

Neuro-Musculo-Skeletal Disorders

NeuroAnesthesia Quiz # 72

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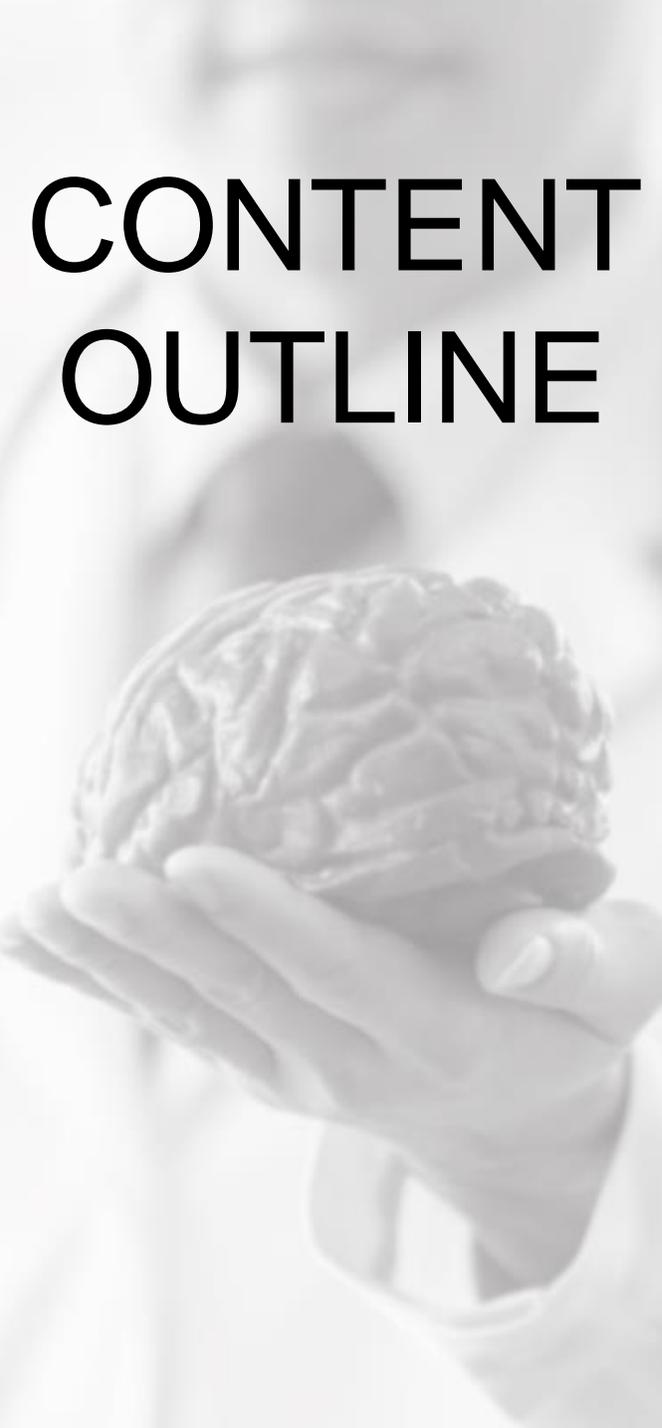
Quiz Team

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CONTENT OUTLINE



Please click on any of the following links to proceed to that question/topic.

Question 1: [Neuroanesthesia and co-existing disorders](#)

Question 2: [Neuromuscular diseases and cardiac involvements](#)

Question 3: [Medication/substance withdrawal](#)

Question 4: [Medication side effects](#)

Question 5: [Perioperative management](#)

QUESTION 1

Which of the following statements regarding co-existing disorder is **FALSE**?

Please click on any of the following links to proceed to that question/topic.

A. [Possible presence of pheochromocytoma should be considered in patients with neurofibromatosis 1](#)

B. [Latex hypersensitivity is unlikely in patients with spinal cord injury](#)

C. [Patients with Lambert-Eaton syndrome may have associated small cell lung cancer](#)

D. [Complicating autoimmune disease may be associated with myasthenia gravis](#)

Sorry! Incorrect.

