

Complications of Pituitary surgery

Neuroanesthesia Quiz 74

Quiz Team

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CONTENT OUTLINE

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

Question 1: Hypoxia in Cushing's

Question 2: Coagulopathy in Cushing's

Question 3: Coagulopathy in Acromegaly

Question 4: Abdominal complications in Cushing's

Question 5: Visual loss after pituitary surgery

QUESTION 1

A 52-year-old female with Cushing's disease is scheduled for urgent transsphenoidal pituitary resection. She becomes severely hypoxic after intubation. All are possible causes of hypoxia, EXCEPT?

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

A: [Pulmonary embolism](#)

B: [Hypertension](#)

C: [Right to left shunt](#)

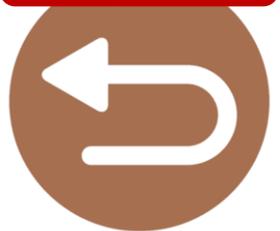
D: [Right heart failure](#)

Sorry! Incorrect.

EXPLANATION

- This is a possibility, hence incorrect.
- Patients with Cushing's have 4 - fold higher risk of PE/thromboembolic events. The increased levels of cortisol increases the synthesis of fibrinogen, Von Willebrand Factor and plasminogen activator type I. Venous thromboembolic events are common and can present as DVT/PE. Pulmonary embolism can be overlooked in the preoperative period and have exaggerated effect under anesthesia.
- Wagner J, Langlois F, Lim DST, McCartney S, Fleseriu M. Hypercoagulability and Risk of Venous Thromboembolic Events in Endogenous Cushing's Syndrome: A Systematic Meta-Analysis. Front Endocrinol (Lausanne). 2019;9:805

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Great Job!! Correct.

EXPLANATION

- This is correct as hypertension is NOT a reason of hypoxia in CD. Patients with Cushing's present with hypercortisolism related hypertension, truncal obesity, impaired glucose intolerance.

Sharma ST, Nieman LK, Feelders RA. Cushing's syndrome: epidemiology and developments in disease management. Clin Epidemiol. 2015;7:281–93

Next Question 

Sorry! Incorrect.

EXPLANATION

- This response is incorrect.
- Patients with PFO/ right to left shunt can become persistently hypoxic intraoperatively in the setting of hypercarbia, hypoxia, acidosis or PE. The RA pressure increases more than the left atrium with opening of the PFO and the flow of desaturated blood causes hypoxemia. It can be diagnosed intraoperatively by TEE.

Silvestry FE, Cohen MS, Armsby LB, et al. Guidelines for the echocardiographic assessment of atrial septal defect and patent foramen ovale: from the american society of echocardiography and society for cardiac angiography and interventions. J. Am. Soc. Echocardiogr. 2015;28(8):910-958. doi:10.1016/j.echo.2015.05.015

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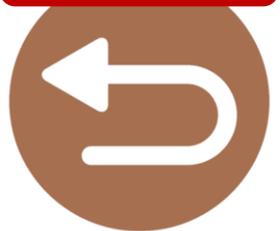
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EXPLANATION

- This response is incorrect.
- Patients with pituitary apoplexy/ intracranial hemorrhage, can present with MI, right heart failure and subsequent pulmonary edema leading to hypoxia. This could be exaggerated with the presence of Right-to-Left shunt.

Morris AL, Donen N. Hypoxia and Intracardiac Right-to-Left Shunt: Complicating Inferior Myocardial Infarction With Right Ventricular Extension. *Arch Intern Med.* 1978;138(9):1405–1406. doi:10.1001/archinte.1978.03630340075024

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QUESTION 2

2. Which of the following statements regarding Cushing's syndrome is **False**?

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

A: [Cerebrovascular incidents are common in Cushing's syndrome](#)

B: [Postoperative abdominal complications may contribute to increased morbidity and mortality](#)

C: [Prophylaxis with anticoagulants rarely help with the thromboembolism in Cushing's Syndrome](#)

D: [Reduction in cortisol may not reduce the thromboembolic phenomenon](#)

Sorry! Incorrect.

EXPLANATION

This is a true statement.

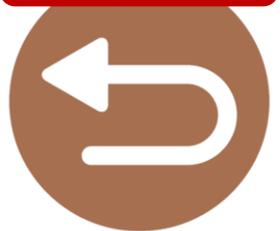
Cerebrovascular accidents are common in patients with Cushing's Syndrome secondary to the procoagulant state and metabolic derangements. Patients carry a high risk of stroke long term. Vascular disease is the most common cause of mortality in CS.

MarcAntonio et al. JAMA. 1994;272:1518–1522

Chaiwat O et al. BMC Anesthesiol.2019;19:39.

Man-Ling Wang et al. DOI: 10.1213/ANE.00000000000005482

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Sorry! Incorrect.

EXPLANATION

This is a True statement.

Postoperative abdominal symptoms are usually masked in patient with high cortisol levels. The abdominal complications like- intestinal perforation, usually occur in the hypercortisolism phase and are not detected until quite late in the postoperative phase.

