Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Airway obstruction	Respiratory distress OSA	Micrognathia Stridor, retractions	Sleep study CT, MRI
CV	Congenital defects Pulm Htn	 Cyanotic episodes Tachypnea	Murmur Desaturation	ECG ECHO CXR SpO_2
RESP	Hypoxia Aspiration pneumonitis	Tachypnea	Retractions Stridor	SpO_2 CXR
GI	Failure to thrive	Feeding problems GE Reflux	Wt	Weight gain Reflux study
CNS	Hypoxia	Seizures Developmental delay		

Key References: Côté A, Fanous A, Almajed A, et al.: Pierre Robin sequence: review of diagnostic and treatment challenges, *Int J Pediatr Otorhinolaryngol* 79(4):451–454, 2015; Cladis F, Anand K, Grunwaldt L, et al.: Pierre Robin sequence: a perioperative review, *Anesth Analg* 119(2):400–412, 2014.

Perioperative Implications

Preoperative Preparation
- Avoid sedative premedication.
- Consider atropine as antisialagogue and to maintain heart rate.

Monitoring
- Pulse oximeter and precordial stethoscope are important.

Airway
- Intubation may be very difficult.
- Consider awake placement of an LMA or intubation in neonates.
- Airway management and intubation may become easier with age in isolated PRS.

Preinduction/Induction
- Spontaneous ventilation is recommended, usually inhalational induction.
- Consider oral or nasopharyngeal airway if obstruction occurs.
- Have difficult airway cart available, with multiple scopes and light wand.
- Consider use of LMA with fiberoptic bronchoscope and exchange catheter.
- Have surgeon in OR capable of performing rigid bronchoscopy and/or tracheostomy at induction.

Extubation
- Thorough evaluation before postop extubation in the OR. If extubation is chosen, pt must be fully awake and should recover in the ICU.

Adjuvants
- Muscle relaxants, if used, should be administered after intubation and reversed if extubation is planned. Minimize use of opioids intraop unless long-term intubation is planned.

Anticipated Problems/Concerns
- Airway obstruction during all phases of anesthesia is very common. Chronic airway may lead to opioid sensitivity intraop and postop.

Pituitary Tumors

Lauren K. Dunn | Edward C. Nemergut

Risk
- 10% of diagnosed brain neoplasms
- Peak incidence fourth to sixth decade of life

Perioperative Risks
- Related to specific hormone-related effects, including difficult airway management; cardiovascular complications (hypertension, coronary artery disease, cardiomyopathy); respiratory compromise (obstructive sleep apnea); and endocrine and lyte abnormalities

Worry About
- Airway management: Difficult mask ventilation and intubation, especially in acromegaly and Cushing disease
- Cardiovascular risk: Htn, CAD, cardiomyopathy
- Respiratory complications: Obstructive sleep apnea and postop ventilatory support
- Endocrine abnormalities: Acromegaly, hyperthyroidism, Cushing disease, panhypopituitarism, postop DI
- EleLyte abnormalities: Hypernatremia secondary to DI
- Rarely, management of elevated ICP

Overview
- Tumors classified by size (macroadenoma >1 cm vs. microadenoma <1 cm) and hormone secretion (functioning vs. nonfunctioning).
- Functioning tumors present with symptoms of hormone excess.
- Nonfunctioning tumors are more likely to be macroadenomas and present with symptoms of mass effect: headache, visual loss (bitemporal hemianopsia), and hypopituitarism.
- Pts rarely present with elevated ICP owing to obstruction of the third ventricle.

Etiology
- Disease and secreted hormones: Acromegaly, growth hormone; Cushing disease, ACTH; gonadotroph, FSH and luteinizing hormone LH; prolactinoma, prolactin; thyrotrophic, TSH
- May occur in MEN 1 syndrome with pancreatic and parathyroid neoplasms.

Usual Treatment
- Medical therapy for treatment of systemic effects of functional tumors: Acromegaly, somatostatin analog (octreotide, lanreotide), growth hormone antagonists (pegvisomant); Cushing disease, ketoconazole, metyrapone (block cortisol synthesis); prolactinoma, dopamine agonist (bromocriptine, cabergoline); thyrotropic, somatostatin analog (octreotide, lanreotide) or propylthiouracil
- Tumor resection via transsphenoidal approach (endoscopic endonasal or sublabial)
- Gamma knife radiosurgery

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Acromegaly: Bone and soft tissue hypertrophy Cushing disease and thyrotropic adenoma: Exophthalmos		Enlarged facial bones, tongue and mandible, laryngeal and pharyngeal thickening, glottic narrowing, possible recurrent laryngeal nerve injury	Indirect laryngoscopy, fiberoptic laryngoscopy
CV	Acromegaly: Htn, CAD, CM Cushing disease: Htn, septal and LV hypertrophy Thyrotropic adenomas: Palpitations, arrhythmias	Chest pain, dysrhythmias, diastolic heart failure Diastolic dysfunction	BP, S_3 and S_4 heart sounds, peripheral edema, JVD	ECG, ECHO, CXR ECG ECG
RESP	Acromegaly and Cushing disease: OSA	Snoring, daytime somnolence		Sleep study
ENDO	Acromegaly: DM type 2 Cushing disease: DM type 2, hypercortisolism Prolactinoma: Infertility, amenorrhea, galactorrhea, impotence (male) Nonfunctioning macroadenoma: Panhypopituitarism		Truncal obesity, striae, moon facies	Preop labs: Metabolic panel (sodium, calcium, glucose), TSH, thyroxine, serum cortisol, ACTH, insulin-like growth factor-1, testosterone, LH, FSH, prolactin, pregnancy test
CNS	Optic chiasm compression	Visual field deficit		Visual field testing
MS	Acromegaly: Bone and soft tissue overgrowth Cushing disease: Osteoporosis, truncal obesity, myopathy	Pathologic fractures, weakness, fatigue	Enlarged hands and feet, cervical spine changes Proximal muscle weakness	
DERM	Cushing disease: Fragile skin	Easy bruising	Striae	

