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Transsphenoidal Surgery for Pituitary Tumor

NeuroAnesthesia Quiz # 68

Start

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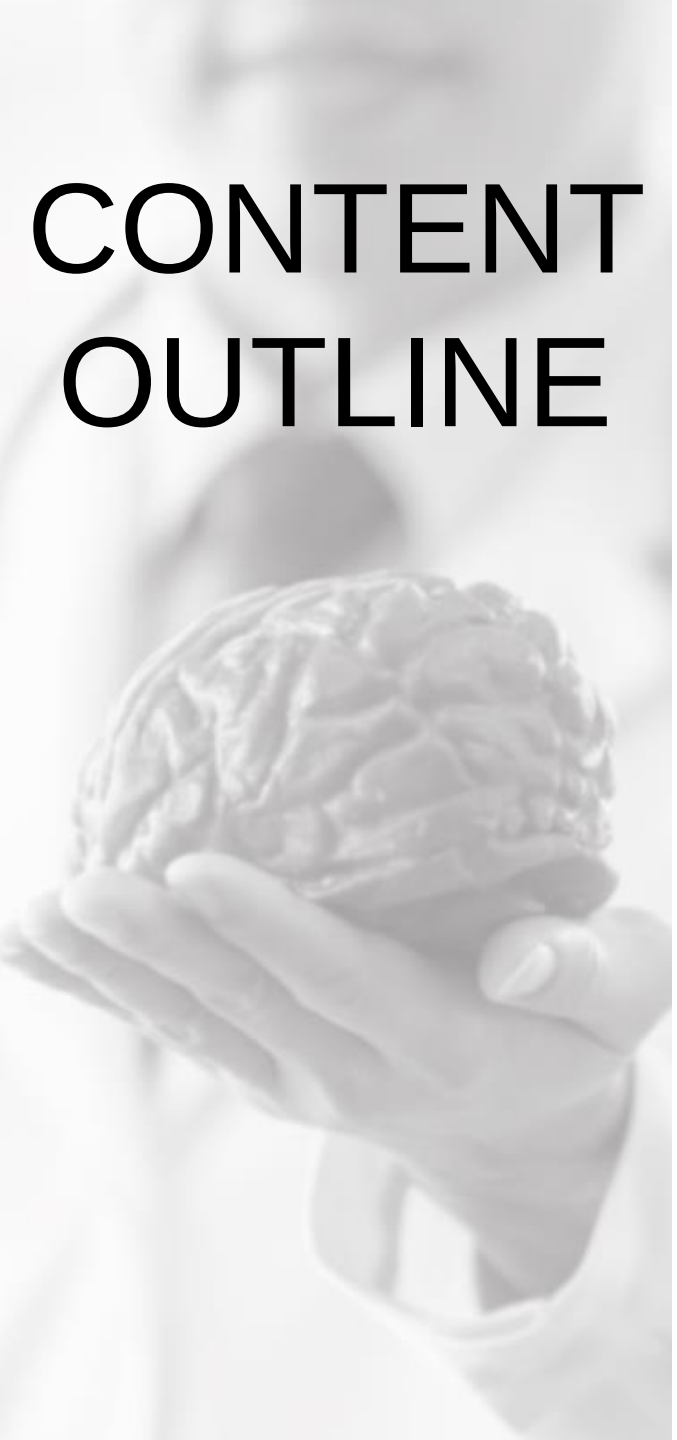

CONTENT OUTLINE

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

Question 1: Inadvertent surgical trauma

Question 2: Prevention of blood accumulation in airway and stomach

Question 3: Intraoperative management

Question 4: Post-extubation airway management

Question 5: Differential diagnosis of polyuria

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QUESTION 1

Due to the anatomical boundaries encountered during transsphenoidal pituitary surgery (TPS), the following surgical complications may occur **EXCEPT**:

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

A. Inadvertent entry into cavernous sinus

B. Hypoglossal nerve injury

C. Nasal septum perforation

D. Internal carotid artery injury

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Sorry! Incorrect.

EXPLANATION

A. Inadvertent entry into cavernous sinus

- Cavernous sinus, which is part of the brain's dural venous sinuses, surrounds the sella turcica laterally on both sides. Internal carotid artery and several cranial nerves pass through cavernous sinus. Vascular and nerve injuries, venous air embolism and pneumocephalus may occur as a result of inadvertent entry into cavernous sinus during TPS.

