Neuro anesthesia quiz

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1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

Please click on answer choices

A. Air embolism with the presence of probe patent foramen ovale
B. Compression of the cervical cord related to neck flexion
C. Jugular venous obstruction
D. Postoperative pneumocephalus
E. Sustained elevation of cerebral perfusion pressure

go to Q 2
1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

A. Air embolism with the presence of probe patent foramen ovale

Venous air embolism is a known complication in the sitting position and can lead to disastrous consequences including cardiac arrest. In the presence of patent foramen ovale, it can lead to paradoxical air embolism and stroke, however isolated quadriplegia is uncommon.

Incorrect

Try again!!
1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

B. Compression of the cervical cord related to neck flexion
Cervical cord compression leading to quadriplegia is a rare complication of the sitting position. Focal pressure on the spinal cord due to extreme flexion of the head on the neck is a postulated mechanism. Regional cord perfusion may also be decreased especially when there is associated decrease in mean arterial pressure and could contribute to cord ischemia. Preventive measures could include avoidance of extreme flexion of the neck and providing a space of at least one inch between the chin and the chest, avoidance of excessive neck rotation particularly in elderly patients with cervical stenosis and maintenance of near normal mean arterial pressure. Monitoring of short latency SSEPs have been advocated to monitor the sensory pathways during the procedure.

Ref: Miller’s textbook of anesthesia: Ch 53: pg 2137
1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

C. Jugular venous obstruction

Jugular venous obstruction can lead to raised intracranial pressure but does not produce quadriplegia by itself.

Incorrect

Try again!!
1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

D. Postoperative pneumocephalus

Pneumocephalus is one of the differential diagnosis of delayed awakening. Collection of air under the dura can increase ICP and neurological deficit but unlikely to cause isolated quadriplegia.
1. A 55 yr-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for the treatment of acoustic neuroma. Which of the following is the most likely cause?

E. Sustained elevation of cerebral perfusion pressure

Sustained elevation in raised ICP again will not cause quadriplegia by itself.

Incorrect

Try again!!
2. A 6-yr-old boy with spina bifida and a chronic indwelling urinary catheter has severe hypotension and hypoxemia during augmentation cystoplasty. Which of the following is the most likely cause?

A. Autonomic neuropathy
B. Disseminated intravascular coagulation
C. Latex allergy
D. Urinary sepsis
E. Venous air embolism

Please click on answer choices and go to Q 3.
Autonomic neuropathy is a disorder affecting the autonomic nerves. Causes include diabetes, amyloidosis, autoimmune disorders. Patients can present with hypotension but usually not hypoxemia.
2. A 6-yr-old boy with spina bifida and a chronic indwelling urinary catheter has severe hypotension and hypoxemia during augmentation cystoplasty. Which of the following is the most likely cause?

Disseminated intravascular coagulation can cause abnormal bleeding and hypovolemia causing hypotension but hypoxemia is unlikely.

Try again
Latex allergy can produce anaphylaxis. It presents as severe hypotension, rash or hives, hypoxemia due to bronchoconstriction. Previous reports indicate a prevalence of latex allergy in patients with spina bifida (SB) ranging between 10% and 73%. From the initial surgical repair of the myelomeningocele, children with Spina Bifida are submitted to multiple surgeries due to the neurologic, orthopedic and urologic problems they may present. Consequently, these children are exposed to several latex-containing products during their multiple interventions and they get sensitized.

Accordingly, latex allergy manifestations can be prevented. (1) Avoiding using latex-containing products since the birth of children with SB. (2) In children already operated of myelomeningocele but without evidence of latex allergy, one should avoid the use of latex materials during their successive admissions to hospital and during further surgeries. And (3) In children known to have developed latex allergy, a latex-free operating room.

2. A 6-yr-old boy with spina bifida and a chronic indwelling urinary catheter has severe hypotension and hypoxemia during augmentation cystoplasty. Which of the following is the most likely cause?

- Urinary sepsis would present with hypotension
- Again hypoxemia is unlikely

Try again
2. A 6-yr-old boy with spina bifida and a chronic indwelling urinary catheter has severe hypotension and hypoxemia during augmentation cystoplasty. Which of the following is the most likely cause?

Venous air embolism is again unlikely in this situation.

Try again
3. Which of the following relationships is indicated by the curve illustrated in the graph shown above?

A. Intracranial blood volume (X) and intracranial pressure (Y)
B. PaCO2 (X) and minute ventilation (Y)
C. PaO2 (X) and hemoglobin saturation (Y)
D. Preload (X) and stroke volume (Y)
E. Systemic arterial blood pressure (X) and cerebral blood flow (Y)
3. Which of the following relationships is indicated by the curve illustrated in the graph shown above?

This choice is incorrect

The PaCO2 and minute ventilation is a straight line between 20 and 80mmHg.

