

Background

- Candidemia is a prominent nosocomial infection,¹ impacting between 7 to 9 per 100,000 people in the United States annually.^{2,3}
- Candidemia, though often comorbid with other conditions in hospitalized patients, is considered one of the most common preventable causes of healthcare associated morbidity and mortality.^{1,4}
- Candidemia is associated with a 15% mortality rate within 1 week of diagnosis.²
- Candida albicans* is the most common pathogen associated with candidemia,⁴ though prevalence of non-*albicans* candidemia has been rising in recent years.⁵ Candidemia due to non-*albicans* species depends on specific risk factors and local epidemiology.^{1,5}
- Considered a highly virulent strain,⁶ *C. tropicalis* is the third most common non-*albicans* species causing candidemia.³ It is most prevalent in Asia and South America. The most common risk factors include neutropenia and hematologic malignancies.^{1,7}
- Risk factors for candidemia include extremes of age, recent surgery, remote history of antibiotic use, recent central lines, intravenous (IV) drug use, parenteral nutrition, and hemodialysis. Immunosuppression and underlying chronic disease are also predisposing factors.^{3,6}
- Despite improved healthcare delivery and infection control protocols, candidemia continues to persist due to a growing population of immunocompromised individuals,¹ changing epidemiology, and emerging antifungal resistance.²⁻⁴
- Overall, there is a 6% resistance rate to fluconazole and 2% to echinocandins, with individual hospital antifungal resistance rates as high as 20-50%.²
- Workup for invasive candidemia to limit morbidity and mortality includes obtaining blood cultures for accurate species identification, repeat blood cultures to demonstrate date of clearance, ophthalmoscopic evaluation to rule out ocular involvement, echocardiography to rule out the presence of vegetations, and early source control.⁸
- The source of candidemia infection impacts clinical presentation and prognosis. It is an independent predictor of mortality, with unclear origin having the highest mortality rates.⁶

Case Description

History

- History of present illness:** 63-year-old male presents with 1-day history of sharp, left-sided, lower back pain, 7/10 in intensity and non-radiating
- Past medical history:** Type 2 diabetes mellitus, hypertension, hyperlipidemia
- Recent hospitalizations:** 1 month prior: acute hypoxic respiratory failure with severe cough resulting in a rectus sheath hematoma
- 4th hospitalization for pyelonephritis in the past 18 months
- Medications:** Metformin 500 mg PO BID
Sitagliptin 100 mg PO daily
Empagliflozin 10 mg PO daily
Losartan 100 mg PO daily
- Allergies:** NKDA
- Past surgical history:** None
- Family history:** Non-contributory
- Social history:** No drug, tobacco, or alcohol use. Recent travel to Bangladesh
- Review of systems:** Significant for dysuria, chills, nausea, vomiting, increased urinary frequency, poor appetite, and cough

Objective Findings

- Vitals on Admission**
 - Heart rate:** 114 beats per minute
 - Blood pressure:** 133/81 mmHg
 - Respirations:** 22 breaths per minute
 - Oxygen saturation:** 96% on room air
 - Temperature:** 37 degrees Celsius
- Physical exam**
 - General:** Alert and oriented; diaphoretic, appears distressed
 - Cardiac:** Regular rate and rhythm, no murmurs, rubs, clicks, or gallops
 - Pulmonary:** Clear to auscultation bilaterally, no crackles, rales, or wheezes
 - Abdomen:** Soft, non-tender, non-distended, normoactive bowel sounds throughout
 - Costovertebral tenderness of left flank
 - Fluctuant abdominal wall mass present on right side; rectus sheath hematoma
 - Skin:** No rashes, lesions, edema, or erythema
 - Lymphatics:** No inguinal lymphadenopathy
 - All other exam findings were within normal limits

Initial Diagnostic Testing

- SIRS criteria 3/4:** Tachycardic (114 bpm), tachypneic (22 breaths/min), leukocytosis (14.4 thous/mm³)
- Urinalysis:** Pyuria, moderate red blood cells, no casts
- Complete blood count:**
 - Leukocytosis (14.4 thous/mm³)
 - Normocytic anemia
 - Hemoglobin 10.2 g/dL
 - hematocrit 30.7%
 - MCV 91.0 fL
- Complete metabolic panel:**
 - Acidotic with high anion gap (15 mmol/L)
 - Hyperglycemic (222 mg/dL)
 - Elevated BUN (26 mg/dL) and creatinine (1.84 mg/dL)
 - Liver enzymes within normal limits
- Urine and blood cultures** collected at admission
- Computed tomography (CT) abdomen and pelvis without contrast (Figure 1):** evidence of left sided hydronephrosis and pyelonephritis without obstruction, notable right rectus sheath hematoma
- Ophthalmoscopic evaluation:** Benign, no acute findings

Patient Outcomes

- Completed a 10 days of ceftriaxone, 5 day course of micafungin, and started on a 4-week course of PO fluconazole upon discharge.
- Given the unclear etiology of candidemia, chart review from the previous 18 months was conducted and revealed an ultrasound from 1 year prior showing a 4.5 cm lobulated, left mesenteric mass.
- The patient admitted to previous knowledge of this mass and referral to general surgery, which he never pursued.
- Re-review of current imaging with radiologists revealed the continued presence of a mesenteric mass near loops of bowel and a small abscess on the left kidney.
- Given the presence of the mesenteric mass, its proximity to bowel loops, and a history of recurrent pyelonephritis, source of infection was likely gut translocation to the mesenteric mass, with subsequent hematologic spread and seeding of the left kidney.
- Patient advised for close outpatient follow-up with infectious disease, ophthalmology, urology, and primary care.
- New referral for general surgery was placed after discharge.