EXPLANATION

A. Possible presence of pheochromocytoma should be considered in patients with neurofibromatosis 1

- ❑ Neurofibromatosis type 1 (NF1) is a neurocutaneous syndrome that always involves the skin, and also occurs in the deeper peripheral nerves/nerve roots and in or on viscera or blood vessels innervated by the autonomic nervous system. Other neoplasia observed in NF1 include pilocytic astrocytoma, gastrointestinal stromal tumors, pheochromocytomas and juvenile myelomonocytic leukemia. During the preoperative evaluation, the possible presence of pheochromocytoma should be considered.

Rosenbaum T, et al. Neurofibromatosis type 1 (NF1) and associated tumors. Klin Padiatr 2014 Nov; 226(6-7):309-15.

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Great Job!! Correct.



EXPLANATION

B. Latex hypersensitivity is unlikely in patients with spinal cord injury

Latex allergy is a well-known complication of repeated exposure to natural rubber latex (NRL) products. Patients with spinal cord injury have significantly higher NRL exposure secondary to long-term indwelling urinary catheter and multiple surgeries, thus are at risk of developing latex allergy.

Monasterio EA, et al. Latex allergy in adults with spinal cord injury: a pilot investigation. J Spinal Cord Med 2000; 23(1):6-9.

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EXPLANATION

C. Patients with Lambert-Eaton syndrome may have associated small cell lung cancer

- Lambert-Eaton syndrome is a rare autoimmune disorder with abnormal production of antibody against presynaptic calcium channels located on cholinergic neurons. As a result of calcium channel blockade and subsequent decreased acetylcholine released at the neuromuscular junction, skeletal muscle weakness will occur. Up to 60% of cases occur as a paraneoplastic disorder, most commonly in association with small cell lung cancer.

Schoser B, et al. Lambert-Eaton myasthenic syndrome (LEMS): a rare autoimmune presynaptic disorder often associated with cancer. J Neurol 2017 Sep; 264(9):1854-1863.

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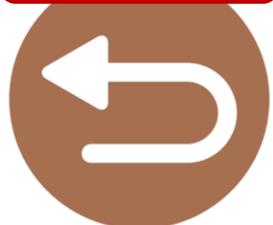
EXPLANATION

D. Complicating autoimmune disease may be associated with myasthenia gravis

Myasthenia gravis (MG) is a chronic autoimmune disorder caused by a decrease in functional acetylcholine receptors at the neuromuscular junction due to their destruction or inactivation by abnormal circulating antibodies. Patients with MG have an increased risk for complicating autoimmune diseases, most commonly autoimmune thyroid disease, systemic lupus erythematosus and rheumatoid arthritis.

Nacu A, et al. Complicating autoimmune diseases in myasthenia gravis: a review. Autoimmunity 2015; 48(6):362-8.

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QUESTION 2

Which of the following statements regarding cardiac involvement in patients with neuromuscular disease is **FALSE**?

Please click on any of the following links to proceed to that question/topic.

A. [Cardiac muscle is rarely affected in patients with Duchenne's muscular dystrophy](#)

B. [Cardiac conduction defects may be present in patients with myotonic dystrophy](#)

C. [Cardiac rhabdomyoma may be present in patients with tuberous sclerosis](#)

D. [Aortic regurgitation may be present in patients with ankylosing spondylitis](#)

Great Job!! Correct.



EXPLANATION

A. Cardiac muscle is rarely affected in patients with Duchenne's muscular dystrophy

- ❑ Degeneration of cardiac muscle invariably accompanies Duchenne's muscular dystrophy. With increased longevity, the clinical relevance of heart disease in Duchenne's muscular dystrophy is growing, as virtually all patients over 18 year of age display signs of cardiomyopathy. Both systolic and diastolic dysfunction may develop as the disease progresses. Heart rhythm abnormalities are also present in a significant portion of patients.

Meyers TA, et al. Cardiac Pathophysiology and the Future of Cardiac Therapies in Duchenne Muscular Dystrophy. Int J Mol Sci 2019 Aug 22; 20(17):4098.

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EXPLANATION

B. Cardiac conduction defects may be present in patients with myotonic dystrophy

- ❑ In patients with myotonic dystrophy, cardiac manifestations may arise as a result of myocardial fatty infiltration, degeneration and fibrosis and present most commonly as arrhythmias or conduction defects. First-degree AV block is common, prophylactic pacemaker placement is recommended even in those with minimal conduction abnormality. Reports of sudden death may reflect the development of complete heart block.