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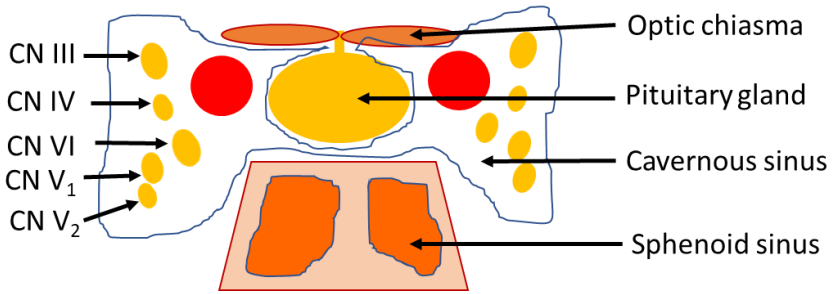
EXPLANATION

B. Hypoglossal nerve injury

- Several cranial nerves (CN III, CN IV, CN V_1, CN V_2, and CN VI) pass through cavernous sinus and are at risk of injury during TPS due to the close proximity to sphenoid bone. However, hypoglossal nerve does not pass through cavernous sinus and would not be at risk of injury during typical TPS.



(Kindly provided by Dr. Verghese T Cherian)

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EXPLANATION

C. Nasal septum perforation

- During TPS, the surgeon places either an operating microscope or a flexible endoscope through the nostril, along with Stealth navigation, to gain access to the sphenoid sinus and sella turcica in order to remove the pituitary tumor. Nasal septum perforation, sinusitis, sinus congestion and sinus headache may occur after surgery.

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EXPLANATION

D. Internal carotid artery injury

- Internal carotid artery passes through cavernous sinus and is at risk of injury and subsequent bleeding and hemorrhagic shock during transsphenoidal surgery.

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QUESTION 2

All of the following are appropriate ways to reduce blood accumulation in oropharyngeal area and stomach during transsphenoidal pituitary surgery (TPS) **EXCEPT**:

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

A. Infiltration of nasal mucosa with epinephrine-containing local anesthetics

B. Placing a pharyngeal pack before surgical incision

C. Placing a nasogastric tube to decompress stomach before emergence

D. Suctioning oropharyngeal area before emergence

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EXPLANATION

A. Infiltration of nasal mucosa with epinephrine-containing local anesthetics

- During TPS, in order to reduce nose bleeding and the intensity of surgical stimulation, the surgeon usually infiltrates the nasal mucosa with vasoconstrictor (such as epinephrine, cocaine or oxymetazoline) and local anesthetics (such as lidocaine).

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EXPLANATION

B. Placing a pharyngeal pack before surgical incision

- During TPS, surgical dissection may lead to accumulation of blood and tissue debris around the pharyngeal area. Therefore, a pharyngeal pack is sometimes placed after endotracheal intubation to limit the filling of stomach with blood and tissue debris, and reduce the likelihood of subsequent nausea, vomiting and aspiration postoperatively.

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EXPLANATION

C. Placing a nasogastric tube to decompress stomach before emergence

- Nasogastric tube placement, which may cause inadvertent trauma to surgical anastomosis and consequent CSF leak, is contraindicated. An orogastric tube may be placed (often by surgeon in many institutions) to decompress a patient's stomach before emergence, although particular attention needs to be paid to avoid the coiling of the tube in the oropharyngeal area or incidentally advancing the tube towards nasopharyngeal area.

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EXPLANATION

D. Suctioning the oropharyngeal area before emergence

- Before emergence from anesthesia, it is critical to thoroughly suction the oropharyngeal area to remove any accumulated blood or tissue debris from surgical dissection, which helps prevent aspiration, coughing, laryngospasm, nausea or vomiting postoperatively.

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QUESTION 3

During transsphenoidal pituitary surgery, which of the following is appropriate?

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

A. Administer dexamethasone routinely for PONV prophylaxis

B. Hyperventilate the patient to facilitate surgical exposure

C. Tape the endotracheal tube at the upper lip close to midline

D. Control blood pressure to reduce intraoperative nose bleeding

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EXPLANATION

A. Administer dexamethasone routinely for PONV prophylaxis

- Dexamethasone should be avoided in Cushing's disease, due to the pre-existing hypercortisolism and the probability of interfering with postoperative endocrinology tests. In non-Cushing's disease, administration of dexamethasone should be always discussed with surgeon before surgery, as a surgeon may have his or her preference as to which patient should receive dexamethasone.

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EXPLANATION

B. Hyperventilate the patient to facilitate surgical exposure

- Controlled hypercapnia has been described as an effective method of temporarily raising ICP to displace the suprasellar portion of a pituitary tumor down into the sella for excision. A target PaCO2 of 40–45mmHg is generally used.

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Korula G, et al. Effect of controlled hypercapnia on cerebrospinal fluid pressure and operating conditions during transsphenoidal operation pituitary macroadenoma. J Neurosurg Anesthesiol 2001 13(3):255-259.

Dunn LK, et al. Anesthesia for transsphenoidal pituitary surgery. Curr Opin Anaesthesiol 2013 26(5):549-554.