Shahidi M, Phillips RA, Chik CL. Intestinal Perforation in ACTH-Dependent Cushing's Syndrome. *BioMed Res Int.* 2019;2019:9721781

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Great Job!! Correct.

EXPLANATION

This is a False statement.

- The Endocrine Society Clinical Practice guidelines suggests that, as the risk of thrombo-embolism is highest in the first 4 weeks after surgery, due to worsening of the clotting profile, perioperative anticoagulation treatment may be considered. The treatment should be individualized with careful monitoring.
- In a retrospective analysis of 313 patients with CS, it was found that, before the introduction of prophylactic anti-coagulation, 10% of patients with CS died due to thrombo-embolism and 10% had vascular morbidity, while the introduction of prophylactic anticoagulation reduced the morbidity due to thromboembolic events to 6% and mortality to 0.4%

Boscaro M, Sonino N, Scarda A, Barzon L, Fallo F, Sartori MT, et al. Anticoagulant prophylaxis markedly reduces thromboembolic complications in Cushing's syndrome. *J Clin Endocrinol Metab.* 2002;87:3662–6.

Wagner J, Langlois F, Lim DST, McCartney S, Fleseriu M. Hypercoagulability and Risk of Venous Thromboembolic Events in Endogenous Cushing's Syndrome: A Systematic Meta-Analysis. *Front Endocrinol (Lausanne).* 2019;9:805

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Sorry! Incorrect.

EXPLANATION

This is a true statement.

The proinflammatory properties of chronic excess glucocorticoids contribute to the development of metabolic and cardiovascular disease in Cushing's disease characterized by insulin resistance and obesity. The inflammatory markers - plasma levels of IL-6 and IL-1 β remained elevated in the postoperative period contributing to the increased thromboembolism and cardiovascular mortality

Shah, N. *et al.* Pro-inflammatory cytokines remain elevated despite long-term remission in Cushing's disease: a prospective study. *Clin. Endocrinol. (Oxf.)*

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QUESTION 3

Which of the following statements regarding Acromegaly patients is **FALSE**?

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

A: [Acromegalic patients are hypercoagulable](#)

B: [Malignancies in acromegalic patient increase their chance of VTE](#)

C: [Sleep apnea may contribute to VTE](#)

D: [Controlled acromegalic patients still have high risk of VTE](#)

Sorry! Incorrect.

EXPLANATION

This is True

Hypercoagulability is an important and under-recognized complication of acromegaly and can result in serious consequences. High calcium along with increased S. fibrinogen, low levels of Protein C and S and increased platelet aggregation contribute to the hypercoagulable state.

Al Dahmani K, Yip C, Anderson D et al: Is acromegaly a hypercoagulable condition? Case reports and review of the literature. J Cancer Allied Spec, 2015; 1(1): 6

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Sorry! Incorrect.

EXPLANATION

This is True

Patients with acromegaly are at a higher risk of developing certain malignancies like- colon, renal and thyroid which could also contribute to a hypercoagulable state.

Elarabi A.M. et al.: Acromegaly related hypercoagulability © Am J Case Rep, 2018; 19: 1541-1545

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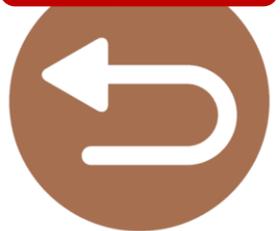
EXPLANATION

This is True

Current epidemiological evidence supports the hypothesis that obstructive sleep apnea may be an independent risk factor for VTE. Research suggests that hypoxemia experienced by patients during apneic episodes, triggers the release of inflammatory factors causing increased fibrinogen, increased platelet aggregation, resulting in increased blood coagulability

Liak C, Fitzpatrick M. Coagulability in obstructive sleep apnea.
Can Respir J. 2011 Nov-Dec;18(6):338-48.

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Great Job!! Correct.

EXPLANATION

- This is False
- All or most VTE tend to occur in an uncontrolled acromegalic patient. Following medical or surgical therapy the levels of the serum coagulants tend to decline. There is a decrease in hyperfibrinogenemia and all the markers point to biochemical remission, hence decreasing the risk of VTE.

Landin-Wilhelmsen K, Tengborn L, Wilhelmsen L, Bengtsson BA: Elevated fibrinogen levels decrease following the treatment of acromegaly. Clin Endocrinol, (Oxf), 1997; 46(1): 69–74 .

Next Question 

QUESTION 4

4. A 62 y/o patient developed bowel perforation on postop day 7 after a transsphenoidal pituitary resection for Cushing's Disease. All could be possible causes **EXCEPT**:

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

A: [Ischemic colitis](#)

B: [Use of Calcium channel blockers](#)

C: [Chronic hypercortisolism](#)

D: [Use of Opioids](#)

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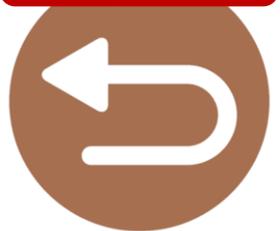
EXPLANATION

This is possible.

