

Episode 122: Key Words Part 1 with Gillian Isaac: Cricothyroid Membrane and Propofol

On this episode: Dr. Gillian Isaac and Dr. Jed Wolpaw

In this 122nd episode Dr. Gillian Isaac and I launch the first in a series of episodes to give high yield information on ABA key words. The first two we address are the cricothyroid membrane and propofol.

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Cricothyroid membrane

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Following induction of GA, mask ventilation and initial attempt at intubation unsuccessful. Which of following is most appropriate?

During induction with supraglottic tumor, intubation and subsequent ventilation via face mask is unsuccessful. Cricothyrotomy is performed with 16G catheter. Which of following is true?

Propofol

Why clinical effects of propofol much shorter than actual elimination half-life?

What is Propofol Infusion Syndrome triad?

Patient needs emergency pericardial window for large effusion. What induction agent is most appropriate?

Comparing induction dose of thiopental vs propofol, propofol produces..

Which of following is known effect of propofol?

75F w/ severe carotid artery stenosis scheduled for GA for repair of fractured hip. What is greatest disadvantage of using propofol for induction?

I. Basic Topics in Anesthesiology

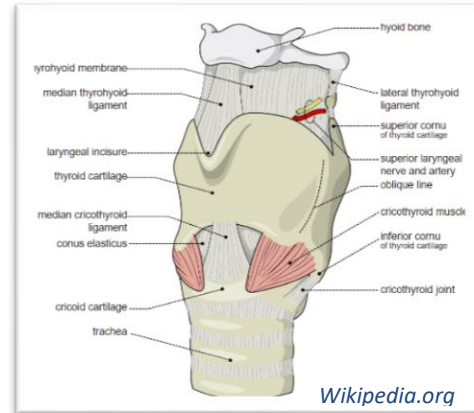
From the ABA Content Outline

A. Basic Sciences

1. Anatomy

a. Topographical Anatomy as Landmarks

- 1) Neck: **Cricothyroid Membrane**, Internal and External Jugular Veins, Thoracic Duct, Carotid and Vertebral Arteries, Stellate Ganglion, Cervical Spine Landmarks (Vertebra Prominens, Chassaignac's Tubercle), Hyoid Bone, Superficial Cervical Plexus



Cricothyroid membrane

- Based on past questions, tested as
 - o Airway/laryngeal innervation
 - o Neck anatomy
 - o Distractor
- References: Barash, anesthesiahub.com
- Coverage to cricothyroid space (9mm) in anterior neck, between thyroid cartilage and cricoid cartilage

What kind of block would you do to target the recurrent laryngeal nerve for awake fiberoptic?

- Transtracheal block because provides sensation to vocal fold and trachea. Good practice because an entry for jet ventilation.
- Location for retrograde wire as part of [Difficult Airway Algorithm](#)
- **Contraindications:** tumor/mass/inability to pass through; (Per Barash:) neonates, kids < 6 ; laryngeal fracture
- Percutaneous transtracheal jet ventilation in DAA

Which of following statements concerning superior laryngeal nerve is true?

- A) Provides sensory innervation to subglottic surface of vocal cord (**B is correct**)
- B) Provides sensory innervation to inferior surface of epiglottis (**correct**)
- C) Branch of glossopharyngeal nerve (**vagus**)
- D) Block by local anesthesia through lateral portion of cricothyroid membrane (**actually through center, or lateral of hyoid bone**)
- E) Most commonly injured nerve in thyroid surgery (**recurrent laryngeal, more common on left than right because of circuitous route**)

Following induction of GA, mask ventilation and initial attempt at intubation unsuccessful. Which of following is most appropriate?

- A) Admin additional muscle relaxant (**no clues such as laryngospasm, or hearing stridor, or coughing**)
- B) Repeat intubation (**correct**)
- C) Fiberoptic intubation (**not quite there in algorithm**)
- D) Retrograde Intubation (**algorithm**)
- E) Cricothyrotomy (**algorithm**)

TIP: Cover choices and answer first.

During induction with supraglottic tumor, intubation and subsequent ventilation via face mask is unsuccessful. Cricothyrotomy is performed with 16G catheter. Which of following is true?