Paul G. Barash,
6th edition, ch 11, page 242
Intracranial elastance is determined by measuring the change in ICP in response to a change in intracranial volume. Normally small increases in volume of one component are initially well compensated. A point is eventually reached, however at which further increases produce precipitous rises in ICP.

The slope of the curve is dependent on which intracranial constituent is increasing. If it is blood or CSF, both of which are poorly compressible, then the slope is steeper. If it is brain tissue, such as from a tumour, the curve is less steep as the tissue is compressible.

Constituents within the skull include the brain (80%/1400ml), blood (10%/150ml) and cerebrospinal fluid (CSF 10%/150ml).

The skull is a rigid box so if one of the three components increases in volume, then there must be compensation by a decrease in the volume of one or more of the remaining components otherwise the ICP will increase (Monro-Kellie hypothesis).
The oxy-hemoglobin dissociation curve relates oxygen saturation (SO2) and partial pressure of oxygen in the blood (PO2), and is determined by what is called "hemoglobin's affinity for oxygen, is a sigmoid shape curve.

Try again
Stroke volume depends on preload, contractility and after load. The above curve does not depict the relationship between preload and stroke volume.

Try again
This choice is incorrect. This is not a curve depicting systemic arterial blood pressure and cerebral blood flow.
4. Which of the following statements concerning brain stem auditory evoked responses is true?

Please click on answer choices

A. They monitor cortical function
B. They are affected by changes in \( \text{paCO}_2 \)
C. They are affected by mild hypothermia
D. They are more resistant to anesthetic effects than somatosensory evoked responses
E. They are abolished coincident with flattening of the EEG.

go to Q 5
Cortical function is monitored by SSEPs and EEG. Auditory evoked potentials do not monitor cortical function.

This answer is incorrect

Try again
Low PaCO2 and mild hypothermia affect SSEP. Auditory evoked potentials are quite resistant to changes in the above parameters.

The answer is incorrect
Brainstem auditory evoked potentials are delivered by repetitive clicks using foam ear inserts attached to stimulus transducers. Cases in which they are commonly monitored include microvascular decompression of cranial nerves (V and VII), resection of acoustic neuroma, posterior fossa exploration, clipping of basilar artery aneurysm.

The most common change observed during monitoring is an increase in I-V inter peak latency and loss of amplitude of wave V. The most common change is usually due to stretch of cranial nerve 8, due to cerebellar retraction. Other causes could be due to sectioning of the nerve, ischemia to the nerve, cerebellar edema or positioning of the head in retromastoid craniotomy, hypotension, hypocarbia.

BAEPs are considered the easiest of the somatosensory evoked potentials to monitor and are least sensitive to changes in preoperative variables. Unlike SSEPs, BAEPs are resistant to the effects of inhalation and intravenous agents and any changes would not be confused with surgically induced changes.

EEG is sensitive to high doses of volatile anesthetics however auditory evoked potentials are quite resistant.

Try again
5. A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl and isoflurane. The most likely cause of this response is

Please click on answer choices

A. Release of histamine
B. Stimulation of carotid sinus
C. Release of prostaglandins
D. Vagal response to peritoneal traction
E. Release of epinephrine
5. A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl and isoflurane. The most likely cause of this response is

Release of histamine can cause facial flushing but unlikely to cause bradycardia and could cause tachycardia and hypotension.

Incorrect

Try again
Autonomic hyperreflexia is a syndrome of vascular instability commonly bradycardia, hypertension, facial flushing occurring after spinal cord injury usually above T7. The trigger to this response is usually a cutaneous, proprioceptive or visceral stimulus (full bladder, surgical stimulation as in the above case).

The sensation enters the spinal cord and causes a spinal reflex, which in normal persons is inhibited from above. Sudden increases in blood pressure are sensed in the pressure receptors of the aorta and carotid sinus. The resultant vagal hyperactivity produces bradycardia, ventricular ectopy and heart block. Reflex vasodilation occurring above the level of the lesion may lead to flushing of the head and neck.

Treatment of autonomic reflexia is with ganglion blocking drugs like trimethaphan, alpha adrenergic blocking drugs like phentolamine, vasodilators like nitroprusside or nitroglycerin, deep general or regional anesthesia. Patients with autonomic hyperreflexia should not be treated with beta blockers alone leaving the alpha receptors unopposed.

Ref: Miller’s textbook of anesthesia, ed 6, pp 1044, Barash clinical anesthesia, ed 4, pp 1109-1110
A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl and isoflurane. The most likely cause of this response is...
5. A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl and isoflurane. The most likely cause of this response is

- Vagal response to peritoneal traction can cause bradycardia or even systole, unlikely to be the cause in this situation.
5. A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl and isoflurane. The most likely cause of this response is

Release of epinephrine is unlikely in this situation. It is unlikely to cause bradycardia.

Incorrect

Try again