

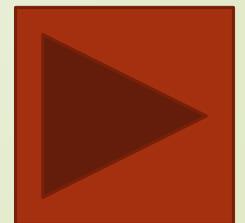
Quiz 28



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Quiz team

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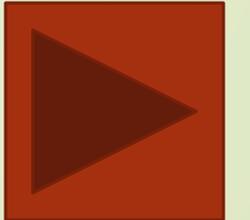
This quiz is being published on behalf of the Education Committee of the SNACC.



1. This is a 74 year old patient admitted with sudden onset of right sided weakness and aphasia. He was apparently normal during lunch. He was rushed to the ER. The stroke team was paged. Which of the following is true regarding time for revascularization?

- A. The window for intravenous TPA (IV TPA) is 6 hours and intra-arterial TPA is 12 hours
- B. The window for intravenous TPA (IV TPA) is 3 hours and intra-arterial TPA is 6 hours
- C. The window for intravenous TPA (IV TPA) and intra-arterial TPA is 6 hours
- D. The window for intravenous TPA (IV TPA) and intra-arterial TPA is 12 hours

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A. The window for intravenous TPA (IV TPA) is 6 hours and intra-arterial TPA is 12 hours

- ▶ This is not correct.
- ▶ The timing of onset of symptoms is critical in the management of acute ischemic stroke and may be the single most important piece of historical information.

**Incorrect**

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B. The window for intravenous TPA(rt-PA) is 3 hours and intra-arterial TPA is 6 hours

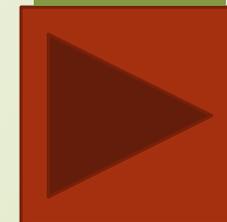
- ▶ The windows for acute intravenous thrombolysis and intra-arterial thrombolysis are less than 3 hours and 6 hours from onset of symptoms, respectively.
- ▶ Consider intra-arterial thrombolysis for patients who present beyond the thrombolysis time window, those who are ineligible for rt-PA, or those who do not improve after intravenous rt-PA

Ref ; Anesthetic Management of Patients with Acute Stroke; Alana M. Flexman,MD, FRCPCa, Anne L. Donovan, MDb, Adrian W. Gelb, MBChB, FRCPCb

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## C. The window for intravenous TPA(rt-PA) and intra-arterial TPA(IAT) is 6 hours

- ▶ IV TPA is effective when administered up to 4.5 hours after ischemic stroke symptom onset in select patients. However, timely administration remains paramount to achievement of optimal therapeutic outcomes.
- ▶ The SITS-MOST (Safe Implementation of Thrombolysis in Stroke-Monitoring Study) and SITS-ISTR (Safe Implementation of Thrombolysis in Stroke International Stroke Thrombolysis Register) registries evaluated the safety and efficacy of rt-PA at both 3 and 4.5 hours and showed promising results.
- ▶ In 2009, the AHA/ASA stroke guidelines were updated to support the use of rt-PA in select patients up to 4.5 hours after symptom onset.

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Incorrect

## D. The window for intravenous TPA (IV TPA) and intra-arterial TPA is 12 hours

- ▶ This is incorrect. This is usually deemed between 3-6 hours.
- ▶ As intra-arterial thrombolysis involves selective injection of thrombolytic drugs directly into intracranial vessels at lower doses than the intravenous route, this technique maybe appropriate in patients who have contraindications to intravenous thrombolysis such as recent surgery.

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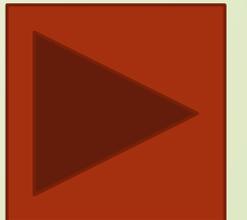
Incorrect



2. The following are risk factors for perioperative stroke except;

- A. Recent stroke
- B. Perioperative beta blocker therapy
- C. Patients with hyperlipidemia on statins
- D. Patients on anticoagulant and antiplatelet therapy preoperatively

Go to q 3



## A. Recent stroke

- ▶ Patients with recent stroke were found to be at risk for postoperative stroke and this risk progressively decreased the longer the duration of time between stroke and subsequent surgery;
- ▶ stroke < 3 months prior, odds ratio (OR) 67.6
- ▶ stroke 3 to 6 months prior, OR 24.02
- ▶ and stroke 6 to 12 months prior, OR 10.39
- ▶ The increased risk of perioperative stroke appeared to return to that of patients with a remote history of prior stroke between 9 and 12 months. Hence, it may be wise to wait for 6-12 months after a prior stroke to undergo elective surgery.

**Incorrect**

**Back to q**



Ref ; Jorgensen ME, Torp-Pedersen C, Gislason GH, et al. Time elapsed after ischemic stroke and risk of adverse cardiovascular events and mortality following elective noncardiac surgery. JAMA. 2014; 312:269–77.

