Episode 234: Keywords Part 20: PONV

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

In this 234th episode I welcome Dr. Gillian Isaac back to the show to discuss another ABA keyword. We cover PONV for the Basic and Advanced exam.

All Keywords Episodes

Questions & Notes

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What Are the Risk Factors for PONV?

All of the following surgeries are associated with an increased risk of PONV EXCEPT:

- **A. Shoulder arthroscopy**
- **B. Laparoscopic surgery**
- **C. Strabismus repair**
- **D. Tympanoplasty**
- **Discussion**

A 22-year-old, non-smoking, woman with no previous anesthetic history, undergoes a laparoscopic ovarian cystectomy, her risk of PONV is most closely approximated by:

- **A. 5%**
- **B. 10%**
- **C. 20%**
- **D. 40%**
- **Discussion**

Nausea and vomiting in pediatric outpatients are directly related to:

- **A. Postoperative pain**
- **B. Unrelated to length of procedure**
- **C. Eliminated by preoperative administration of droperidol**
- **D. Eliminated by intraoperative nasogastric drainage**
- **E. More frequent than in adults**
- **Discussion**

Which of the following operations would be associated with the least incidence of PONV in a 5-year-old boy?

- **A. Tonsillectomy**
- **B. Strabismus surgery**
- **C. Myringotomy tube placement**
- **D. Orchiopexy**

Discussion

Each of the following results in the reduction of incidence of postoperative vomiting in children undergoing strabismus surgery, EXCEPT:

A. IV hydration of 30 ml/kg/hr

B. Dexamethasone (0.15 - 1 mg/kg IV)

C. Ondansetron (50 - 200 mcg/kg IV)

D. Anticholinergics (atropine 10-20 mcg/kg or glycopyrrolate 10mcg/kg)

Discussion

Metoclopramide acts to:

A. Block dopamine receptors

B. Decrease gastric acid production

C. Decrease lower esophageal sphincter tone

D. Delay gastric emptying

E. Facilitate central cholinergic stimulation

Discussion

A patient with Parkinson's Disease undergoes general anesthesia, your plan to nausea and vomiting would include all of the following, EXCEPT:

A. Dexamethasone

B. Scopolamine patch

C. Metoclopramide

D. Ondansetron

Discussion

A patient has tonic movements of the head and neck, nystagmus, and slurred speech after receiving metoclopramide for nausea after nitrous oxide and opioid anesthesia. The most appropriate pharmacologic treatment is:

A. Diphenhydramine

B. Midazolam

C. Naloxone

D. Phenytoin

E. Physostigmine

Discussion

A 72-year-old patient who takes levodopa and carbidopa, is undergoing colon resection, metoclopramide is administered preoperatively and anesthesia is maintained with propofol, fentanyl, nitrous oxide, and vecuronium. 15 mins after reversal of muscle relaxation with neostigmine and atropine, and tracheal extubation, the patient has dyspnea and muscular rigidity. Which of the following is the most likely cause:

A. Central cholinergic syndrome

B. Fentanyl-induced rigidity

C. Inhibition of methionine-synthetase via nitrous oxide

D. Metoclopramide-induced dopamine antagonism

E. Peripheral conversion of levodopa to dopamine

Discussion

Metoclopramide:

A. Decreases gastric acid secretion

B. Decreases gastric esophageal sphincter tone

C. Contraindicated in patients with Parkinson's disease

D. Most effective when administered with atropine

E. Requires intact vagus nerve for gastrointestinal effects

Discussion

Which of the following is an effect of metoclopramide?

A. Decrease lower esophageal sphincter tone

B. Decreased MAC for enflurane

C. Extrapyramidal signs

D. Decrease gastric pH

E. Relief of intestinal obstruction

Discussion

A 65-year-old man has nausea and vomiting in the PACU, needing antiemetic therapy. He develops involuntary facial movements, difficulty swallowing and torticollis. Which of the following drugs is most likely the cause?

A. Promethazine

B. Diphenhydramine

C. Metoclopramide

D. Granisetron

Discussion

Severe nausea and vomiting in the PACU is most effectively treated with a drug that acts as an antagonism of which receptor:

A. Alpha adrenergic

B. Beta adrenergic

C. Dopaminergic

D. GABA

E. Glutamate

Discussion

Which of the following premedicant drug combinations is most effective in preventing passive regurgitation in anesthesia?

