



# Triple Threat: A case of Bubonic, Septicemic, and Pneumonic Plague Through Feline Transmission

Viridiana Estrada, MD. Isabel Z. Fernandez, PhD. Amanda V. Johnson, MD. Samuel Carpentier, MD, PhD. Jason John, MD. Kellie Hawkins, MD, MPH.

University of Colorado Hospital-Department of Internal Medicine

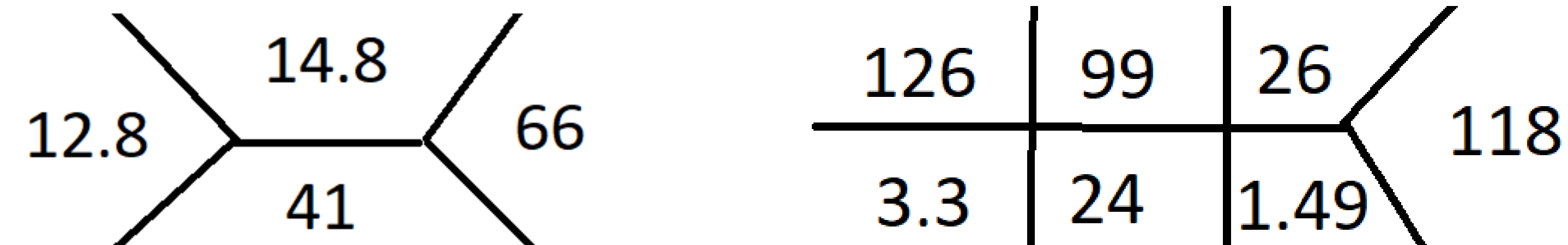
## INTRODUCTION

- Yersinia pestis* is a gram-negative bacteria that causes plague and is primarily transmitted to humans through flea bites or animal exposure (1).
- The infection can present with 3 clinical forms:
  - Bubonic plague**, 80-95% of all cases, develops from an infected flea bite through which bacteria travel to regional lymph nodes, generating inflamed nodes known as buboes. 40–70% mortality rate without treatment (2).
  - Septicemic plague**, 10-15% of all cases, develops from a deeper bite/cut that inoculates bacteria directly into the bloodstream or can be secondary from bubonic plague infection. Almost 100% mortality rate without treatment and 40% with treatment (2).
  - Pneumonic plague** can be secondary or primary. Primary occurs through aerosol exposure to *Y. pestis* (1). Secondary pneumonic plague is caused by hematogenous spread to the lungs. *Y. pestis* can be spread by droplet transmission by infected individuals. The mortality rate is almost 100% without treatment within 24 hours.
- Between 1994 and 2003, the United States reported 61 cases of plague and in 2006 alone, 13 cases with 2 deaths in the southwestern US region were reported (3).

