, or lymphadenopathy. Examination of other system including cardiovascular, abdominal, and nervous system was normal.

Then the physician suggested her go for Laboratory investigations. She went for her complete blood picture, there we found out that she had abnormal white blood cell count, lymphocytes count, MCV values, neutrophils count and her ESR level also shows abnormal values and the remaining all the values found to be normal. Radiographic finding like chest X-ray, CT scan also done on patient.

---

## 3. Clinical findings

The assessment of the severity of community-acquired pneumonia is important to guide the antibiotic therapy [6]. Laboratory investigations showed increased white blood cell (WBC) count 25,300 cells/cumm and neutrophils count. Decreased in lymphocyte count 10%, platelet count 3.23 lakhs/cumm and mean corpuscular volume (MCV) was 81.9 fl. Erythrocyte sedimentation rate (ESR) 1ST hr showed high values 110 mm/hr and normal Serum Creatinine 0.5 mg/dl was observed. Liver function tests showed normal bilirubin, SGOT, SGPT values and Total protein, mild decline in albumin (2.8 g/dl) levels (Table 2). Sputum culture test identify the gram-negative *Pseudomonas aeruginosa* bacteria. A chest radiograph showed infiltration shadow from the right and left lower lung lobe (fig. A.1), and chest computed tomography (CT) showed diffuse sub pleural ground glass opacities with septal thickening and involving all the segments of both the lungs (fig. A.2).

### 3.1. Treatment

Antibiotic therapy was initiated on empiric basis. Physician started IV fluids, antibiotic therapy includes intravenous (IV) levofloxacin 750mg, azithromycin 500mg, and clarithromycin 500mg and ascoril syrup was given for cough. Nebulization started every 6th hourly, Patient was previously known hypertensive condition for that physician prescribed telmisartan 40mg. other medications include tab. N-acetyl cysteine, pantoprazole, and tab. Levocet 5mg. physician suggested nurse regular monitoring of GRBS, oxygen saturation levels and BP.

After Five days treatment, vital signs were stabilized, and the fever subsided. Seven days after admission, patient signs improved, physician changed antibiotics dose. After 10 days, patient was instructed for chest x-ray and chest CT scan, reports showed pneumonia had improved. Physician also instructed sputum culture test to the patient; results showed negative for *Pseudomonas aeruginosa*. Physician prescribed low doses antibiotic medication like azithromycin 30mg and ascoril syrup in patient discharge summary and recommended the follow-up sessions. After 12days on admission, patient discharged from hospital with no complaints.

### 3.2. Reports

Table1 shows patient vital signs on admission, it includes blood pressure, pulse rate, respiratory rate, body temperature and oxygen saturation levels.

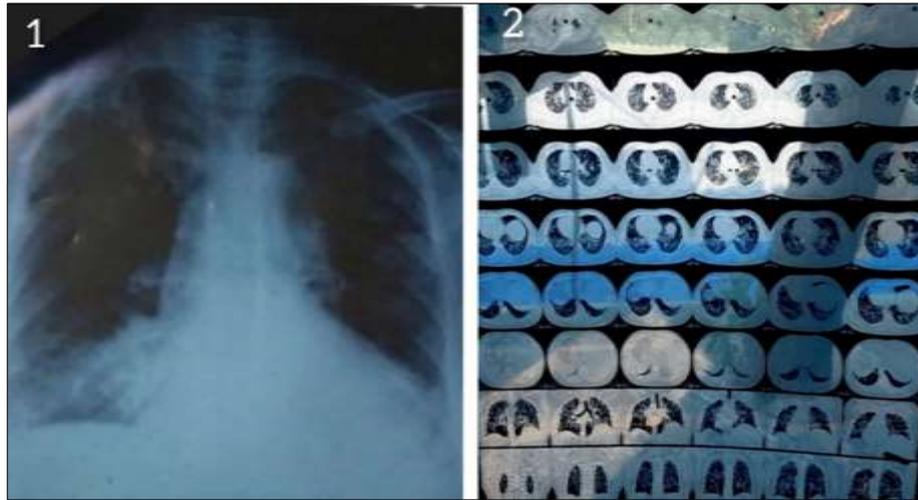
Table 2 shows complete blood picture count and biochemistry. HB haemoglobin, PCV packed cell volume, RBC red blood cells, WBC white blood cell count, MCV mean corpuscular volume, MCH mean cell haemoglobin, MCHC mean corpuscular haemoglobin concentration, ESR 1st HR erythrocyte sedimentation rate, SGOT serum glutamic-oxaloacetic transaminase, SGPT serum glutamic pyruvic transaminase.