Khalighi K, et al. Cardiac involvement in myotonic dystrophy. J Community Hosp Intern Med Perspect 2015 Feb 3; 5(1):25319.

Wahbi K, et al. Incidence and predictors of sudden death, major conduction defects and sustained ventricular tachyarrhythmias in 1388 patients with myotonic dystrophy type 1. Eur Heart J 2017 Mar 7; 38(10):751-758.

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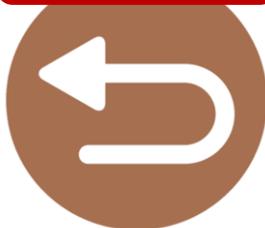
EXPLANATION

C. Cardiac rhabdomyoma may be present in patients with tuberous sclerosis

- Tuberous sclerosis complex is a genetic disorder characterized by the growth of numerous noncancerous tumors in skin, brain, heart and other vital organs. Cardiac rhabdomyoma, although rare, is the most common benign cardiac tumor associated with tuberous sclerosis. Both echocardiography and MRI are useful for detecting cardiac tumors. Surgical resection may be needed in case of significant hemodynamic compromise.

Shen Q, et al. Cardiac rhabdomyomas associated with tuberous sclerosis complex in children. From presentation to outcome. Herz 2015 Jun; 40(4):675-8.

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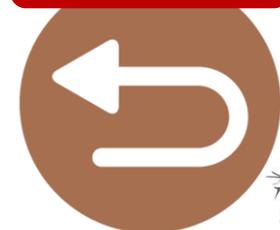
EXPLANATION

D. Aortic regurgitation may be present in patients with ankylosing spondylitis

- In patients with ankylosing spondylitis, other extra-articular systems (ophthalmologic, cardiac, pulmonary and neurologic system) are also affected. Left ventricular dysfunction, aortitis, aortic regurgitation, pericarditis and cardiomegaly have been reported in 2-10% of all patients.
- About 30% of patients also experience anterior uveitis (eye pain, redness, and blurred vision). Lung involvement is characterized by progressive fibrosis of the upper portion of the lung.

Ozkan Y, et al. Cardiac Involvement in Ankylosing Spondylitis. J Clin Med Res 2016 Jun; 8(6):427-30.

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QUESTION 3

A 53-year-old male, with history of muscle spasticity, chronic pain, alcohol and opioid abuse, is hospitalized for malfunctioning intrathecal baclofen pump. Which of the following statements regarding medication or substance withdrawal is **TRUE**?

Please click on any of the following links to proceed to that question/topic.

A. [Oral baclofen is adequately effective in treating intrathecal baclofen withdrawal](#)

B. [Delirium tremens usually occurs two weeks after the cessation of alcohol ingestion](#)

C. [Clonidine is contraindicated in management of opioid withdrawal](#)

D. [Baclofen withdrawal may lead to seizure activity](#)

Sorry! Incorrect.

EXPLANATION

A. Oral baclofen is adequately effective in treating intrathecal baclofen withdrawal

- Intrathecal baclofen is commonly used in treating severe muscle spasticity. Abrupt cessation of intrathecal baclofen therapy may result in withdrawal symptoms including seizures and hemodynamic instability. Oral baclofen as a rescue medication is often not effective as it does not effectively cross blood–brain barrier to achieve high enough CSF levels. The vast difference in bioavailability of oral doses and intrathecal doses makes equivalent oral doses impossible to achieve without causing cardiopulmonary collapse. Patients may require a CSF injection of baclofen while pump/catheter malfunction is investigated.

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Watve SV, et al. Management of acute overdose or withdrawal state in intrathecal baclofen therapy. Spinal Cord 2012 50:107–111

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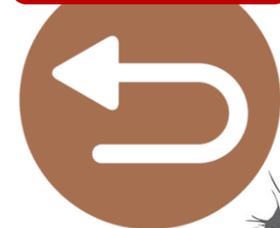
EXPLANATION

B. Delirium tremens usually occurs two weeks after the cessation of alcohol ingestion

Delirium tremens usually occurs 2 to 4 days after the cessation of alcohol ingestion, manifesting as hallucinations, combativeness, hyperthermia, tachycardia, hypertension or hypotension, and grand mal seizures.

Hines RL, Marschall KE, eds. Stoelting's Anesthesia and Co-Existing Disease. 5th ed. Philadelphia, PA: Churchill Livingstone; 2008:543.

