PONV : The big little problem.

Dr. Dewinter
• Introduction
• Definition
• Pathophysiology
• Ponv risk factors and prognosis systems
• Antiemetics
• Ponv scheme
• Conclusion
Introduction

- Incidence of PONV: 30%
- Most common complaint after GA
- Outcome parameters:
  - Wellbeing
  - Patient satisfaction
- First guidelines:
Definition

- **Vomiting:**
  actual oral expulsion of gastrointestinal contents

- **Nausea:**
  subjective feeling of the need to vomit
Pathophphysiology

Figure 86-1 Pathways for nausea and vomiting. Dotted lines are hypothetical pathways with only indirect evidence. (Created by Christian Apfel, MD, PhD.)
Miller’s Anesthesia seventh edition p.2730
### Risk factors

<table>
<thead>
<tr>
<th>Group</th>
<th>Risk factor*1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient-dependent</strong></td>
<td>Female sex</td>
</tr>
<tr>
<td></td>
<td>History of PONV</td>
</tr>
<tr>
<td></td>
<td>Motion sickness</td>
</tr>
<tr>
<td></td>
<td>Nonsmoker status</td>
</tr>
<tr>
<td><strong>Anesthesia-dependent</strong></td>
<td>Volatile anesthetics</td>
</tr>
<tr>
<td></td>
<td>Duration of anesthesia (risk increases relatively by approx. 60% every 30 min)</td>
</tr>
<tr>
<td></td>
<td>Nitrous oxide</td>
</tr>
<tr>
<td><strong>Surgery-dependent</strong></td>
<td>Type of operation</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>Postoperative opioid administration</td>
</tr>
<tr>
<td></td>
<td>Intraoperative opioid administration</td>
</tr>
</tbody>
</table>
# Prognosis systems

Validated, simplified PONV prognosis systems for adults and children, stating the risk factors involved and calculated incidences of PONV

<table>
<thead>
<tr>
<th>Prognosis system</th>
<th>Koivuranta et al. (7)</th>
<th>Apfel et al. (1)</th>
<th>Eberhart et al. (12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient population</td>
<td>Adults</td>
<td>Adults</td>
<td>Children</td>
</tr>
<tr>
<td>Risk factors</td>
<td>Female sex</td>
<td>Female sex</td>
<td>Age &gt;3 years</td>
</tr>
<tr>
<td>Prior history of PONV</td>
<td>History of PONV</td>
<td>History of motion sickness</td>
<td>History of PONV or motion sickness in the child or a first-degree relative</td>
</tr>
<tr>
<td>Prior history of motion sickness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonsmoker status</td>
<td>Nonsmoker status</td>
<td></td>
<td>Strabismus surgery</td>
</tr>
<tr>
<td>Length of operation &gt;60 min</td>
<td>Expected postoperative administration of opioids</td>
<td></td>
<td>Length of operation &gt;30 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculated incidence of PONV with n risk factors present (sum of the risk factors listed above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Dtsch Arztebl Int 2010; 107(42): 733-41
Antiemetics

- **Anticholinergics**: scopolamine
- **Dopamine antagonists**: droperidol, alizapride
- **5-HT3 blockers**: ondansetron, dolasetron, granisetron
- **Corticosteroids**: dexamethasone
- **Antihistamines**: promethazine
- **Propofol**
Anticholinergics

- Oldest class of antiemetic
- Scopolamine
- Muscarinic receptors: cerebral cortex, pons
- Dry mouth, drowsiness, impaired eye accommodation, sedation, confusion
- Motion sickness > ponv
- Iv, transdermal
Dopamine antagonists

- Benzamides
- Butyrophenones
Benzamides

• Domperidone, metoclopramide, alizapride
• Dopamine (D2) receptor antagonists
• Extrapyramidal effects, hypotension, neuroleptic syndrome, supraventriculaire tachycardia
Butyrophenones

