

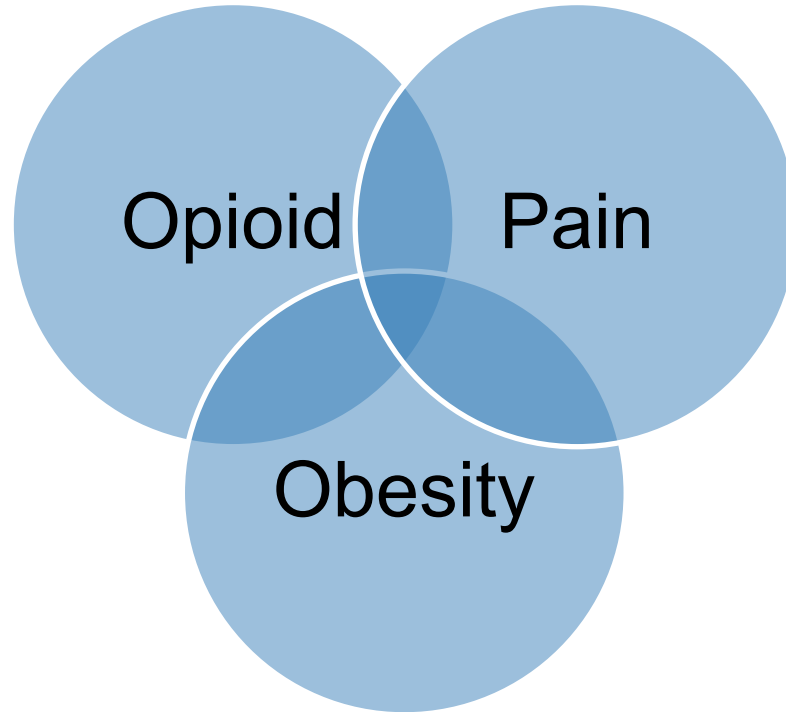
***OPIOID-FREE
ANESTHESIA***

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WHAT IS IT ABOUT?

- 1. WHY DID WE START USING FENTANYL IN ANESTHESIA?***
- 2. PROTECTING OUR PATIENTS***
 - A. SAFER ANESTHETIC/FEWER SIDE EFFECTS***
 - B. INFLAMMATORY AND ENDOCRINE CHANGES***
- 3. NATURAL EVOLUTION OF ANESTHESIA BASED ON***
 - A. INCREASES IN***
 - 1. MEDICATIONS AVAILABLE***
 - 2. KNOWLEDGE OF OPIOIDS***
 - 3. KNOWLEDGE OF PAIN MECHANISMS***
 - 4. REGIONAL ANESTHESIA OPTIONS***

PATIENTS





1.

PRECONCEPTIONS

PRECONCEPTION #1

OPIOIDS ARE SAFE

× #1 CAUSE OF EMERGENCIES IN PACU ARE RESPIRATORY

PRECONCEPTION #2

OPIOIDS ARE EFFECTIVE FOR TREATMENT OF PAIN

× >50% OF PATIENTS REPORT MODERATE TO SEVERE PAIN

PRECONCEPTION #3

OPIOID RELATED SIDE EFFECTS (ORADES) CAN BE MANAGED

- × PONV/PRURITIS MOST COMMON CAUSE OF UNEXPECTED ADMISSION***
- × MANY SIDE EFFECTS ARE UNTREATABLE***

PRECONCEPTION #4

***INTRA-OPERATIVE OPIOIDS DON'T CONTRIBUTE TO ADDICTION
(ADDICTION REQUIRES CONSCIOUSNESS)***

- × ADDICTION IS A GENETIC DISORDER***
- × DEPENDENCE OCCURS TO 100% OF PATIENTS TAKING OPIOIDS***

PRECONCEPTION #5

OPIOIDS ARE NECESSARY FOR INTRA-OPERATIVE HEMODYNAMIC CONTROL

× ***OPIOID-FREE ANESTHESIA***

× ***REGIONAL ANESTHESIA***



2.

ORADES

ORADES

RESPIRATORY

- RESPIRATORY DEPRESSION***
- PHARYNGEAL MUSCLE WEAKNESS***
- PNEUMONIA***

PAIN

- SISYPHUS EFFECT (OPIOID INDUCED HYPERALGESIA & OPIOID TOLERANCE)***
- SURGICAL HYPERALGESIA***
- CHRONIC POST-SURGICAL PAIN***

GI/GU

- PONV***
- CONSTIPATION***
- ILEUS***
- URINARY RETENTION***

ORADES

PSYCHOLOGIC

- ADDICTION***
- DEPENDENCE***
- OPIOID USE DISORDER***

IMMUNE/ENDOCRINE

- IMMUNOSUPPRESSION:
KILLER T CELL &
CORTISOL INHIBITION***
- TESTOSTERONE
DEFICIENCY***
- OSTEOPOROSIS:
MALUNION***

NEUROLOGIC

- SEDATION***
- PRURITUS***
- HALLUCINATION***
- BLOCK REM SLEEP***



3.

