

- **Smulowitz's hospital has created a support system for physicians and families.** They had the assistance of the University of Michigan and other programs. It is complicated and there is room for improvement.
  - There needs to be a robust system for recognizing and reporting when adverse events occur.
  - There needs to be a dedicated team of individuals that are involved early on in determining what should be communicated to patients and families and how. This is complicated and it is important to have training. This depends on the hospital setting. Communication may take place during hospitalization as well as afterwards.
  - There needs to be a close working relationship between the hospital and the insurer. Some malpractice insurers are within the hospital system but more often they are external to it. There needs to be close coordination between the hospital and the insurer. Sometimes the insurer will want external review of the case and they will need to be involved before any decisions are made on financial compensation.
- **How do you offer an apology?** This is difficult and many hospitals have decided not to train everyone. There may be dedicated and trained individuals that physicians can reach out to when something bad happens and get assistance in what to say and how to say it. Apology can be simple and upfront. "I am so sorry that this happened to you or your family. I can't imagine how you possibly feel." This is empathic and not dismissive. "This was something that we are going to look into. We don't know what happened or the facts. Someone will get back to you about it."
- **Where do you go next after the apology?** We need to take care of ourselves. The second victim phenomenon involves clinicians. Formal peer support programs can be helpful. If these aren't available, know people in your department that you can reach out to and who will be helpful. We need to make sure we take care of ourselves and each other when bad things happen. Even if you can't discuss the case, you can discuss how you feel. There is a lot that we can talk about.

## Stroke in Pregnancy

Gita Pensa, MD and Julie Roth, MD

### Take Home Points

- **The incidence of stroke is increasing in pregnancy.**
- **Migraines with aura are a risk factor for stroke in pregnancy.**
- **Pregnant women with stroke should receive emergent imaging such as CT/CT angiography. Although MRI is an option, it is not available or timely in most centers.**
- **tPA does not cross the placenta but may result in a higher risk of uterine bleeding and rupture.**
- **There is evidence that the incidence of stroke in younger patients has been increasing over the last decade.** There are differences in risk factors and presentations between men and women.
- **Strokes in pregnant women.** Stroke in pregnancy has an incidence of 10-30 per 100,000 patients. There is an increase in stroke incidence in pregnancy and it is unclear why. It does correlate with the increasing incidence of hypertensive disorders in pregnancy.
- **In older patients with stroke,** we consider hypertension, atrial fibrillation, cervical vessel stenosis, smoking, hyperlipidemia, and diabetes.
- **In younger patients,** aside from hypertension, we need to consider more unusual causes. Strokes may occur from cervical vessel dissection, venous obstruction, and hypercoagulable states.
- Risk factors in pregnancy include preeclampsia/eclampsia, C-section, pregnancy related hematologic problems, congenital heart defects, gestational diabetes, and migraines.
- Migraines with aura are a risk factor for stroke in pregnant and non-pregnant women. Migraine with aura can also be a stroke mimic. Many strokes in the young present with headache as well as focal neurologic features and it can be difficult to differentiate between strokes and stroke mimics.
- **How do we work up stroke in a pregnant patient?** CT and CT angiogram (CTA) of the head and neck. Dissection is in the differential. If you have fast access to MRI, you can do MRI/MRA but most of us don't have rapid access to MRI. MRA does not need contrast. Gadolinium should be avoided in pregnant patients as its risks are not as well defined.
  - **CT of the head has low risk of radiation exposure to the fetus.** It is less than 0.01 rads.

- **For CTA, you need to give iodinated contrast.** Our knowledge of the safety of a single dose of IV contrast comes from the pulmonary embolism literature.
- Bourjeily, G et al. **Neonatal thyroid function: effect of a single exposure to iodinated contrast medium in utero.** *Radiology*. 2010 Sep;256(3):744-50.
- Among several hundred infants exposed to a single dose of contrast in utero, there was only one infant that had transiently abnormal thyroid function tests and normalized within a week.

#### CASE

**A woman who is 6 months pregnant presents with new onset hemiparesis. CT and CTA does not show abnormalities such as bleed, dissection, large vessel occlusion, or visible stroke. It has been two hours since symptom onset. What do you do? Do you give tPA?**

- **There are no guidelines.** There is some data available. We need to counsel patients on theoretical risks.
- **Does tPA cross the placenta?** No. tPA is a large molecule that does not cross the placenta.
- Depending on the stage of pregnancy, there is a lot of blood going to the placenta. There are case reports of uterine bleeding or rupture with thrombolytics. This data includes tPA for all indications not just stroke. The major bleeding risk is a little lower for stroke than these other disorders.
- We need to consider the risks and severity of symptoms. tPA will be out of the system in 24 hours but hemiparesis has high morbidity. Shared decision making should occur.
- **What if there was a large vessel occlusion on CT?** Should you proceed straight to IR? There is less data than thrombolytics. There are a handful of case reports. Interventionalists often have to give heparin or IIb/IIIa inhibitors to prevent peri-procedural thrombosis. There is a risk of vessel perforation or rupture. We need to consider all of these factors.

#### CASE

**A pregnant patient with stroke was taken for mechanical thrombectomy that was unsuccessful so they placed a stent. The patient did well and had full neurologic recovery. She had to take clopidogrel subsequently but developed an allergy. She then had to start a IIb/IIIa inhibitor. What do you do for delivery?**

- The OB/GYN, maternal fetal medicine, anesthesia, and neurology services all worked together to develop a plan. They used a short-acting blood thinner at the time of delivery. Although you are focused on the patient at the time of treat-

ment, you need to consider the future course as well.

#### CASE

**A patient who is 6 months pregnant presents with non-dominant hand clumsiness. CT and CTA are negative. Everyone decides not to proceed with tPA after an assessment of risks and benefits. How is the patient treated?**

- **Full dose aspirin is contraindicated in pregnancy but 81 mg of aspirin is often used.** 81 mg is often used as prevention in patients who are at high risk for preeclampsia.
- **Anticoagulation.** Outside of pregnancy, anticoagulation is usually only used as secondary stroke prevention in patients with atrial fibrillation, mechanical valves or venous stroke. Anticoagulation is used for both arterial and venous thromboembolic disease in pregnancy. Dr. Roth and her neurology colleagues are more likely to anticoagulate a pregnant patient, but most patients are given baby aspirin for secondary stroke prevention, and this is what is supported by most practice guidelines.

#### Related Material

[EM:RAP 2015 January: The LIN Session: tPA in Pregnancy](#)

## No Spleen, Big Problems

Anand Swaminathan, MD and Isaac Bogoch, MD

#### Take Home Points

- **Asplenic patients are at higher risk of bacterial infections with encapsulated organisms.**
- **Ask about vaccination status in asplenic patients.**
- **Have a low threshold to admit febrile asplenic patients and make sure they have very close follow-up if discharged.**
- **In the March 2018 introduction, we discussed a patient who was diagnosed with pneumonia and discharged home on appropriate antibiotics.** The patient returned a day later and was much sicker. The patient had a history of surgical splenectomy.
- **Asplenic patients are at a higher risk of certain bacterial infections such as encapsulated organisms like *Pneumococcus*, *Meningococcus* and *Hemophilus influenzae* type B. Thus they can decompensate quickly.** This is because the spleen contains macrophages which remove bacteria.
- **Recommendations for vaccinations differ for asplenic patients.** Patients should receive the 13-valent conjugated pneumococcal vaccine followed by the 23-valent polysaccharide pneumococcal vaccine approximately 8 weeks later. Patients