## B. Perioperative beta blocker therapy

- ▶ Evidence demonstrates a reduced risk of cardiac events with perioperative beta-blockade, though this may come at the expense of increased stroke risk in non-cardiac surgery patients
- ▶ Furthermore, there may be an increased risk with relatively non-selective beta-blockers. This may be due to impaired cerebral vasodilation and cardiac output in the setting of malperfusion and non-selective beta-blockade

Ref; Vlisides and Mashour ; Perioperative stroke. *Can J Anaesth*. 2016, February; 63(2); 193-204

**Incorrect**

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## C. Patients with hyperlipidemia on statins

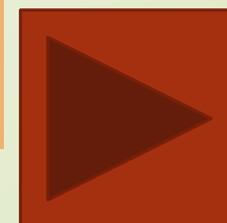
- This is the correct answer. Statins have not been found to be a risk factor for stroke, rather a meta-analysis has found beneficial effects while using statins
- Statins or 3-hydroxy- 3-methyl glutaryl coenzyme A reductase inhibitors are drugs which are used to treat hyperlipidemia
- The benefits of statins in prevention of stroke is thought to be related to their pleiotropic effects and to their lipid lowering properties.
- More randomized controlled studies are needed to prove their benefit.

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Ref; Everett BM, Glynn RJ, MacFadyen JG, Ridker PM. Rosuvastatin in the prevention of stroke among men and women with elevated levels of C-reactive protein: justification for the Use of Statins in Prevention: an Intervention Trial Evaluating Rosuvastatin (JUPITER). Circulation. 2010; 121:143–50.

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## D. Patients on anticoagulant and antiplatelet therapy preoperatively

- Some patients – especially those on preoperative anticoagulation or antiplatelet therapy – may be at increased risk for perioperative thromboembolic events via a hypercoagulable state, which may be driven by both surgical intervention and rebound hypercoagulation

Incorrect

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3. Which of the following is false regarding hemodynamic management in acute stroke?

- A. Hemodynamic variability predicts poor outcome in stroke
- B. Systolic blood pressure between 140-180mmHg showed favorable outcomes.
- C. Blood pressure above 185/110 is a contraindication to thrombolysis
- D. It is ideal to keep systolic blood pressure less the 140mmHg in this scenario

Go to q 4



## A. Hemodynamic variability predicts poor outcome in stroke

- ▶ Early neurological deterioration (END) is a common condition associated with poor outcome after acute ischemic stroke.
- ▶ Chung et al studied the association between blood pressure (BP) variability and development of END and found that there is an independent association between acute in-hospital BP variability and the development of END calculated as max-min, SD (standard deviation), and coefficient of variation.

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Blood pressure variability and the development of early neurological deterioration following acute ischemic stroke.  
Chung. *Journal of Hypertension* Volume: 33 Issue 10 (2015)

Incorrect

## B. Systolic blood pressure between 140-180mmHg showed favorable outcomes.

- ▶ Society for neuroscience in anesthesiology and critical care (SNACC) has recommended that systolic arterial pressure should be maintained  $>140$  mm Hg (fluids and vasopressors) and  $<180$  mm Hg (with or without i.v. rtPA-intravenous thrombolysis), and diastolic arterial pressure  $>105$  mm Hg (class IIa, level of evidence B). After successful recanalization, arterial pressure targets should be adjusted to avoid potential hemorrhagic conversion

Talke PO, Sharma D, Heyer EJ, Bergese SD, Blackham KA, Stevens RD. Society for Neuroscience in Anesthesiology and Critical Care Expert consensus statement: anesthetic management of endovascular treatment for acute ischemic stroke: endorsed by the Society of NeuroInterventional Surgery and the Neurocritical Care Society. J Neurosurg Anesthesiol 2014; 26: 95–108

Incorrect

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## C. Blood pressure above 185/110 is a contraindication to thrombolysis

- ▶ This is true. A blood pressure  $> 185/110$  is a contraindication to thrombolysis due to risk of hemorrhagic conversion.

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Incorrect

D. It is ideal to keep systolic blood pressure less the 140mmHg in this scenario



- ▶ This statement is false and hence this is the correct answer. Blood pressure lowering could lead to a poor outcome.
- ▶ A potential strategy for management supported by the current literature is to avoid lowering arterial pressure dramatically during the first 12 h after stroke onset, when collateral circulation compromise is still a concern.
- ▶ The SNACC has recommended that systolic arterial pressure should be maintained  $>140$  mm Hg (fluids and vasopressors)

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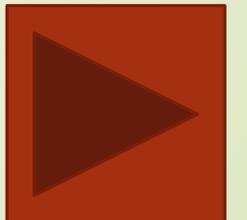
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4. The stroke team wants to emergently do an angiography and possible clot extraction in a patient with acute stroke. Patient looks anxious . His blood pressure is 180/100. You decide to do this case under local anesthesia. Which of the following statements is true.

- A. Time delay to revascularization occurs with general anesthesia
- B. Risk of cerebral ischemia due to hypotension occurs with general anesthesia.
- C. Risk of hypercarbia and hypoxia occurs with general anesthesia.
- D. Worse neurologic outcome with general anesthesia.