**Table 1** Vital signs on admission

S.NO	Vital signs:	Observed values	Normal values
1.	Blood pressure	140/90 mmHg	120/80 mmHg
2.	Pulse rate	90 beats/min	72 beats/min
3.	Respiratory rate	20 breaths/min	12-16 breaths/min
4.	Body temperature	101°F	98.6°F
5.	Oxygen saturation levels	90%	>95%

**Table 2** Laboratory data on admission

S.NO	Complete blood count and biochemistry:	Observed Values	Normal values
1.	HB	10.6 gm/dl%	12-15 gm/dl%
2.	PCV	29.6%	36-46%
3.	RBC	3.65 million/cumm	3.8-4.8 millions/cumm
4.	WBC	25,300 cells/cumm	4,000-11,000 cells/cumm
5.	Neutrophils	74%	40-80%
6.	Lymphocytes	10%	20-40%
7.	Eosinophils	01%	1-6%
8.	Monocytes	02%	2-10%
9.	MCV	81.9 fl	83-101 fl
10.	MCH	29.1 pg	27-32 pg
11.	MCHC	35.8 g/dl	31.5-34.5 g/dl
12.	Platelets	3.28 lakhs/cumm	2,78 Lakhs/cumm
13.	ESR 1 <sup>st</sup> HR	110 mm/hr	0-13 mm/hr
14.	Total Bilirubin	0.8 mg/dl	0.2-1.2 mg/dl
15.	Direct Bilirubin	0.3 mg/dl	0.0-0.3 mg/dl
16.	SGOT	21 IU/L	5-34 IU/L
17.	SGPT	23 IU/L	Up to 34 IU/L
18.	Alkaline Phosphatase	86 IU/L	53-141 IU/l
19.	Total Proteins	6.5 g/dl	6.0-8.0 g/dl
20.	Albumin	2.8 g/dl	3.5-5.2 g/dl
21.	Blood Urea	18 mg/dl	12.6-42.6
22.	Serum Creatinine	0.5 mg/dl	0.5-1.4 mg/dl
23.	Random Blood Sugar	95 mg/dl	70-140 mg/dl



**Figure 1 and 2** Chest X-ray and computed tomography on admission.1. chest X-ray on admission showed infiltrative shadow from the right and left lower lobes of lungs. 2. Computed tomography showed diffuse sub pleural ground glass opacities with septal thickening and involving all the segments of both the lungs, more so in lower lobes

---

#### 4. Discussion

Majority of patients who are affected with community acquired pneumonia are above 65 years old that indicates geriatric patients are more prone to community acquired pneumonia and it shows high incidence rate in males compared to females[7].Community-acquired pneumonia mostly caused by gram-negative bacteria like streptococcus pneumoniae, *Pseudomonas aeruginosa* and haemophilus influenzae out of this, *Pseudomonas aeruginosa* shows high mortality rate in community-acquired pneumonia than other bacteria[8,9], which can be identified by sputum culture test. Presence of comorbid conditions like chronic lung diseases, diabetes, chronic kidney disease, high blood pressure, obesity and immunodeficiency can increase the incidence of community-acquired pneumonia [10]. Generally White blood cell count used in diagnose disorder, if it between 10,000 to 15,000 cells/cumm not useful in distinguishing causal agent, if WBC count >15,000 to 25,000 cells/cumm shows high mortality rate and indicates patient having serious bacterial infection [11'12]. Chest Radiographic findings provides a comprehensive evaluation of the patient disease condition, it includes chest X-ray, CT scan. Chest X-ray mostly used in diagnosis, which detects infection in the lungs and chest CT scan provides detailed picture of the organ and both can detect the severity of community-acquired pneumonia [13,14]. Antibiotic therapy should be initiated after diagnosis the community acquired pneumonia [15]; levofloxacin is a standard drug which is mainly used to treat the community-acquired pneumonia in geriatric patients.

---

#### 5. Conclusion

Community-Acquired pneumonia due to "*Pseudomonas aeruginosa*" in geriatric patients is rare and mostly occur in patients with specific risk factors like obstructive lung diseases, immune deficiency, hypertension, obesity etc. Here in this case, patient presented to hospital with chief complaints of fever, cough, shortness of breath, chest pain. Physician confirmed patient is suffering with community-acquired pneumonia based on laboratory data, sputum culture test and imaging studies and Standard antibiotic treatment initiated. After 12 days, patient discharged from hospital with stable condition. In conclusion, laboratory data, sputum culture test and imaging studies like chest X-ray, computed tomography are clearly demonstrating the patient condition and helps the physician while giving the appropriate treatment to patient.

