Common Perioperative Problems

CONSENSUS GUIDELINES FOR PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING (PONV)

Postoperative nausea and vomiting (PONV) is one of the leading postoperative complaints from patients and the leading cause of readmission to the hospital. Severe vomiting can be associated with dehydration, postoperative bleeding, pulmonary aspiration, and wound dehiscence.[1]

PONV occurs twice as frequently in children than in adults, increasing from 3 yrs of age until puberty, then decreasing to adult rates. Gender differences are not seen before puberty. The two most common emetogenic surgical procedures evaluated in children are strabismus repair and adenotonsillectomy.

Risk factors for PONV in children include the following:

1. Patient factors
    a. age ≥ 3 years
    b. history of Postoperative Vomiting (POV)/ PONV/motion sickness
    c. family history of POV/ PONV
    d. post pubertal female
    e. gastric dysmotility
    f. anxiety
    g. pain
2. Surgical factors
    a. surgery ≥ 30min
    b. adenotonsillectomy
    c. otoplasty
    d. strabismus surgery
    e. dental surgery

f. intra abdominal surgery including laparoscopic
g. genitourinary surgery

3. Anaesthetic factors
    a. volatile anaesthetics
    b. long acting opioids
    c. anticholinergic agents e.g. neostigmine

PONV Risk Score for Children (Eberhart et al)

Risk factors	Points
Surgery ≥ 30min	1
age ≥ 3 years	1
strabismus surgery	1
history of postoperative vomiting or family history of PONV	1

Risk of postoperative vomiting associated with number of risk factors for PONV

number of risk factors	risk of postoperative vomiting
0 or 1	10%
2	30%
3	50%
4	70%

Do note that this score has been validated for other emetogenic surgeries as well.

Generally, strategies to prevent PONV in children include

a) use of regional anaesthesia
b) use of propofol for induction and maintenance of anaesthesia
c) avoidance of nitrous oxide for more than 1 hour
d) avoidance of volatile anaesthetic agents
e) minimise perioperative opioid use with multimodal analgesia such as paracetamol, NSAIDS, clonidine or dexmedetomidine, ketamine or IV lignocaine given intraoperatively
f) adequate hydration intraoperatively (30 vs 10 mL/kg lactated ringer's more effective in PONV reduction) and consider allowing clear feeds up 1 hour before anaesthesia
g) avoidance of neostigmine if feasible for reversal of neuromuscular blockade, using train of 4 as a guide on requirement for reversal and consider the use of suggamadex in patients at high risk of PONV
h) prophylactic antiemetic therapy for children with any risk factor for PONV

INTRA-OP PROPHYLAXIS

Single drug (for low risk i.e. no risk factor or 1 risk fastor)

- *IV ondansetron 0.1 -0.15mg/kg* (max 4 mg, only in children > 1 mth old, to be used with caution in cardiac patients with arrhythmias, particularly prolonged QT syndrome) for the following groups:
  - ≥ 3yrs
  - use of intra-operative opioids
  - middle ear surgery
  - surgeries ≥30 mins duration
  - side effects: headache/ prolongation of QT interval that is dose dependent and rarely significant at usual doses

Double prophylaxis (for moderate risk i.e. 1-2 risk factors)

- *IV ondansetronn 0.1- 0.15 mg/kg* (max 4 mg) AND
- *IV dexamethasone 0.1-0.15 mg/kg* (max 4mg) **at the start of surgery** IF NO CONTRAINDICATIONS and at least 1 risk for includes any of the following:
    - Strabismus surgery
    - Tonsillectomy ± Adenoidectomy
    - Middle ear surgery + opioid use
    - Previous history of PONV
  - side effects: hyperglycaemia, restlessness, headache, blurred vision
  - added advantage: can reduce pain
  - **contraindication: Dexamethasone must be used with care in oncology patients since it can be part of the chemotherapy regimen for leukemia and lymphoma patients and result in tumour lysis syndrome, or affect the efficacy of CAR T-cell therapy.**
  - If dexamethasone is contraindicated, then consider the use of droperidol for combination PONV prophylaxis if required although prolonged QT will be a contraindication for this combination.

