Academic Medical Center | Patient Safety Organization
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# Patient Safety Alert: Diagnosis and Treatment of Ischemic Stroke

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Arriving at accurate, prompt diagnoses and their accompanying treatment plans presents unique challenges in the emergency department (ED) setting. Narrow diagnostic focus, communication failures, and limited availability of key resources (imaging, access to a patient's prior medical history) periodically coalesce into a climate of increased risk, particularly with patients presenting with symptoms related to ischemic stroke.

The AMC PSO recently convened subject matter experts and ED clinical leaders to address these challenges in assessing and treating patients presenting with symptoms related to ischemic stroke and, in particular, vertebrobasilar stroke. The key points resulting from this convening session are as follows:

## KEY POINTS

- 20% of ischemic strokes are vertebrobasilar strokes.
- Vertebrobasilar stroke mortality rates can reach 90%
- Patients often present with a continuum of symptoms, rather than focused, discrete findings
- Symptoms often mimic other neurological disorders, requiring a thorough differential diagnosis
- A thorough neurological exam is critical, particularly focusing on the posterior circulation functions including eye movement, balance, and gait
- Conflicting diagnostic studies and/or conflicting diagnoses should be reviewed by attending physicians
- Recommendations include employing Computerized Tomography Angiography (CTA), when Magnetic Resonance Angiography (MRA) is not readily available
- Patient sedation may be appropriate when non-compliance prevents completion of radiologic tests
- Timely communication and follow-up to all providers is critical to diagnosis and treatment

## CASE STUDY

A young (age<40) male patient arrived at the ED via EMS, presenting with a chief complaint of speech impairment and altered mental status. Earlier that evening, the patient was noted to be vomiting and having difficulty speaking. A family member notified EMS and the patient was transported to a local ED.

On presentation, the patient was noted to have

- Anxiety
- Slurred speech
- Difficulty completing sentences
- Left-sided facial weakness

While the patient reported left-sided body numbness, initial assessments indicated no other motor deficits and his vital signs were within normal parameters. The patient had no known allergies and was not taking any medications. He denied any headache. The patients' past medical history was significant for anxiety and depression.

After the initial assessment, the ED's stroke protocol was initiated. The neurology team estimated a low probability of a cerebrovascular accident. A head CT was performed and was negative. The patient's agitated state precluded the ability to perform a CT angiogram.

The patient was admitted to observation, and was seen in consultation by neurology and psychiatry. On further evaluation the next morning, concern was raised regarding a primary neurological event and an MRI was ordered, which subsequently confirmed an occlusion of the basilar artery (BAO) and subsequent CVA.

The patient's condition worsened, requiring intubation and transferred to an ICU for further treatment. The patient was discharged two weeks later to a rehabilitation facility, with significant residual symptoms.

Upon further review of the case, it was learned that the patient's family history included a paternal stroke at 20 years of age. This, however, had not been communicated to the care delivery team.

## COMMON PRESENTING SYMPTONS

Patients presenting with basilar artery occlusion often present with a continuum of symptoms which may include the following:

- Dizziness, nausea, headache
- Contra lateral hemi paresis or asymmetric quadriparesis

- Pupillary abnormalities
- A wide spectrum of isolated or complex combined eye-movement disorders (i.e. nystagmus, lateral gaze abnormalities)
- Visual field deficits (i.e. diplopia, greyout)
- Pseudobulbar symptoms: facial weakness, dysphonia, dysarthria and/or dysphagia
- Reduced consciousness

## CTA AND MRA IN TIMELY DIAGNOSIS

Achieving an accurate and timely diagnosis may be aided by CTA in place of, or in conjunction with, MRA:

| Computed Tomography Angiography (CTA) |
|---|
| *Advantages*<br>• sensitivity and specificity of more than 90% for demonstrating occlusion<br>• images with high resolution<br>• rapid image acquisition<br>• useful in medically unstable patients intolerant of prolonged imaging<br><br>*Limits*<br>• restricted by the presence of vessel calcification |
| **Magnetic Resonance Angiography (MRA)** |
| *Advantages*<br>• can visualize posterior circulation more readily than CTA<br>• contrast-enhanced MRA might provide high resolution images compatible with digital subtraction angiography<br><br>*Limits*<br>• lack of availability in many facilities<br>• unsuitable for unstable, uncooperative and/or intubated patients<br>• false negatives rate can increase in posterior circulation images when lesions are small and imaging is performed within 24 hours of symptom onset |

## STRATEGIES FOR IMPROVING DIAGNOSIS AND TREATMENT

- **Complete history and physical**
  - When facing unusual or atypical neurological symptom complexes, expand differential diagnosis to include posterior strokes
  - A thorough neurological exam is critical, particularly focusing on the posterior circulation functions including eye movement, balance, and gait
- **Imaging Resources**
  - Availability and utilization of CTA and/or MRA services is often critical to timely diagnosis and treatment
- **Communication**
  - Adopt process to ensure accurate and timely communication of critical test results among all providers (including consultative services)
  - Incorporate team training principles and standardized handoff processes to minimize variations and errors in patient handoffs to avoid delays in treatment
  - Develop policies to ensure adequate communication between attending clinicians and consider mandating attending-to-attending communication, when consultant diagnosis is in contradiction to primary attending differential
- **Supervision**
  - Adopt policies for consistent supervision of trainees and midlevel providers. Rendering diagnosis in the ED requires close supervision and confirmation by ED Attendings

## ADDITIONAL REFERENCES


- http://emcrit.org/podcasts/posterior-stroke/
- http://emjclub.com/podcast/2014/1/25/can-the-hints-exam-differentiate-central-from-peripheral-vertigo
- http://hwcdn.libsyn.com/p/a/d/d/add761f2a2847ea5/hints-exam.pdf?c_id=2502227&expiration=1403065963&hwt=252eec36ca4a769df9dc3300c48c67ee


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