### **Emergency Neurovascular Imaging Protocols and Indications:**

Correct ordering and protocoling of emergent neurovascular imaging is important for optimal patient care. Below are the protocol rationales, available protocols, their intended use and indications.

**CT head and lumbar puncture** remain the accepted initial studies for emergent evaluation of suspected extra-axial hemorrhage , except in select patients with contraindications to lumbar puncture (e.g., Xa inhibitor, severe thrombocytopenia).

#### **CTA Head:**

Protocol:

- 1. Noncontrast CT Head (Dual Energy)
- 2. CTA of the intracranial vessels from skullbase to vertex
- 3. Postcontrast CT Head (Dual Energy)

Rationale:

- 1. Detect causes of intraparenchymal hemorrhage such as arteriovenous malformation or other vascular malformations, particularly when a hypertensive etiology is thought less likely or other causes need to be excluded.
- 2. Detect aneurysm or other source of hemorrhage in patients with known extra-axial hemorrhage.
- 3. DE post contrast series improves evaluation for CTA spot sign

Indications:

- 1. Intracranial parenchymal hemorrhage
- 2. Extra-axial hemorrhage

## CTA Head and Neck (stroke):

Protocol:

- 1. Noncontrast CT Head (Dual Energy)
- 2. CTA of the intracranial vessels from arch to vertex
- 3. Delayed CTA of the cervical and intracranial vessels from arch to vertex

Rationale: Intended to evaluate for intracranial hemorrhage and infarct extent on noncontrast CT and evaluate the patency of the cervical and intracranial vessels on the arterial phase. The post

contrast imaging through the entire neck and head is intended to differentiate between delayed flow and occlusion in severely narrowed carotid arteries.

Indications:

- 1. Stroke syndrome, including symptoms of vertebral basilar insufficiency (e.g., dizziness, ataxia, vertigo)
- 2. (Note that known intracranial hemorrhage should be evaluated with CTA Head protocol, as neck imaging is not generally necessary in these patients and the dual energy post contrast head improves evaluation for CTA spot sign)

#### CTA neck:

Protocol:

1. CTA of the neck from arch through the circle of Willis

Indication:

- 1. Neck pain and clinical concern for dissection or blunt cervical vascular injury (includes strangulation, blunt neck trauma, unilateral neck pain with mechanism for injury, etc)
- 2. Penetrating neck trauma
- 3. (Note that if there is concern for resulting infarct, Head and Neck Stroke CTA should be performed)

## CTV:

Protocol:

- 1. Noncontrast CT Head (Dual Energy)
- 2. CTA of the intracranial vessels from skullbase to vertex
- 3. CTV of the intracranial vessels from skullbase to vertex

(Note that there is no separate Epic Order for CTV. Ordering physicians should order "CTA head" and request CTV in the ordering comments.)

Indication:

1. Suspected dural venous sinus thrombosis

# CTA/CTV vs MRA/MRV

- 1. In most cases, CTA/CTV performs with equal or better sensitivity and logistics than MRA/MRV in emergent settings and is usually the study of choice
- 2. Considerations for ordering MRA/MRV include:
  - a. Contraindication to CTA
  - b. MRI is planned for the patient for another indication and CT has been already obtained or bypassed (i.e rare stroke cases without CTA)
  - c. Carotid or vertebral dissection, primarily or depending on CTA findings
  - d. Alternative or confirmatory method for diagnosis of dural venous sinus thrombosis