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EXPLANATION

C. Clonidine is contraindicated in management of opioid withdrawal

- Clonidine is not contraindicated, in fact it is frequently used in management of opioid withdrawal. Opioid withdrawal symptoms often include manifestations of excess sympathetic nervous system activity (diaphoresis, mydriasis, hypertension, tachycardia). Clonidine, as an alpha-2 adrenergic agonist, has been reported to attenuate opioid withdrawal symptoms (presumably by replacing opioid-mediated inhibition with alpha2-agonist-mediated inhibition of the sympathetic nervous system in the brain). A patient's blood pressure and heart rate should be monitored during clonidine therapy.

Gowing L, et al. *Alpha₂-adrenergic agonists for the management of opioid withdrawal*. *Cochrane Database Syst Rev* 2016 May 3 (5):CD00202

Hines RL, Marschall KE, eds. *Stoelting's Anesthesia and Co-Existing Disease*. 5th ed. Philadelphia, PA: Churchill Livingstone; 2008:545.

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Great Job!! Correct.



EXPLANATION

- D. Baclofen withdrawal may lead to seizure activity
- ❑ Baclofen is a Gamma-Aminobutyric Acid (GABA) analog and is a useful modality for treating spasticity. Abrupt cessation of baclofen therapy may result in seizures. Benzodiazepines also facilitate the inhibitory effects of GABA, can help in management of baclofen withdrawal.

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QUESTION 4

A 38-year-old male with history of seizure, chronic pain and depression undergoes a vagus nerve stimulator (VNS) implantation. His home medications include phenytoin, carbamazepine, amitriptyline, fluoxetine, fentanyl patch and tramadol. Which of the following statements regarding side effects of his home medication is **FALSE**?

Please click on any of the following links to proceed to that question/topic.

A. [Phenytoin may cause cardiac arrhythmias and hypotension](#)

B. [Tricyclic antidepressants may contribute to seizure activity](#)

C. [Opiates will not contribute to serotonin syndrome in patients receiving SSRI antidepressants](#)

D. [Adverse hematologic reactions may be associated with antiepileptic drugs therapy](#)

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EXPLANATION

A. Phenytoin may cause cardiac arrhythmias and hypotension

- Phenytoin is an anticonvulsant which is also a Class IB antiarrhythmic. Cardiac arrhythmias and hypotension may occur following rapid intravenous fusion of phenytoin. For elderly patients and patients with cardiovascular co-morbidities, a slower infusion rate is recommended with careful monitoring heart rhythm and blood pressure.

Mathews SR, et al. Phenytoin-induced bradycardia and hypotension. Indian J Pharmacol 2019 51(2):120-122.

Guldiken B, et al. Cardiovascular adverse effects of phenytoin. J Neurol 2016 May;263(5):861-870.

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EXPLANATION

B. Tricyclic antidepressant may contribute to seizure activity

- ❑ Tricyclic antidepressants (TCAs) are thought to affect depression by inhibiting synaptic reuptake of norepinephrine and serotonin and lead to increased availability of neurotransmitters in the central nervous system. TCAs also affect histaminergic and cholinergic systems. Seizure activity has been reported in patients receiving TCAs therapy.

Preskorn SH, et al. Tricyclic antidepressant-induced seizures and plasma drug concentration. J Clin Psychiatry 1992 May;53(5):160-162.

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Great Job!! Correct.



EXPLANATION

C. Opiates will not contribute to serotonin syndrome in patients receiving SSRI antidepressants

- ❑ Serotonin syndrome may occur with therapeutic drug use, overdose, or interaction between serotonergic drugs. A large number of drugs, including selective serotonin reuptake inhibitors (SSRIs), atypical and cyclic antidepressants, monoamine oxidase inhibitors (MAOIs), analgesics (e.g., meperidine, fentanyl, tramadol) have been associated with the serotonin syndrome.

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Hines RL, Marschall KE, eds. Stoelting's Anesthesia and Co-Existing Disease. 5th ed. Philadelphia, PA: Churchill Livingstone; 2008:535.