Go to q 4



## A. Time delay to revascularization occurs with general anesthesia

- ▶ Although there was a school of thought that general anesthesia could potentially increase the revascularization time, it has not been substantiated in the recent Anstroke trial

Hassan AE, Chaudhry SA, Zacharatos H, Khatri R, Akbar U, Suri MF, Qureshi AI. Increased rate of aspiration pneumonia and poor discharge outcome among acute ischemic stroke patients following intubation for endovascular treatment. *Neurocrit Care*. 2012 Apr;16(2):246-50.

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Incorrect

## B. Risk of cerebral ischemia due to hypotension occurs with general anesthesia.



- ▶ A blood pressure lower than 140/80 could have a deleterious effect on stroke outcome. It is a universally accepted fact that induction of GA in a patient with a history of hypertension, along with altered cerebral autoregulation can lead to hypotension due to associated dehydration, drugs used as antihypertensives and a high sympathetic drive which is now obtunded.
- ▶ Thus a risk of cerebral ischemia associated with hypotension after general anesthesia would be a drawback

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Ref; 1. Avitsian R, Machado SB. *Anesthesiol Clin.* 2016 Sep;34(3):497-509. Anesthesia for Endovascular Approaches to Acute Ischemic Stroke.  
2. Simonsen CZ, Sørensen LH, Juul N, Johnsen SP, Yoo AJ, Andersen G, Rasmussen M. *Int J Stroke.* 2016 Dec;11(9):1045-1052. Anesthetic strategy during endovascular therapy: General anesthesia or conscious sedation? (GOLIATH - General or Local Anesthesia in Intra Arterial Therapy) A single-center randomized trial.

## C. Risk of hypercarbia and hypoxia.

- ▶ The risk of hypercarbia and hypoxia would be a complication of local anesthesia with sedation. In general anesthesia, this is unlikely due to controlled ventilation. At the same time hypocarbia could be a complication of general anesthesia and one should be cautious to avoid hyperventilation.

Löwhagen Hendén. General Anesthesia Versus Conscious Sedation for Endovascular Treatment of Acute Ischemic Stroke: The AnStroke Trial (Anesthesia During Stroke). *Stroke* Volume: 48 Issue 6 (2017)

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Incorrect

## D. Worse neurologic outcome with general anesthesia

- ▶ The question whether choice of anesthesia technique has an impact on neurological outcome after EVT (endovascular therapy) for AIS (Acute ischemic stroke) has been a matter of debate.
- ▶ Several retrospective studies have been published in the past, all showing better neurological outcome after local anesthesia with sedation as compared with GA. However, all retrospective studies experience selection bias, with the GA group having higher baseline stroke severity and posterior circulation strokes.
- ▶ The recent Anstroke trial which is a prospective randomized single-center study, investigated the impact of anesthesia technique on neurological outcome in acute ischemic stroke patients and found no difference in outcomes as long as hypotension was avoided and normoventilation was maintained.

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Löwhagen Hendén. General Anesthesia Versus Conscious Sedation for Endovascular Treatment of Acute Ischemic Stroke: The AnStroke Trial (Anesthesia During Stroke). *Stroke* Volume: 48 Issue 6 (2017)

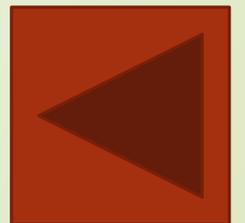
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5. As the interventionalist extracts the thrombus, he informs you about dye extravasation. Patient develops extremely high blood pressure and bradycardia. There is dilation of one pupil. All the following are appropriate **except**?

- A. This indicates vessel perforation and protamine should be administered.
- B. Intubation and hyperventilation.
- C. Neurosurgical consult and placement of a ventriculostomy.
- D. This indicates cerebral infarction and requires that the patient's blood pressure be increased.

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# A. This indicates vessel perforation and protamine should be administered

- ▶ Inadvertent rupture of an intracranial artery is a complication that is recognized by extravasation of the dye during angiography. There would be sudden hemodynamic changes consistent with increased intracranial pressure like extreme hypertension and bradycardia. Close communication with the proceduralist regarding need for reversal of heparin with protamine is recommended.
- ▶ When confronted with this complication, the important initial step is to resist the reflex temptation to withdraw the microcatheter that caused the perforation.

Iatrogenic Arterial Perforation during Acute Stroke Interventions  
T.N. Nguyen, S. Lanthier and D. Roy  
American Journal of Neuroradiology May 2008, 29 (5) 974-975;

Back to q



Incorrect

## B. Intubation and hyperventilation.

- ▶ Intubation to protect the airway in an unresponsive patient and hyperventilation to lower the intra cranial pressure would be indicated.

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Incorrect



## C. Neurosurgical consult and placement of a ventriculostomy.

- ▶ A neurosurgical consult and placement of ventriculostomy to manage the high intracranial pressure would certainly be recommended.

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Incorrect



D. This indicates cerebral infarction and requires that the patient's blood pressure be increased.

- Cautious lowering of an elevated blood pressure should be done in this situation. Increasing the blood pressure could lead to more complications in the presence of intracranial or subarachnoid hemorrhage.



End of set

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