## CASE PRESENTATION

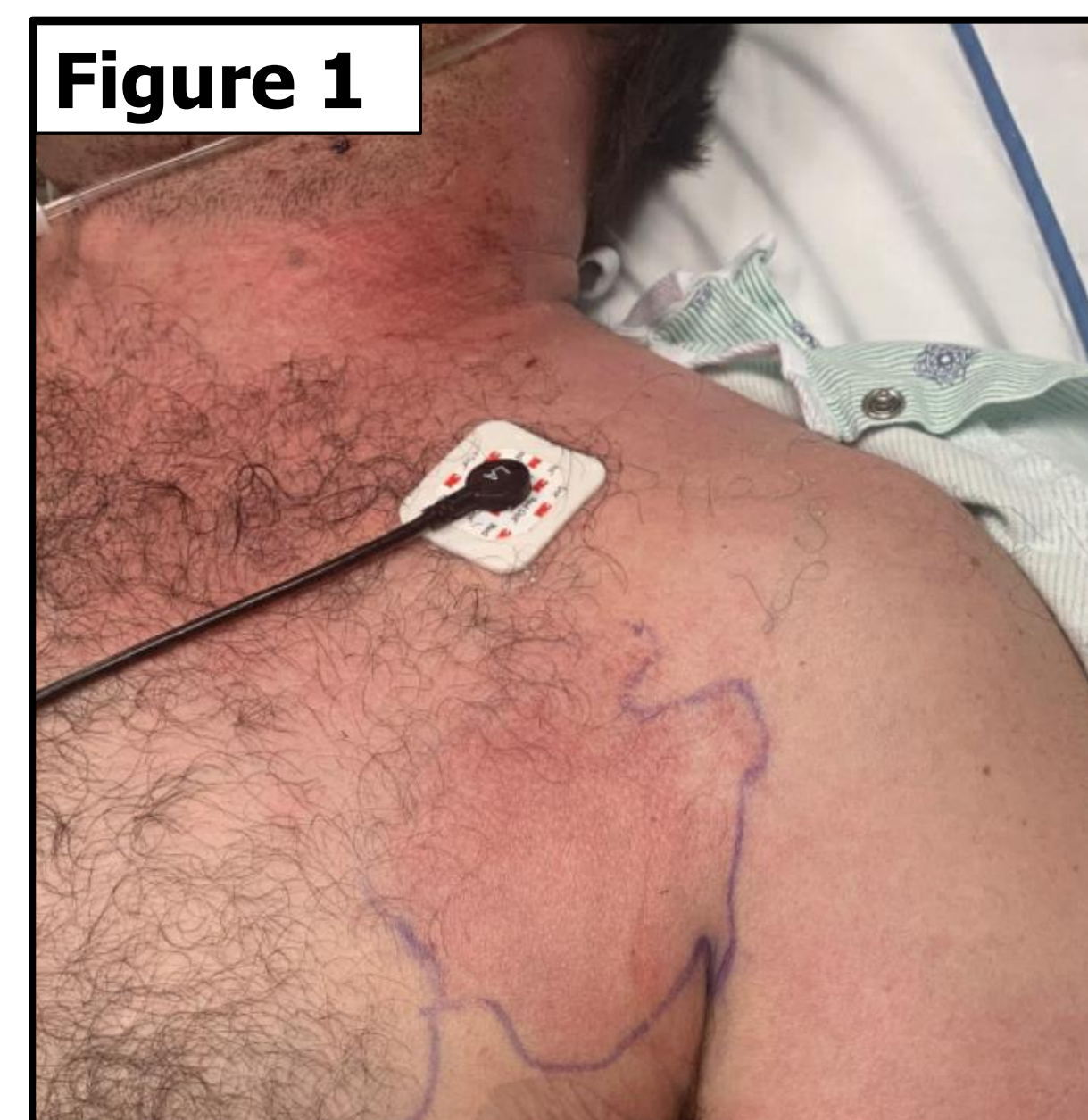
- HPI:**  
37-year-old male with no significant past medical history who presented with a five-day history of fever, nausea, and painful lymphadenopathy.
- Two days prior to symptom onset, patient underwent cutaneous and respiratory secretion exposure to an infected cat in rural Colorado.
  - Initial symptoms: chest tightness, axillary pain, fever, and myalgias.
  - Influenza and SARS-CoV-2 testing were negative.
  - Began treatment with azithromycin for presumed *Bartonella* versus *Francisella* infection. Two days later, continued having high fevers and new painful axillary swelling which prompted hospital admission. Gentamicin was added after a lymph node biopsy.
- Presenting Vitals:**  
 Temp: 101.8 °F (38.8°C), HR: 122, BP: 134/91, RR: 18, O2: 94% on RA
- Physical Exam:**
- Diaphoretic
  - Enlarged and tender left cervical and left axillary lymph nodes with well-demarcated axillary and chest wall erythema (**Figure 1**)
  - Superficial scratch on medial side of right forearm

## LABORATORY DATA



- AST: 74 U/L, ALT: 34 U/L, Alk Phos: 132 U/L,
- Total Bilirubin: 0.7 mg/dL, direct bilirubin: 0.4 mg/dL,
- Total protein: 6.4 g/dL, Albumin: 3.6 g/dL
- RBC morphology: p+Dohle bodies, +vacuolization, decreased platelets
- Blood culture and lymph node biopsy grew *Y. pestis*.