A. Cimetidine and glycopyrrolate

B. Metoclopramide and atropine

C. Metoclopramide and ranitidine

D. Metoclopramide, atropine and ranitidine

E. Metoclopramide and sodium bicitrate

Discussion

During pulmonary artery catheterization, a 65-year-old man receives morphine 6 mg, scopolamine 0.4 mg IV. The pulse oximeter indicates desaturation which quickly resolves with stimulation. When

the drapes are removed, he has unilateral eye pain, decreased visual acuity and dilated irregular pupils. The eye symptoms are most likely caused by:

A. Retinal hemorrhage

B. Morphine-induced oculogyric crisis

C. Corneal abrasion

D. Carotid artery embolization

E. Angle closure glaucoma

Discussion

A 69-year-man is confused and agitated 1 hour after perioperative intramuscular administration of scopolamine, for awake fiber-optic laryngoscopy. SpO2 measurements via pulse oximetry show 97%. Which of the following drugs is most appropriate for treatment of his altered mental status?

A. Fentanyl

B. Flumazenil

C. Midazolam

D. Neostigmine

E. Physostigmine

Discussion

A healthy 10 kg child is flushed and restless after premedication with meperidine 15 mg and scopolamine 0.2 mg IM. Skin is warm and dry. Temperature is 38 degrees celsius. Pulse is 130 BPM, BP is 90/60 mm Hg. The most likely cause is:

A. Dehydration

B. Idiosyncratic reaction to meperidine

C. Malignant hyperthermia

D. Neuroleptic malignant syndrome

E. Scopolamine

Discussion

Which of the following statements is FALSE regarding scopolamine patch applied preoperatively?

A. It may produce sedation

B. It decreases the risk of nausea

C. Adds to analgesia

D. Inhibits muscarinic receptors

Discussion

A previously healthy 28-year-old woman scheduled for laparoscopic tubal ligation becomes agitated and refuses to undergo the procedure after being brought to the operating room. This behavior is most likely from preoperative administration of:

A. Droperidol

B. Cimetidine

C. Atropine

D. Meperidine

E. Midazolam

Discussion

The use of droperidol as a preanesthetic medication has been associated with each of the following EXCEPT:

A. Acute anxiety

B. Anterograde amnesia

C. Hypotension

D. Extrapyramidal signs

E. Catalepsy

Discussion

The mechanism of action of droperidol involves antagonism of all the following receptors EXCEPT:

A. Serotonin

B. Dopamine

C. Alpha-adrenergic

D. Glutamate

Discussion

A 24-year-old female patient with preoperative QTc interval of 550 ms is undergoing breast surgery under general anesthesia. Droperidol is administered for postop nausea, following which the patient enters polymorphic ventricular tachycardia. Which of the following drugs/therapies is best for the patient at this point?

A. Amiodarone

B. Lidocaine

C. Pacing

D. Diltiazem

Discussion

A 22-year-old college athlete with history of prolonged QTc interval, presents for inguinal hernia repair. Which of the following is the LEAST likely to prolong the QT interval:

A. Ondasetron

B. Metoclopramide

C. Succinylcholine

D. Propofol

Discussion

Long term use of cimetidine has been associated with:

A. Delayed emergence after thiopental induction

B. Increased hypotension after morphine

C. Increased risk for isoflurane nephrotoxicity

D. Prolonged action of succinylcholine

E. Prolonged sedation after diazepam

Discussion

A 30-year-old woman who underwent a knee arthroscopy has PONV in the PACU, per report she received ondansetron 4 mg IV 30 mins prior to the completion of her procedure. Which of the following is most appropriate for managing her PONV in the PACU?

A. Scopolamine patch

B. Dexamethasone

C. Ondansetron

D. Promethazine

Discussion

Promethazine primarily inhibits which of the following receptors?

A. Serotonin

B. Dopamine

C. Muscarinic

D. Acetylcholine

Discussion

Ondansetron causes its antiemetic effect by acting as:

A. Agonist at 5HT2 receptors

B. Antagonist at 5HT2 receptors

C. Agonist at 5HT3 receptors

D. Antagonist at 5HT3 receptors

Discussion

A 49-year-old patient is undergoing craniotomy for tumor resection. The patient received drugs including thiopental, vecuronium, isoflurane, and fentanyl. The patient is brought to the PACU with a heart rate of 58, BP of 196/96, and oxygen saturation of 98%. A few moments later the patient has 2 episodes of vomiting. You would then:

A. Give ondansetron

B. Give metoclopramide

C. Give fentanyl

D. Call the neurosurgeon

Discussion

References

What Are the Risk Factors for PONV?