Patients with Cushing's can develop intestinal perforation peri-operatively secondary to ischemic colitis caused by thromboembolism. The diagnosis can be delayed due to masking of the typical symptoms of bowel perforation.

Wijewickrama et al. BMC Endocrine Disorders
(2021) 21:29

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Great Job!! Correct.

EXPLANATION

- This is not a possible cause.
- Usually, Intestinal perforation occurs due to high intracolonic pressure and disruption of the intestinal mucosa. Calcium channel blockers may reduce the intracolonic pressure by decreasing the duration of and weakening the strength of the contractions, hence would not be the cause.

Shahidi M, Phillips RA, Chik CL. Intestinal Perforation in ACTH-Dependent Cushing's Syndrome. Biomed Res Int. 2019 Mar 13;2019:9721781.

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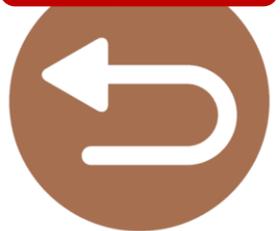
EXPLANATION

This is possible.

Patients with chronic Cushing's disease with prolonged high cortisol levels are prone to intestinal perforation secondary to reduced collagen turnover leading to weakened colonic wall integrity, reduction of prostacyclin formation and impaired wound healing. The immunosuppressive effects of hypercortisolism, whether endogenous or exogenous, may contribute to initial lack of containment of a perforation and impaired healing.

Shahidi M, Phillips RA, Chik CL. Intestinal Perforation in ACTH-Dependent Cushing's Syndrome. Biomed Res Int. 2019 Mar 13;2019:9721781

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Sorry! Incorrect.

EXPLANATION

This is possible.

Opioids may decrease the transit time and increase colonic pressure in the postoperative period and may be a contributing factor for bowel perforation in a compromised bowel due to hypercortisolism.

Shahidi M, Phillips RA, Chik CL. Intestinal Perforation in ACTH-Dependent Cushing's Syndrome. Biomed Res Int. 2019 Mar 13;2019:9721781

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QUESTION 5

All are causes of visual loss postoperatively after a redo transsphenoidal resection of a malignant pituitary tumor, **EXCEPT:**

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

A: [Overpacking of the Sella](#)

B: [Postoperative hemorrhage](#)

C: [Cerebral vasospasm](#)

D: [Early empty Sella syndrome.](#)

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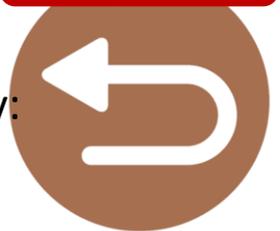
EXPLANATION

This is True

The optic nerve is especially susceptible at the proximal opening of the optic canal, where the overlying dura forms the falciform process. Physical deformation of the optic canal and subsequent optic nerve compression may lead to ischemic injury. Overpacking of the Sella during the reconstruction of the skull base can cause visual changes/loss. Prompt decompression with high-dose steroids may reverse the visual loss.

Matthew S Agam, BS, Gabriel Zada, MD, Complications Associated With Transsphenoidal Pituitary Surgery: Review of the Literature, *Neurosurgery*, Volume 65, Issue CN_suppl_1, September 2018, Pages 69–73

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Sorry! Incorrect.

EXPLANATION

This is True

Post-operative hemorrhage can occur secondary to traumatic injury to the orbit during surgery . This could lead to orbital compartment syndrome and potential visual loss. Prompt evacuation of hematoma may reverse the changes.

Matthew S Agam, BS, Gabriel Zada, MD, Complications Associated With Transsphenoidal Pituitary Surgery: Review of the Literature, Neurosurgery, Volume 65, Issue CN_suppl_1, September 2018, Pages 69–73

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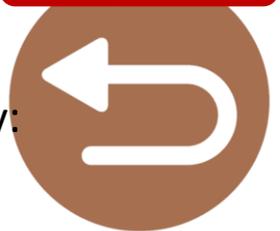
EXPLANATION

This is True

Cerebral vasospasm is an infrequent cause of visual loss secondary to prolonged manipulation/traction of the superior hypophyseal artery.

Matthew S Agam, BS, Gabriel Zada, MD, Complications Associated With Transsphenoidal Pituitary Surgery: Review of the Literature, Neurosurgery, Volume 65, Issue CN_suppl_1, September 2018, Pages 69–73

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Great Job!! Correct.

EXPLANATION

- This is False
- Empty Sella syndrome can cause traction on the empty chiasm secondary to peri chiasmal scarring and lead to visual deterioration. But this is a delayed phenomenon and usually occurs months or years after pituitary surgery

Thomé, C., Zevgaridis, D. Delayed visual deterioration after pituitary surgery – a review introducing the concept of vascular compression of the optic pathways. *Acta Neurochir* **146**, 1131–1136 (2004)

End of set

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