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EXPLANATION

D. Adverse hematologic reactions may be associated with antiepileptic drugs therapy

- ❑ Some antiepileptic drugs are associated with adverse hematologic reactions that range from mild thrombocytopenia or neutropenia to anemia, red cell aplasia, until bone marrow failure. Fortunately, severe hematologic disorders such as aplastic anemia are very rare. Perioperative hematological monitoring is needed especially using carbamazepine, phenytoin and valproic acid.

Verrotti A, et al. Anticonvulsant drugs and hematological disease. *Neurol Sci* 2014 Jul;35(7):983-93.

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QUESTION 5

Which of the following statements is **FALSE**?

Please click on any of the following links to proceed to that question/topic.

A. [Neostigmine should be avoided as a reversal of nondepolarizing neuromuscular blockade in patients with myotonic dystrophy](#)

B. [Arterial puncture may lead to significant hematoma in patients with Ehlers-Danlos syndromes](#)

C. [Patients with myasthenia gravis are more sensitive to succinylcholine](#)

D. [The risk of relapse in multiple sclerosis decreases during pregnancy](#)

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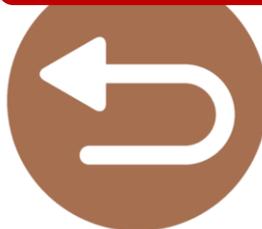
EXPLANATION

A. Neostigmine should be avoided as a reversal of nondepolarizing neuromuscular blockade in patients with myotonic dystrophy

❑ In patients with myotonic dystrophy, reversal of neuromuscular blockade with agents that inhibit acetylcholinesterase (neostigmine) may precipitate myotonia, and is therefore relatively contraindicated. Careful titration of short-acting neuromuscular blockade may obviate the need for reversal with neostigmine. There are some cases report that sugammadex provides a means of reversing neuromuscular blockade without exacerbating myotonia.

Ahmed S, et al. Use of Sugammadex in a Patient with Myotonic Dystrophy. Cardiol Res. 2018 Feb; 9(1): 50–52.

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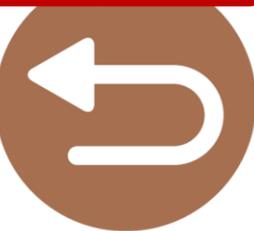
EXPLANATION

B. Arterial puncture may lead to significant hematoma in patients with Ehlers-Danlos syndromes

- ❑ Ehlers-Danlos syndromes represent a group of connective tissue disorders associated with fragile skin, easy bruising, and joint hypermobility. The vasculature is particularly well endowed with type III collagen, accounting for complications such as excessive bleeding even spontaneous rupture of major arteries. Caution should be taken in attempting an arterial or central line as any hematoma formation could be extensive.

Hines RL, Marschall KE, eds. Stoelting's Anesthesia and Co-Existing Disease. 5th ed. Philadelphia, PA: Churchill Livingstone; 2008:444.

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Great Job!! Correct.



EXPLANATION

C. Patients with myasthenia gravis are more sensitive to succinylcholine

- ❑ In contrast to marked sensitivity to nondepolarizing muscle relaxants, patients with myasthenia gravis may exhibit the resistance to succinylcholine. The mechanism for the resistance to succinylcholine is not completely understood, but the decreased number of acetylcholine receptors at the postsynaptic neuromuscular junction may play a role.

Eisenkraft JB, et al. Resistance to succinylcholine in myasthenia gravis: a dose-response study. Anesthesiology 1988 Nov;69(5):760-3.

Hines RL, Marschall KE, eds. Stoelting's Anesthesia and Co-Existing Disease. 5th ed. Philadelphia, PA: Churchill Livingstone; 2008:453.

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EXPLANATION

D. The risk of relapse in multiple sclerosis decreases during pregnancy

- ❑ Multiple sclerosis (MS) commonly affects women in childbearing years. Pregnancy is a naturally occurring disease modifier of MS associated with a 70% reduction in relapse rates in the third trimester, which is roughly equal to the most effective disease-modifying treatments for MS. Given this efficacy, various pregnancy factors have been tested to determine which plays a part in pregnancy's protection, and some have been translated to completed or ongoing phase II clinical trials. However, in contrast to protective effects during pregnancy, the postpartum period entails increased relapse risk.

Voskuhl R, et al. *Pregnancy: Effect on Multiple Sclerosis, Treatment Considerations, and Breastfeeding. Neurotherapeutics.* 2017 Oct;14(4):974-984.

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