6:38

- Female gender, non-smoking status, history of PONV or motion sickness, use of postoperative opioid medications, any use of anesthetics, certain surgical procedures (breast, abdominal, ENT, laparoscopic, etc.), duration of surgery.

All of the following surgeries are associated with an increased risk of PONV EXCEPT:

7:10

A. Shoulder arthroscopy

B. Laparoscopic surgery

C. Strabismus repair

D. Tympanoplasty

Discussion

- Laparoscopic surgeries, strabismus surgeries, and ENT surgeries all increase risk of PONV
- Out of these options, **(Option A)** shoulder arthroscopy has the lowest risk, and can also be done with regional anesthesia (lowering risk of PONV).

A 22-year-old, non-smoking, woman with no previous anesthetic history, undergoes a laparoscopic ovarian cystectomy, her risk of PONV is most closely approximated by:

8:10

A. 5%

B. 10%

C. 20%

D. 40%

Discussion

- Patient-specific risk factors she has: non-smoker, female
- If she had 0 risk factors, then baseline would be around 10% risk of PONV
- 1 risk factor would be around 20%
- 2 risk factors would be around 40% **(Option D)**

Nausea and vomiting in pediatric outpatients are directly related to:

11:12

A. Postoperative pain

B. Unrelated to length of procedure

C. Eliminated by preoperative administration of droperidol

D. Eliminated by intraoperative nasogastric drainage

E. More frequent than in adults

Discussion

- PONV is related to postop pain, especially in pediatric patients **(Option A)**
- PONV is related to the length of procedure
- There is no way to completely eliminate PONV, so C and D are unlikely.
- Pediatric PONV is not more frequent than in adults

Which of the following operations would be associated with the least incidence of PONV in a 5-year-old boy?

12:17

A. Tonsillectomy

B. Strabismus surgery

C. Myringotomy tube placement

D. Orchiopexy

Discussion

- Tonsillectomy is a longer procedure, and ENT surgery is associated with increased risk of PONV
- Strabismus surgery is highly associated with PONV
- Myringotomy tube placement is a short procedure (<30 mins) with minimal pain which decreases risk of PONV **(Option C)**
- Orchiopexy is a longer and more painful procedure

Each of the following results in the reduction of incidence of postoperative vomiting in children undergoing strabismus surgery, EXCEPT:

13:36

A. IV hydration of 30 ml/kg/hr

B. Dexamethasone (0.15 - 1 mg/kg IV)

C. Ondansetron (50 - 200 mcg/kg IV)

D. Anticholinergics (atropine 10-20 mcg/kg or glycopyrrolate 10mcg/kg)

Discussion

- Superhydration has been shown to decrease PONV
- Dexamethasone and ondansetron are antiemetics
- Anticholinergics do not decrease PONV **(Option D)**

Metoclopramide acts to:

17:13

A. Block dopamine receptors

B. Decrease gastric acid production

C. Decrease lower esophageal sphincter tone

D. Delay gastric emptying

E. Facilitate central cholinergic stimulation

Discussion

- Metoclopramide blocks dopamine receptors (**Option A**)

A patient with Parkinson's Disease undergoes general anesthesia, your plan to nausea and vomiting would include all of the following, EXCEPT:

18:00

A. Dexamethasone

B. Scopolamine patch

C. Metoclopramide

D. Ondansetron

Discussion

- Don't block dopamine receptors in a patient with Parkinson's (**Option C**)

A patient has tonic movements of the head and neck, nystagmus, and slurred speech after receiving metoclopramide for nausea after nitrous oxide and opioid anesthesia. The most appropriate pharmacologic treatment is:

18:45

A. Diphenhydramine

B. Midazolam

C. Naloxone

D. Phenytoin

E. Physostigmine

Discussion

- Diphenhydramine is the treatment for the anti-dopaminergic effects of metoclopramide, via blocking acetycholine (**Option A**)