Hospital Course

- Day #1:** Started on IV ceftriaxone for acute pyelonephritis in the emergency department and admitted to medicine service for further management.
- Day #3:** Patient starts to spike fevers overnight. Retroperitoneal ultrasound was done, indicating left kidney hydronephrosis without evidence of obstruction. No changes in current management were made, though etiology of new fever was unclear.
- Day #5:** Blood cultures come back positive for *C. tropicalis*. Urine cultures remain negative. Infectious disease consulted. Patient started on IV micafungin and continued on ceftriaxone due to evidence of pyelonephritis. Blood cultures sent for antifungal susceptibility testing.
- Day #9:** Echocardiography and CT abdomen and pelvis with contrast was done to investigate source of candidemia (Figure 3). No new findings from prior imaging. No vegetations on echocardiogram. Interventional radiology consulted regarding drainage of rectus sheath hematoma to obtain sample for culture; rectus sheath hematoma was not amenable for drainage and slowly resolving over time.
- Day #10:** New blood cultures come back negative. Urine cultures continued to remain negative. Patient switched from IV micafungin to oral fluconazole after resistance testing indicated susceptibility to fluconazole. Ceftriaxone was discontinued.
- Day #15:** Patient discharged with oral fluconazole. Planned for close outpatient follow-up. No source of infection was identified.

Figure 1. Non-Contrast CT Abdomen/Pelvis: Right Rectus Sheath Hematoma



Figure 2. Fever Curve Throughout Admission

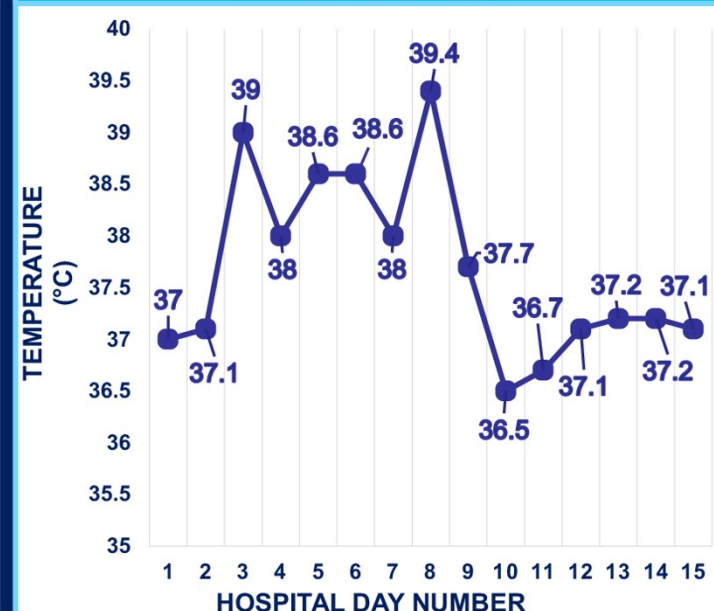
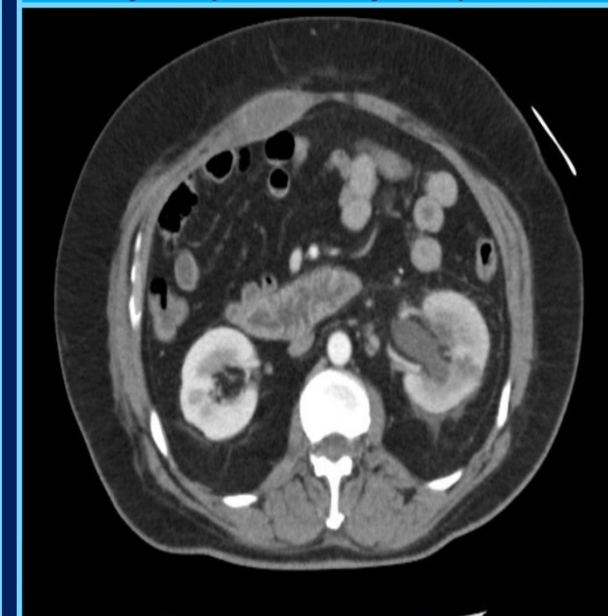


Figure 3. Contrast CT Abdomen/Pelvis: Left Pyelonephritis and Hydronephrosis



Discussion

- Given the poor prognosis associated with candidemia of unclear origin,⁶ extensive workup for source of infection including imaging, repeat blood cultures, antifungal resistance testing,⁸ and thorough chart review was vital in the management of this patient.
- Isolation of *C. tropicalis* as opposed to *C. albicans* is less common, though likely related to a combination of individual patient risk factors, local epidemiology, and geographic region.⁵ Non-*albicans* candidemia is more prevalent in diabetic patients as opposed to the general population.⁹
- Though diabetes mellitus predisposes individuals to a higher risk for candida infections, the presence of a major risk factor is seen in the majority of patients with candidemia. Major risk factors include invasive lines, recent surgery, or recent antibiotic use.⁹

Conclusion

- Proper treatment of candidemia requires a multidisciplinary approach and prompt initiation of a proper antifungal regimen.
- Full workup for candidemia should include thorough history and physical exam, blood cultures, ophthalmoscopic evaluation, echocardiography, and early source control.
- Non-*albicans* candidemia is rising in prevalence and antifungal resistance must be taken into consideration when deciding the course of antifungal treatment.
- While antifungals are the cornerstone of treatment for candidemia, early source control is vital. Candidemia of unclear source is associated with the highest rates of morbidity and mortality.

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