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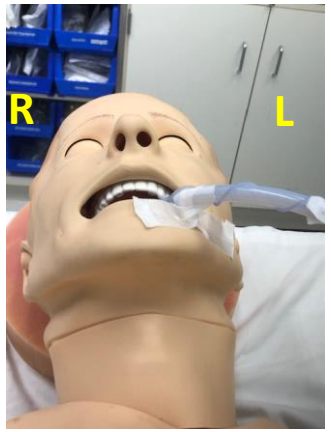
EXPLANATION

C. Tape the endotracheal tube at the upper lip close to midline

- During transsphenoidal pituitary surgery, patient's upper lip should be free for surgical approach. The ETT is usually taped at the lower lip. Depending on whether the surgeon is left- or right-handed, the ETT needs to be positioned to the side opposite to where the surgeon is standing.

Jaffe RA, Samuels SI, eds. Anesthesiologist's Manual of Surgical Procedures. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009:111.



Right-handed surgeon

Left-handed surgeon

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EXPLANATION

D. Control blood pressure to reduce intraoperative nose bleeding

- ❑ Transsphenoidal pituitary surgery (TPS) can be intensely stimulating and thus leads to intraoperative hypertension. Significant hypertension may worsen intraoperative nose bleeding, which subsequently interferes with surgical exposure and visualization under microscope or endoscope during TPS.

Dunn LK, et al. Anesthesia for transsphenoidal pituitary surgery. Curr Opin Anaesthesiol 2013 26(5):549-554.

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QUESTION 4

In PACU, your patient is wearing a face tent with oxygen flow at 10 L/min. He appears drowsy and snores. SaO2 is 91%. Which of the following is appropriate when managing this patient?

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

A. Bag-mask ventilation

B. Place a nasopharyngeal airway

C. Start CPAP

D. Reverse residual narcotics and muscle relaxant, consider placing an oropharyngeal airway

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EXPLANATION

A. Bag-mask ventilation

- In order to reduce the risk of postoperative CSF leak and subsequent meningitis (especially if there has been an intraoperative CSF leak, which is usually resealed with fibrin glue or by packing the sphenoid sinus with fat or muscle), it is essential to avoid any maneuvers that apply positive pressure to the nasopharyngeal airway (such as bag-mask ventilation, CPAP or BiPAP, incentive spirometry).

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EXPLANATION

B. Place a nasopharyngeal airway

- The opening into the sella turcica is usually gently closed with fibrin glue or soft tissues (fat or muscle). Any instrumentations, such as insertion of a nasopharyngeal airway or nasogastric tube, could dislodge the sealing tissues and lead to CSF leak, therefore should be avoided.

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EXPLANATION

C. Start CPAP

- CPAP, which applies positive pressure to the nasopharyngeal airway and thus increases the risk of postoperative CSF leak, should be avoided.

Interestingly, there is a recent case series reports 8 patients had CPAP applied in the immediate postoperative period and the incidence of postoperative CSF leak, infection, and pneumocephalus was similar between OSA patients with and without CPAP. Obviously, more well-designed studies are warranted to establish the safety of CPAP in this population.

Click to Return to Question

Rieley W, et al. Immediate Use of Continuous Positive Airway Pressure in Patients with Obstructive Sleep Apnea Following Transsphenoidal Pituitary Surgery: A Case Series. J Neurosurg Anesthesiol. 2020 Jan;32(1):36-40.

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Great Job!! Correct.

EXPLANATION

D. Reverse residual narcotics and muscle relaxant, consider placing an oropharyngeal airway

- It is paramount to ensure complete reversal of muscle relaxant and judicious use of opioid medication. Airway obstruction can be relieved by using an oropharyngeal airway since the nasal passage may be blocked due to surgical packing.

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QUESTION 5

If your patient has copious urine output at the end of transsphenoidal pituitary surgery (TPS), which of the following should **NOT** be the cause of his or her polyuria?

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

A. Intraoperative IV mannitol administration

B. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

C. Hyperglycemia

D. Perioperative overhydration

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EXPLANATION

A. Intraoperative IV mannitol administration

- If mannitol, an osmotic diuretic, is given during surgery for reducing ICP, polyuria may occur as a result of diuresis.

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EXPLANATION

B. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

- In contrast to Diabetes Insipidus (DI), SIADH leads to reduced urine output instead of higher urine output, because excessive antidiuretic hormone in SIADH causes an inappropriate increase in reabsorption of solute-free water from the kidney.

Sorba EL, et al. Diabetes insipidus and syndrome of inappropriate antidiuresis (SIADH) after pituitary surgery: incidence and risk factors. Neurosurgical Review 2020 Jun 24 Online ahead of print.

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EXPLANATION

C. Hyperglycemia

- Glucose intolerance is common in Cushing's disease and acromegaly. In patients with co-existing DM, close monitoring and treatment of hyperglycemia are critical. Increased urine output may occur as a result of osmotic diuresis from hyperglycemia.

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EXPLANATION

D. Perioperative overhydration

- Perioperative excessive IV fluid administration may contribute to higher urine output. IV fluid overload may lead to cerebral edema and should be avoided.

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