A 72-year-old patient who takes levodopa and carbidopa, is undergoing colon resection, metoclopramide is administered preoperatively and anesthesia is maintained with propofol, fentanyl, nitrous oxide, and vecuronium. 15 mins after reversal of muscle relaxation with neostigmine and atropine, and tracheal extubation, the patient has dyspnea and muscular rigidity. Which of the following is the most likely cause:

19:40

A. Central cholinergic syndrome

B. Fentanyl-induced rigidity

C. Inhibition of methionine-synthetase via nitrous oxide

D. Metoclopramide-induced dopamine antagonism

E. Peripheral conversion of levodopa to dopamine

Discussion

- Atropine can cause central cholinergic syndrome, but the symptoms of dyspnea and muscular rigidity fits more with an anti-dopaminergic syndrome (**Option D**)

Metoclopramide:

22:08

A. Decreases gastric acid secretion

B. Decreases gastric esophageal sphincter tone

C. Contraindicated in patients with Parkinson's disease

D. Most effective when administered with atropine

E. Requires intact vagus nerve for gastrointestinal effects

Discussion

- (**Option C**)

Which of the following is an effect of metoclopramide?

22:35

A. Decrease lower esophageal sphincter tone

B. Decreased MAC for enflurane

C. Extrapyramidal signs

D. Decrease gastric pH

E. Relief of intestinal obstruction

Discussion

- **Option C**, though not every time.

A 65-year-old man has nausea and vomiting in the PACU, needing antiemetic therapy. He develops involuntary facial movements, difficulty swallowing and torticollis. Which of the following drugs is most likely the cause?

23:50

A. Promethazine

B. Diphenhydramine

C. Metoclopramide

D. Granisetron

Discussion

- Pyramidal symptoms, (**Option C**). Though promethazine is possible too. Diphenhydramine would be a treatment option.

Severe nausea and vomiting in the PACU is most effectively treated with a drug that acts as an antagonism of which receptor:

27:13

A. Alpha adrenergic

B. Beta adrenergic

C. Dopaminergic

D. GABA

E. Glutamate

Discussion

- Dopaminergic receptors (**Option C**)
- Keep in mind, some recent studies showing midazolam having antiemetic studies (GABA)

Which of the following premedicant drug combinations is most effective in preventing passive regurgitation in anesthesia?

28:10

A. Cimetidine and glycopyrrolate

B. Metoclopramide and atropine

C. Metoclopramide and ranitidine

D. Metoclopramide, atropine and ranitidine

E. Metoclopramide and sodium bicitrate

Discussion

- Raniditinde has H2-blocking effects which stimulate gastric emptying (**Option C**)

During pulmonary artery catheterization, a 65-year-old man receives morphine 6 mg, scopolamine 0.4 mg IV. The pulse oximeter indicates desaturation which quickly resolves with stimulation. When the drapes are removed, he has unilateral eye pain, decreased visual acuity and dilated irregular pupils. The eye symptoms are most likely caused by:

31:23

A. Retinal hemorrhage

B. Morphine-induced oculogyric crisis

C. Corneal abrasion

D. Carotid artery embolization

E. Angle closure glaucoma

Discussion

- Retinal hemorrhage, and corneal abrasion does not cause dilated irregular pupils
- Scopolamine is contraindicated in patients with glaucoma (**Option E**)

A 69-year-man is confused and agitated 1 hour after perioperative intramuscular administration of scopolamine, for awake fiber-optic laryngoscopy. SpO2 measurements via pulse oximetry show 97%. Which of the following drugs is most appropriate for treatment of his altered mental status?

32:50

A. Fentanyl

B. Flumazenil

C. Midazolam

D. Neostigmine

E. Physostigmine

Discussion

- Anticholinergic syndrome treatment is physostigmine (**Option E**).

A healthy 10 kg child is flushed and restless after premedication with meperidine 15 mg and scopolamine 0.2 mg IM. Skin is warm and dry. Temperature is 38 degrees celsius. Pulse is 130 BPM, BP is 90/60 mm Hg. The most likely cause is:

33:50

A. Dehydration

B. Idiosyncratic reaction to meperidine

C. Malignant hyperthermia

D. Neuroleptic malignant syndrome

E. Scopolamine

Discussion

- Anticholinergic syndrome from scopolamine (**Option E**)

Which of the following statements is FALSE regarding scopolamine patch applied preoperatively?