For high risk patient (3 or more risk factors)

- double antiemetics
- use of TIVA

POST-OP PRESCRIPTION

- **IV ondansetron 0.15 mg/kg 8 hourly/prn** for:
  - ALL SDA and inpatients at risk of PONV

- ALL patients put on Acute Pain Service for PCA/NCA opioids and epidurals. (Order in the CLMM along with Acute Pain Service orders)

TREATMENT for established vomiting (defined as vomiting ≥ 2X post-op)

If the patient has established vomiting despite PONV prophylactic antiemetic therapy, consider using an antiemetic from another class of drugs rather than repeat a dose of the antiemetic that has been administered within the past 6 hours.

Besides adverse psychological, metabolic and physiological effects, persistent vomiting is an unpleasant event that may lead to dehydration, electrolyte imbalances, pulmonary aspiration and surgical complications like wound dehiscence. Prompt management is therefore required and should focus on both pharmacological and non-pharmacological management.

Pharmacological management

- **IV ondansetron 0.15mg/kg (max 8 mg)**
  - If ondansetron has not been given

- **IV dexamethasone 0.15 mg/kg (max 8 mg)**
  - If only ondansetron has been given, and dexamethasone not given yet
  - Ensure no contra-indications eg. Hyperglycaemia, systemic sepsis, tumors

- **Call the consultant anaesthetist** if vomiting persists in spite of the above, may consider the following with discretion:
  - IV Droperidol 10-25 mcg/kg (max 1.25 mg)
    - not as first-line, only in children>2yrs with wt>10kg, see FDA black box warning.

- Consider as 3rd line for children 10 years or older; 4th line for children younger than 10 years of age
- useful if dexamethasone contraindicated
- contraindicated in patients known to have prolonged QT syndrome

- IV Diphenhydramine 0.5-1 mg/kg (max 25 mg)
  - side effects: sedation, urinary retention, dry mouth, blurred vision
  - **not to use post tonsillectomy or other airway surgery**
- IV Metoclopramide 0.15-0.25mcg//kg 6h (maximum 0.5mg/day or 30mg/ day)
  - contraindicated in infants
  - consider for bilious vomiting
  - do not continue if ineffective; efficacy uncertain
  - side effects: extrapyramidal side effects seen more commonly in children
- Transdermal Scopolamine patch (Hyoscine 1mg/72hr once), may have a role in safely ameliorating PONV in adolescents, not in younger pediatric patients.
  - Not FDA approved for less than 12 years old.
  - side effects: dry mouth, dizziness, blurred vision
- IV Propofol subhypnotic dose infusion (as rescue in PACU only, ordered by consultant anaesthetist)
- Aprepitant PO 3 mg/kg (up to 125 mg)
  - a central NK1 receptor antagonist to prevent the binding of substance P
  - Side effects: fatigue, headache, reduced appetite, constipation, dyspepsia, hiccups, flushing
  - limited use if the patient is actively vomiting

Non-pharmacological intervention

1. hydration
2. acupressure point/ acustimulation: PC 6

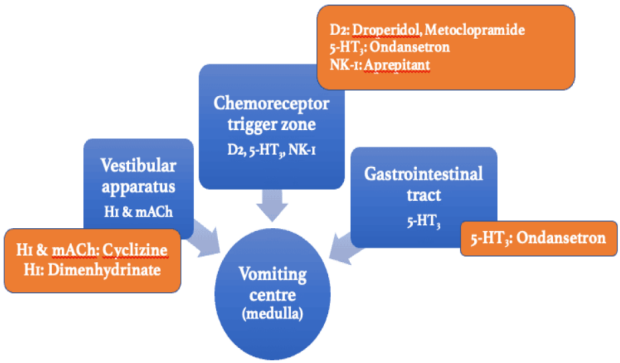

Figure 5: Summary of antiemetic sites of action

- D2 = Dopamine 2 receptor;
- 5-HT3 = 5-Hydroxytryptamine 3 receptor;
- NK-1 = Neurokinin type-1 receptor;
- H1 = Histamine 1 receptor;

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