- A) Application of pressure > 35 cmH₂O ↑ risk of pulmonary barotrauma (**not true bc bypassing pressure regulator and expect it to be high**)
- B) Normal PaCO₂ can be maintained using standard circle system attached to catheter (**probably not true because can't ventilate as well through small catheter vs ETT – circle system is low pressure side so not adequate**)
- C) PaO₂ > 100mmHg can be maintained indefinitely using TTJV using pure O₂ through catheter (**likely true bc can oxygenate well**)
- D) Emergency tracheostomy would have likely improved the likelihood of survival (**correct**)
- E) Presence of tumor is contraindication to JV via cricothyrotomy (**not absolute according to Barash**)
- **RECAP:** likely to see this topic as part of DAA, laryngeal/airway innervation, and big distractor answer

Propofol

- Often asked as mechanism, redistribution, propofol infusion syndrome
- **Mechanism:** GABA agonist that can cause amnesia, anesthesia, not much analgesia; vasodilation
 - Benzodiazepines act on GABA_A → ↑ Chloride conductance
 - Barbiturates increase duration of chloride channel opening
- **Pharmacokinetics:** Elimination: 2-24hr

- 3) **Propofol** *From the ABA Content Outline*

 - a) Mechanism of Action
 - b) Pharmacokinetics and Pharmacodynamics
 - c) Metabolism and Excretion
 - d) Effect on Circulation
 - e) Effect on Respiration
 - f) Effect on Other Organs
 - g) Side Effects and Toxicity
 - h) Indications and Contraindications

Why clinical effects of propofol much shorter than actual elimination half-life?

- Widely redistributed, then metabolized by liver (and lungs?) and eliminated by kidneys
- Context sensitive half-time increases over time. Infusion 10-12 hrs, not as fast as 0.5 - 1hr clinical use
- **CMRO₂ effects:** ↓ as well as ↓ CBF → ↓ ICP, which is good because brain also needs less blood
- **Systemic BP:** ↓ thus → ↓ cerebral perfusion pressure. Thus may not be a great induction agent in some scenarios
- **Respiratory:** apnea with high dose. Barash: 1.5-2.5mg/kg with 25-35% occurrence of apnea
- **Response to hypoxia/hypercarbia:** ↓
- More cardiovascular depressant effect than thiopental, thus not good to give in heart failure / sepsis
- Unknown antiemetic mechanism
- **Propofol Infusion Syndrome:** more likely associated with high doses (>70mcg/kg/min, over longer periods of time)

What is Propofol Infusion Syndrome triad?

- Metabolic acidosis, cardiac arrhythmia/instability, rhabdomyolysis
- **Effect on neuromonitoring:** pretty stable unless bolus - ↓ amplitude, ↑ latency
- **Contraindications:** soy lecithin allergy (egg allergy not big concern); severe cardiovascular disease; dehydration; profound hypotension

Patient needs emergency pericardial window for large effusion.

What induction agent is most appropriate?

- **Ketamine.** Ask yourself what do you want to NOT do with tamponade? Don't want to slow HR. Other options: alfentanil, midazolam, propofol, thiopental

Comparing induction dose of thiopental vs propofol, propofol produces..

- A) Better maintenance of cerebral perfusion pressure
- B) Greater inhibition of glucocorticoid production
- C) Higher incidence of myoclonus (**this does happen**)
- D) Less severe hypotension
- E) Less severe respiratory depression

Which of following is known effect of propofol?

- A) Decrease amplitude of SSEP (**correct**)
- B) Induces malignant hyperthermia (**volatiles, succinylcholine**)
- C) Inhibition of cytochrome p450 (**several, but not propofol**)
- D) Initiation of porphyria (**variety of drugs, but not propofol**)
- E) Inhibition of glucocorticoid function (**etomidate**)

75F w/ severe carotid artery stenosis scheduled for GA for repair of fractured hip. What is greatest disadvantage of using propofol for induction?

- Patient really relies on cerebral perfusion pressure so question likely relates to significant drop in SVR.
- *Other options:*
 - Pain during IV injection
 - Prolonged apnea after induction (**can mask ventilate**)
 - Prolonged awakening (**bolus dose shouldn't – this likely refers to infusion**)
 - Prolonged elimination half-life

REMEMBER: Cover the question and answer before looking at choices. This helps you from getting distracted while saving time. Go through each wrong answer and understand it!

Anything else to add about cricothyroid membrane or propofol?

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Notes by [Brian H Park, MD](#)