---

#### Compliance with ethical standards

##### Acknowledgments

I would like to thank all the researchers and scholars for providing the valuable information regarding community-acquired pneumonia. Special thanks to Dr. Aleena Roy for unwavering guidance, insightful feedback, and continuous encouragement throughout this journey.

*Disclosure of conflict of interest*

No conflict of interest to be disclosed.

*Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

---

**References**

- [1] Javier H. Ticona, Victoria M. Zaccone, Isabel M. McFarlane, et al. Community-Acquired Pneumonia: A Focused Review. *American Journal of Medical Case Report*, 2021. Vol. 9, NO. 1, 45-52.
- [2] Todd F. Hatchette, Rekha Gupta, Thomas J. Marrie. *Pseudomonas aeruginosa* Community-Acquired Pneumonia in Previously Healthy Adults: Case Report and Review of the Literature. *Clinical Infectious Diseases*, 2000; 31: 1349-56.
- [3] Satish Maharaj, Carmen Isache, Karan Seegobin, Simone Chang, et al. Necrotizing *Pseudomonas aeruginosa* Community-Acquired Pneumonia: A Case Report and Review of the Literature. *Hindawi Case Report in Infectious Diseases Volume 2017*, Article ID 1717492.
- [4] Catia Cilloniz, Celia Cardozo, Carolina Garcia-Vidal. Epidemiology, Pathophysiology, and microbiology of Community-acquired pneumonia. *ARH Annals of Research Hospitals* 2018; 2:1 Doi: 10.21037/arh.2017.12.03.
- [5] M. Nawal Lutfiyya, PH.D., Eric Heneley, M.D., M.P.H., Linda F. Chang, PHARM.D., M.P.H., B.C.P.S., et al. Diagnosis and Treatment of Community-Acquired Pneumonia. *American Family Physician*. February 1, 2006. Volume 73, Number 3.
- [6] Daniel M. Musher, M.D., Anna R. Thorner, M.D. Community-Acquired Pneumonia Review Article. *The New England Journal of Medicine* 2014; 371:1619-28. Doi: 10.1056/NEJMra1312885.
- [7] Eva Polverino. PhD, Catia Ciloniz. PhD, Santiago Ewig. PhD, et al. Impact of age and Comorbidity on cause and outcome in Community-Acquired Pneumonia. Original Research. *Chest Journal*. September 2013, *Chest* Volume 144, Issue 3, P999-1007.
- [8] Mauricio Ruiz, Santiago Ewig, Maria Angeles Marcos, Jose Antonio Martinez, et al. Etiology of Community-Acquired Pneumonia: Impact of age, Comorbidity, and Severity. *American Journal of Respiratory and Critical Care Medicine* 1999 Vol 160. Pp 397-405.
- [9] Vardhmaan Jain, Rishik Vashisht, Gizem Yilam, Abhishek Bhardwaj. Pneumonia pathology. Bookshelf ID: NBK526116. PMID:30252372 Statpearls [Internet]. National Library of Medicine.
- [10] Thomas Wesemann, Harald Nullmann, Marc Andre Pflug, Hans Jurgen Heppner, et al. Pneumonia Severity, Comorbidity and 1-year mortality in predominantly older adults with Community-Acquired Pneumonia: a cohort study. Research article. *BMC Infectious Diseases* (2015) 15:2 doi.1186/s12879-014-0730-x.
- [11] Mathieu Blot, Delphine Crosier, Amenline Vagner, Alain Putot, et al. A leukocyte Score to Improve Clinical Outcome Predictions in Pneumococcal Pneumonia in Adults. Doi: 10.1093/ofid/ofu075.
- [12] Julianna G. Gardner, BA., Divya R. Bhamidipati, BS., Adriana M. Rueda, MD., Edward Graviss, PhD, MPH., et al. The White Blood Cell Count and Prognosis in Pneumococcal Pneumonia. Journal Article. *Oxford Academic. Open Forum Infectious Diseases*, Volume3, Issue Suppl\_1, December 2016, 1245.
- [13] A.B. Moberg, U. Taleus, P. Garvin, S.-G. Fransson, M. Falk. Community-Acquired Pneumonia in Primary care: Clinical assessment and the usability of chest radiography. Research Article. *Scandinavian Journal of Primary Health Care*. Volume 34, 2016 – Issue 1.
- [14] Tomas Franquet, MD. Imaging of Community-Acquired Pneumonia. Symposium Review Article. *Thorac Imaging*. September 2018, Volume 33, Number 5.
- [15] John G. Bartlett, M.D., Linda M. Mundy, M.D. Current Concepts. Community-Acquired Pneumonia. *The New England Journal of Medicine*. Vol. 333 No. 24