

# Surviving the Apprehensive Methicillin-Sensitive Staphylococcus aureus (MSSA) Bacteremia: A Case of Bacteremia with an Undetermined Source of Infection Leading to Suspected Cardioembolic Ischemia and Biochemical Septic Shock

Authors: Greisy D. Curbelo Sesein, MD; Eduardo Marino-Urbino, MD; Christopher Fontela, MD; Melanio J. Rodriguez, MD; Jorge A. Diaz, MD; Shivaan C. Oomrigar, MD; Ramon Mendoza Bello, Yoandy Rodriguez-Fuentes, MD

## Introduction

This research presents a complex case of a 70-year-old male with acute metabolic encephalopathy and biochemical septic shock, later attributed to cardioembolic ischemia, resulting from Methicillin-Sensitive Staphylococcus Aureus (MSSA) bacteremia with an elusive source of infection.

## Case Description

The 70-year-old patient, with a medical history of hypertension and aortic valve stenosis status post-Coronary Artery Bypass Grafting and bioprosthetic valve replacement on dual anti-platelet therapy (clopidogrel and aspirin), was admitted following an unwitnessed fall and a day of vomiting and generalized weakness. Upon arrival, the patient exhibited altered mental status, hypotension, and acidosis. Initial diagnostic workup raised suspicion of biochemical septic shock and a possible postictal state. Upon arrival to the Emergency Department, patient was seen by trauma services for (+) HS, (+) LOC, (+) AP. Patient underwent a PAN-SCAN that showed no acute intracranial hemorrhage or mass effect, no acute post-traumatic intrathoracic process, no acute post-traumatic abdominopelvic process nor post-traumatic thoracic or lumbar spine injury. Pelvis X-ray showed no evidence of acute fracture or dislocation. Lab-work was remarkable for acute metabolic acidosis, initial K was 2.35, bicarb 8, lactic acid 4.4, calcium 4.0 and Mag 1.1. Subsequent brain MRI revealed cardioembolic ischemia and subarachnoid hemorrhage concurrent with MSSA bacteremia. A multidisciplinary approach involving ICU, neurology, interventional cardiology, and infectious disease specialists ensued, leading to comprehensive evaluations, including transesophageal echocardiography and MRI of the spine. Despite an exhaustive workup, the source of infection remained elusive. Treatment encompassed fluid resuscitation, corticosteroids, broad-spectrum antibiotics, and antiviral therapy.

## Hospital Course

**Brain CT Scan:** A CT scan of the brain performed 6 hours after admission revealed a subarachnoid hemorrhage in the right post-central sulcus, leading to a transfer to the Intensive Care Unit (ICU) and close monitoring.

**Cardiac Assessment:** A 2D echocardiogram showed heart failure with reduced ejection fraction (HFrEF), a dilated left atrium, mild mitral regurgitation (MR), and moderate bioprosthetic aortic stenosis.

**Neurological Assessment:** An MRA of the head and neck revealed areas of restricted diffusion, suspected to be due to emboli or thrombus. Transesophageal echocardiogram (TEE) ruled out endocarditis or thrombus as a potential source, which was

**Thrombocytopenia Concerns:** Concerns arose regarding worsening thrombocytopenia in the setting of bioprosthetic aortic valve stenosis, leading to testing for Heyde syndrome, which returned positive for von Willebrand factor (VWF) antigen.