34:25

A. It may produce sedation

B. It decreases the risk of nausea

C. Adds to analgesia

D. Inhibits muscarinic receptors

Discussion

- A, B, and D are all true
- Scopolamine does not add to analgesia (**Option C**)

A previously healthy 28-year-old woman scheduled for laparoscopic tubal ligation becomes agitated and refuses to undergo the procedure after being brought to the operating room. This behavior is most likely from preoperative administration of:

37:05

A. Droperidol

B. Cimetidine

C. Atropine

D. Meperidine

E. Midazolam

Discussion

- Droperidol can have behavioral adverse effects including dysphoria, postoperative drowsiness or restlessness, hyperactivity and anxiety (**Option A**)

The use of droperidol as a preanesthetic medication has been associated with each of the following EXCEPT:

38:05

A. Acute anxiety

B. Anterograde amnesia

C. Hypotension

D. Extrapyramidal signs

E. Catalepsy

Discussion

- Droperidol does not cause anterograde amnesia (**Option B**)

The mechanism of action of droperidol involves antagonism of all the following receptors EXCEPT:

38:47

A. Serotonin

B. Dopamine

C. Alpha-adrenergic

D. Glutamate

Discussion

- Glutamate receptor is not antagonized by droperidol (**Option D**)

A 24-year-old female patient with preoperative QTc interval of 550 ms is undergoing breast surgery under general anesthesia. Droperidol is administered for postop nausea, following which the patient enters polymorphic ventricular tachycardia. Which of the following drugs/therapies is best for the patient at this point?

39:20

A. Amiodarone

B. Lidocaine

C. Pacing

D. Diltiazem

Discussion

- Patient has developed Torsades de Pointes, ideally 1st line therapy is giving magnesium, but pacing can increase the heart rate and decrease the prolonged QTc interval (**Option C**).

A 22-year-old college athlete with history of prolonged QTc interval, presents for inguinal hernia repair. Which of the following is the LEAST likely to prolong the QT interval:

41:00

A. Ondasetron

B. Metoclopramide

C. Succinylcholine

D. Propofol

Discussion

- All anti-emetics except corticosteroids can prolong QT intervals. Propofol does not prolong the QT interval **(Option D)**.

Long term use of cimetidine has been associated with:

41:55

A. Delayed emergence after thiopental induction

B. Increased hypotension after morphine

C. Increased risk for isoflurane nephrotoxicity

D. Prolonged action of succinylcholine

E. Prolonged sedation after diazepam

Discussion

- Cimetidine is a P450 inhibibitor which would slow down the metabolism of diazepam (**Option E**).

A 30-year-old woman who underwent a knee arthroscopy has PONV in the PACU, per report she received ondansetron 4 mg IV 30 mins prior to the completion of her procedure. Which of the following is most appropriate for managing her PONV in the PACU?

42:55

A. Scopolamine patch

B. Dexamethasone

C. Ondansetron

D. Promethazine

Discussion

- Scopolamine and dexamethasone work better when given earlier in the procedure, ondansetron has already been given which has not removed symptoms, left with trying promethazine **(Option D)**.

Promethazine primarily inhibits which of the following receptors?

43:55

A. Serotonin

B. Dopamine

C. Muscarinic

D. Acetylcholine

Discussion

- Promethazine primarily inhibits dopamine receptors **(Option B)**.

Ondansetron causes its antiemetic effect by acting as:

44:20

A. Agonist at 5HT2 receptors

B. Antagonist at 5HT2 receptors

C. Agonist at 5HT3 receptors

D. Antagonist at 5HT3 receptors

Discussion

- Ondansetron is a 5HT3 antagonist **(Option D)**.

A 49-year-old patient is undergoing craniotomy for tumor resection. The patient received drugs including thiopental, vecuronium, isoflurane, and fentanyl. The patient is brought to the PACU with a heart rate of 58, BP of 196/96, and oxygen saturation of 98%. A few moments later the patient has 2 episodes of vomiting. You would then:

45:20

A. Give ondansetron

B. Give metoclopramide

C. Give fentanyl

D. Call the neurosurgeon

Discussion

- Vomiting after craniotomy is concerning for increased intracranial pressure. To be safe, you should call the neurosurgeon (**Option D)**.

References

1. Barash PG, et al. Preoperative Patient Assessment and Management. Clinical Anesthesia, 8e Eds.(23)2017. Lippincott Williams & Wilkins.

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