Key References: Miller BA, Ioachimescu AG, Oyesiku NM: Contemporary indications for transsphenoidal pituitary surgery, *World Neurosurg* 82(6S):S147–S151, 2014; Nemergut EC, Dumont AS, Barry UT, et al.: Perioperative management of patients undergoing transsphenoidal pituitary surgery, *Anesth Analg* 101(4):1170–1181, 2005.

Perioperative Implications

Preoperative Preparation

- Hormone replacement therapy for panhypopituitarism
- "Stress dose" steroid is often unnecessary, but the prudent practitioner should be aware of the risk of absolute or relative hypocorticalism and be prepared to treat if necessary.

Monitoring

- Consider invasive arterial monitoring if BP cuff size is inadequate or in pts with significant cardiac disease
- Acromegalic pts may have compromised ulnar blood flow; place radial arterial line with caution.
- Theoretical risk of VAE due to head up positioning. No reports of VAE-related morbidity or mortality and additional monitors (i.e., end-tidal nitrogen or precordial Doppler) not typically required.

Airway

- A standard ETT or oral RAE tube is acceptable.
- Be prepared for difficult airway in acromegalic pts; 20% of those with Mallampati class 1 and 2 airways are difficult to intubate.
- If macroglossia is present, intubation with intubating LMA or fiberoptic bronchoscope difficult. Consider awake fiberoptic intubation.

Induction

- Consider rapid sequence induction in pts with GERD or DM and delayed gastric emptying.

Maintenance

- Infiltration of nasal mucosa with local anesthetic and epinephrine may cause dysrhythmias and hypertension.
- Choice of anesthetic to facilitate rapid emergence; propofol, remifentanil, or volatile anesthetics are all reasonable.
- Muscle relaxation to provide immobile surgical field and reduce risk of CSF leak, visual field or vascular injury.
- Injury to carotid artery may result in significant blood loss, but this is uncommon. Deliberate Htn may facilitate repair.
- Valsalva maneuver may be used to check for CSF leak.

Extubation

- Suction stomach and oropharynx to remove blood and irrigation fluid.
- Perform awake extubation with pt in seated position to minimize risk of airway obstruction or aspiration.

Postoperative Period

- Prophylaxis for and treatment of PONV.
- Treat headache pain with opioids, NSAIDs, or acetaminophen.
- Monitor serum sodium and UOP for development of DI or SIADH (rare).
- Postop visual field testing is important, as injury optic nerves may result in catastrophic loss of vision.
- Complications include cranial nerve palsy and CSF leak.
- Screen for hypopituitarism and replace hormones as needed.

Adjuvants

- Use opioids cautiously in pts with OSA.
- Treat hemodynamic instability with α_1- and β-blockers.

Anticipated Problems/Concerns

- Airway management
- Hemodynamic instability and risk of myocardial ischemia
- OSA and need for assisted ventilation postop

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Placenta Previa

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Risk

- Incidence: 1:200-250 pregnancies
- Highest incidence with multiparity, repeat C-section or other uterine surgery, prior placenta previa, advanced maternal age, tobacco use, cocaine use, male fetus

Perioperative Risks

- Maternal mortality is <1%.
- Fetal complications: Prematurity (45% of deliveries at <37 wk); mortality increased 3 to 4 times.
- Life-threatening hemorrhage of mother or fetus.
- Fetal hypoxia.

Worry About

- Blood loss, hypovolemia.
- Increased risk of aspiration due to pregnancy or recent oral intake.
- Higher risk of placenta accreta, increta, and percreta, possibly requiring hysterectomy.
- Fetal compromise from inadequate intervillous blood flow.
- Preterm labor: Concomitant tocolytic therapy can alter hemodynamic response to hemorrhage.

Overview

- Placental implantation in advance of fetal presenting part.
  - Placenta previa: Placenta overlies cervical os.
  - Low-lying placenta: Placenta is near but not overlying the os.
- Often presents as painless vaginal bleeding in the second or third trimester.
- Diagnosis confirmed by transvaginal ultrasound ("gold standard") by measuring distance from internal cervical os to placental edge.

Etiology

- Unknown

Usual Treatment

- Expectant management.
- In pts with low-lying placenta, mode of delivery depends on distance from placental edge to internal cervical os.
  - >2 cm: Can undergo trial of labor.
  - 1-2 cm: Controversial, but consider trial of labor.
  - <1 cm: C-section.
- Uncomplicated placenta previa, stable without bleeding: Planned C-section at 36 wk.
- Persistent hemorrhage: Emergency C-section.