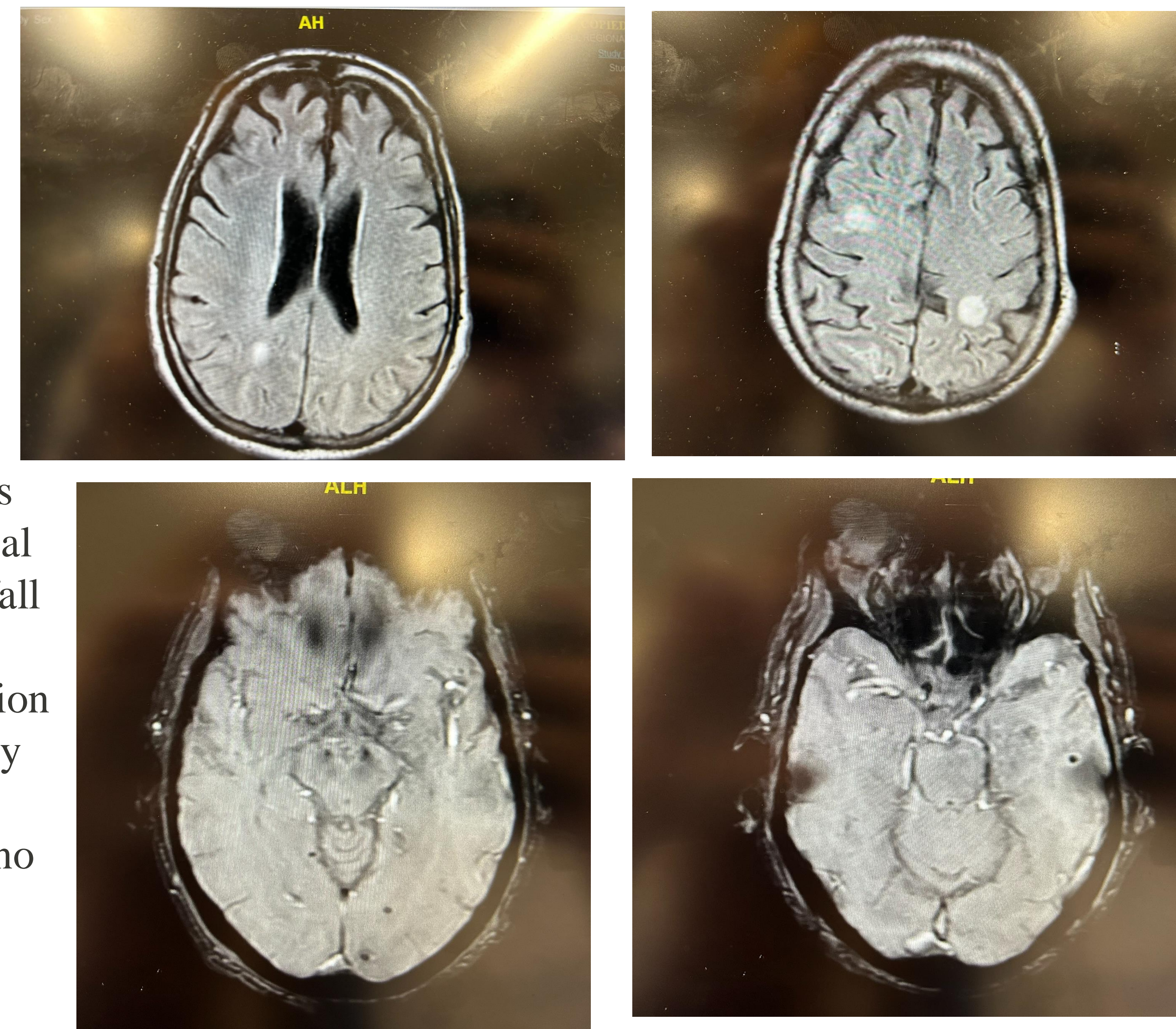
**Respiratory Issues:** The patient required intubation and mechanical ventilation due to bilateral multifocal pneumonia (PNA) as observed on a CT chest. Bedside bronchoscopy was performed.

**Spinal Assessment:** An MRI of the spine was negative for abscess or infectious processes.

**Infection and Treatment:** Despite multiple assessments, there was no clear source for the patient's bacteremia. The MRI of the brain raised concerns about potential encephalitis. Lumbar puncture (LP) cultures were collected, and the patient was treated with linezolid, acyclovir, rifampin, and cefepime.

**Current Status:** As of the present, the patient is medically stable with no clear source of infection, and blood, urine, and cerebrospinal fluid (CSF) cultures have returned negative. The patient is being discharged with a PICC line to continue antibiotic treatment with cefazolin and rifampin for six weeks. Follow-up with consultants and a Primary Care Physician (PCP) within two weeks of discharge is recommended.

## Images



## Discussion

This case underscores the intricate challenges in managing a patient with biochemical septic shock, cardioembolic ischemia, and MSSA bacteremia without an identified source of infection. Such cases are exceedingly rare, with an incidence of less than 1%. The multidisciplinary approach was instrumental in facilitating a successful outcome, resulting in the patient's complete recovery from the initial encephalopathic state. The study highlights the importance of collaborative care to mitigate the high mortality and poor prognosis associated with similar cases of undetermined MSSA bacteremia.

Embolic Stroke of Undetermined Source (ESUS) is a term used to describe a specific subset of cryptogenic strokes, which are strokes with an unknown cause. ESUS emphasizes the likelihood that many unexplained strokes are probably embolic in nature, meaning they are caused by the embolization (blockage) of a blood vessel by an embolus, a particle that travels through the bloodstream.

ESUS is defined as a nonlacunar brain infarct without proximal arterial stenosis or cardioembolic sources. The concept of ESUS, moreover, implies that a full standard evaluation was done.

## References

- Kunitz SC, Gross CR, Heyman A, et al. The pilot Stroke Data Bank: definition, design, and data. *Stroke* 1984; 15:740.
- Foulkes MA, Wolf PA, Price TR, et al. The Stroke Data Bank: design, methods, and baseline characteristics. *Stroke* 1988; 19:547.
- Adams HP Jr, Bendixen BH, Kappelle LJ, et al. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. *Stroke* 1993; 24:35.
- Saver JL. CLINICAL PRACTICE. Cryptogenic Stroke. *N Engl J Med* 2016; 374:2065.
- Ay H, Furie KL, Singhal A, et al. An evidence-based causative classification system for acute ischemic stroke. *Ann Neurol* 2005; 58:688.
- Ay H, Benner T, Arsava EM, et al. A computerized algorithm for etiologic classification of ischemic stroke: the Causative Classification of Stroke System. *Stroke* 2007; 38:2979.
- Hart RG, Diener HC, Couotts SB, et al. Embolic strokes of undetermined source: the case for a new clinical construct. *Lancet Neurol* 2014; 13:429.
- Kamel H, Merkle AE, Iadecola C, et al. Tailoring the Approach to Embolic Stroke of Undetermined Source: A Review. *JAMA Neurol* 2019; 76:855.
- Kamel H, Navi BB, Parikh NS, et al. Machine Learning Prediction of Stroke Mechanism in Embolic Strokes of Undetermined Source. *Stroke* 2020; 51:e203.