## CLINICAL IMAGES



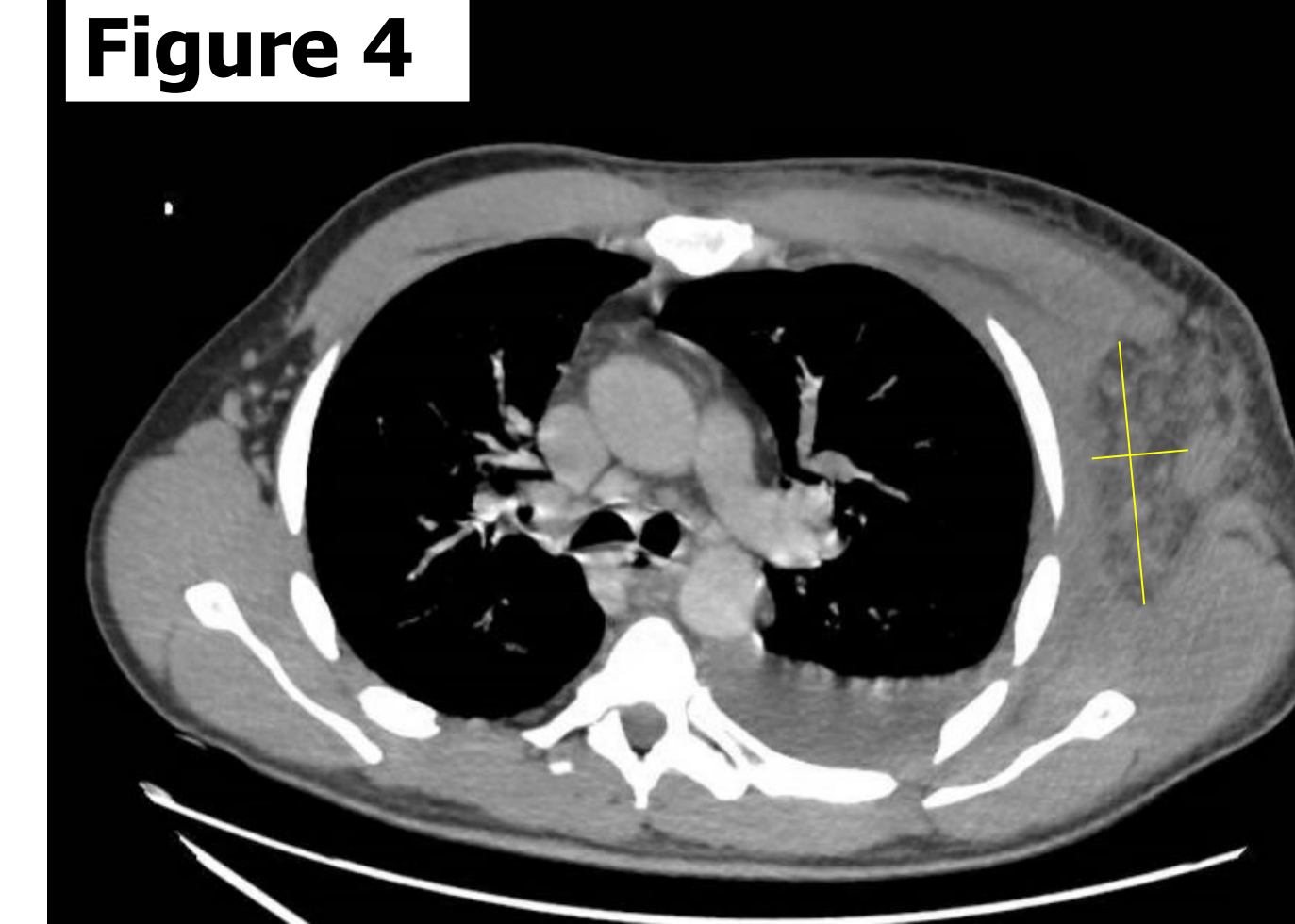
Enlarged left cervical and axillary lymph nodes with well-demarcated erythema



CT chest showing multifocal pneumonia and left pleural effusion



CT neck showing enlarged left cervical lymph node measuring up to 5.6 cm in diameter



CT chest showing enlarged axillary lymph node with soft tissue swelling

**Chest X-ray on admission:** Clear lungs. Normal cardiomeastinal silhouette. Small left effusion that blunts the costophrenic angle.

## HOSPITAL COURSE

- Patient developed progressive encephalopathy, respiratory failure requiring intubation, and pressors for septic shock.
- Levofloxacin was added and the patient clinically improved following extubation two days later.
- The patient was discharged after a thirteen day stay on oral levofloxacin and doxycycline to complete course.
- The day after discharge, he re-presented with high-grade fevers and worsening left upper extremity swelling. At this time, he was noted to have a left brachiocephalic deep vein thrombosis. His course of doxycycline was extended for an additional 14 days given concern for thrombophlebitis and he was initiated on anticoagulation.
- The patient continues to follow with infectious disease as an outpatient.

## DISCUSSION

- A large proportion of plague cases over the last decades in the US involve feline transmission (3).
- While the patient had possible respiratory exposure to an infected feline, his clinical course correlates most closely with either bubonic or septicemic plague as primary with progression to secondary pneumonic plague.
- Initial antibiotic coverage was targeted towards common zoonotic diseases. This permitted bacterial dissemination and resulted in multiple complications.
- Our report highlights the importance of high clinical suspicion and prompt antibiotic coverage for *Y. pestis* in endemic areas for patients with concerning presentations.

## REFERENCES

1. Pechous RD, Sivaraman V, Stasulli NM, Goldman WE. Pneumonic Plague: The Darker Side of *Yersinia pestis*. Trends Microbiol. 2016 Mar;24(3):190-197.
2. Eastman, J.T.: The making of a pandemic: bubonic plague in the 14th century. J. Lanc. Gen. Hosp. 4(1), 10–17 (2009)
3. Butler T. Plague into the 21st Century. Clinical infectious diseases. 2009;49:736-742.