- Droperidol, (haloperidol)
- Doses: 0.625-1.25mg
- As effective as ondansetron
- <-> headache
- Anxiety, restlessness, akathisia
- Black box warning
- Cl: Parkinson’s disease
Figure 86-12 Prolongation of QTc interval after postoperative nausea and vomiting treatment by droperidol or ondansetron. (From Charbit B, Albaladejo P, Funck-Brentano C, et al: Prolongation of QTc interval after postoperative nausea and vomiting treatment by droperidol or ondansetron. Anesthesiology 102:1094-1100, 2005.) Miller's Anesthesia seventh edition p.2746
5-HT 3 antagonists

- Blocks serotonine (5 hydroxy-tryptamine) receptors centrally and peripherally
- Ondansetron, granisetron, dolasetron, tropisetron, palonosetron
- 25% overall risk reduction for ponv
- Metabolized by the liver
- Side effect: headache, constipation, mild asthenia, prolongation QT interval
Corticosteroids

• Dexamethasone (5mg)
• Mechanism: unknown
• Before induction
• Co-analgetics, positively affect mood and convalescence
Antihistamines

- Phenothiazine derivative
- Promethazine (phenergan)
- Historically used
- Sedation, lethargy
Propofol

- 1981: Briggs & co: first mentioned the antiemetic effect
- Mechanism to prevent ponoV: unclear
- Antiemetic effect is dose related
- Single dose propofol: unable to prevent ponoV
- Subhypnotic dose: -1mg/kg/h
  - 10mg bolus dose, continuous infusion of 10µg/kg/min
- TIVA, TCI significant effect in ↓ ponoV
Venn diagrams for nausea, vomiting, and retching in patients after general inpatient or outpatient anesthesia with inhalational or propofol anesthesia.

Novel antiemetics

- **Palonosetron**:  
  - a second generation 5HT3 receptor antagonist  
  - prolonged duration of action  
  - as effective as ondansetron  
  - 0.075mg effective dose

- **Aprepitant**:  
  - neuerokinin-1 receptor antagonist  
  - prevention of pomyv  
  - oral dose of 40mg
**PONV Schema**

**Evaluatie PONV risico**
- 0,1,2,3,4
- 10%, 20%, 40%, 60%, 80%

**POV risico kinderen**
- >3j
- Chirurgie>=30'
- Strabisme
- POV

- 0,1,2,3,4
- 9%, 10%, 30%, 55%, 70%

**Anesthesie**
1. LRA
2. Propofol inductie en onderhoud
3. Geen N2O
4. O2 supplement
5. Geen decurarisatie
6. Opiaat gebruik beperken

**GEEN PROFYLAXIS**

**LAAG 10%**
- MATIG 20%
- HOOG 30-60%
- ZEER HOOG >60%

**GEEN PROFYLAXIS**

**MONO THERAPIE**
- DHB of DXM
- Litican
- Ondansetron

**2 COMBINATIE THERAPIE**
- DHB
- Of Ondansetron en DXM

**3 COMBINATIE THERAPIE**
- DHB en DXM en Ondansetron

**DHB ONDANSETRON LITICAN DXM**
- Ondansetron**
- Litican**
- DHB**
- DXM**(“)”

**ONDANSETRON**
- Litican**
- DHB**

**ONDANSETRON**
- DHB**
- Litican DXM**
- (aprepitant)

**LITICAN DHB***
- ONDANSETRON**
- DXM**
- (aprepitant)

**Profilactische dosis**:
- DHB : 0,625mg (0,01-0,015mg/kg)
- DXM : 5mg (0,1-0,15mg/kg)
- Ondansetron : 4mg (0,1mg/kg)

**Therapeutische dosis**:
- DHB : 0,625mg (0,01-0,015mg/kg)
- DXM : 5mg (0,1-0,15mg/kg)
- Ondansetron : 1mg (0,1mg/kg)
- Litican : 50-100mg
- Aprepitant : 40mg (po)

* Werkt pas na 2h
** zo nog niet toegediend
*** enkel zinvol te herhalen na 6h
**** enkel zinvol te herhalen na 8h

Dr. Geertrui Dewinter UZ Gasthuisberg Leuven 30/05/2011
Conclusions

• Identify ponv risk factors
• High risk patients: always prophylaxis
• ≠ classes antiemetics: compatible, additive
• TIVA: anti-ponv effect
• Preemptive antiemetics ≠ treatment antiemetics