HOW-TO

SPECIAL POPULATIONS

➤ ***RESPIRATORY***

➤ ***OBESE, OSA, ELDERLY, COPD***

➤ ***COMPLEX PAIN MANAGEMENT***

➤ ***LONG TERM OPIOID USE, ACUTE ON CHRONIC PAIN, RISK FOR CPSP***

➤ ***PONV***

➤ ***OPIOID-USE DISORDER***

➤ ***CANCER***

TOOLBOX

GOLD STANDARD

***REGIONAL
OR
NEURAXIAL***

INTRA-OPERATIVE MANAGEMENT

***ALPHA2AGONIST
KETAMINE
LIDOCAINE INFUSION
MAGNESIUM
N2O
BETA BLOCKERS***

POST-OPERATIVE MANAGEMENT

***ACETAMINOPHEN
NSAIDS/COXIBS
DEXAMETHASONE
GABAPENTINOID
SSRI***



POST-OP SEDATION

THE MAJOR COMPLICATION OF OFA

ALPHA2AGONIST

➤ ***BENEFITS***

- ***ANALGESIC/ANTI-HYPERALGESIC***
- ***ANXIOLYSIS***
- ***ANTI-SHIVERING***
- ***REDUCES EMERGENCE DELIRIUM***
 - ***PEDIATRICS AND ELDERLY***

ALPHA2AGONIST

➤ **DEXMEDETOMIDINE**

➤ **SIDE EFFECTS**

➤ **BRADYCARDIA**

➤ **HYPER/HYPOTENSION**

➤ **SEDATION**

➤ **CONSIDERATIONS**

➤ **10 MINUTE ONSET**

➤ **CAN'T ADMINISTER RAPIDLY**

ALPHA2AGONIST

➤ ***DEXMEDETOMIDINE***

➤ ***INDUCTION***

➤ ***0.3-0.5 MCG/KG/10 MINUTES***

➤ ***MAINTENANCE***

➤ ***0.2-1 MCG/KG/HR***

➤ ***PACU***

➤ ***0.1-0.5 MCG/KG/HR***

ALPHA2AGONIST

➤ ***CLONIDINE***

➤ ***BENEFITS***

➤ ***SAME AS DEXMEDETOMIDINE***

➤ ***SIDE EFFECTS***

➤ ***HYPOTENSION/BRADYCARDIA***

➤ ***SEDATION***

➤ ***CONSIDERATIONS***

➤ ***12 HOUR HALF LIFE***

ALPHA2AGONIST

➤ **CLONIDINE**

➤ **2-5 MCG/KG IV**

➤ **300 MCG MAX**

➤ **100 MCG ON INDUCTION, 50 MCG PRN AFTER THAT**

➤ **0.1-0.3 MCG/KG/HR**

➤ **5-7 MCG/KG PO**

NMDA ANTAGONIST

- ***KETAMINE BENEFITS***
 - ***ANALGESIA/ANTI-HYPERALGESIA***
 - ***BRONCHODILATION***
 - ***ANTI-DEPRESSANT***

NMDA ANTAGONIST

- ***KETAMINE SIDE EFFECTS***
 - ***SEDATION***
 - ***HALLUCINATIONS***
 - ***DISASSOCIATION***
 - ***DYSPHORIA***

NMDA ANTAGONIST

➤ KETAMINE

➤ INDUCTION

➤ 0.3-0.5 MG/KG

➤ MAINTENANCE

➤ 2-10 MCG/KG/MIN = 0.1-0.6 MG/KG/HR

➤ PRE/PACU

➤ 0.1-0.3 MG/KG/5 MINUTES

NMDA ANTAGONIST

- ***MAGNESIUM BENEFITS***
 - ***ANALGESIA/ANTI-HYPERALGESIA***
 - ***BRONCHODILATOR***
 - ***ANTI-SHIVERING***

NMDA ANTAGONIST

- ***MAGNESIUM SIDE EFFECTS***
 - ***PROLONGED NON-DEPOLARIZERS***
 - ***USE CAUTION IN RENAL FAILURE***
 - ***HYPOTENSION***

NMDA ANTAGONIST

➤ ***MAGNESIUM***

➤ ***INDUCTION***

➤ ***30-50 MG/KG***

➤ ***MAINTENANCE***

➤ ***10 MG/KG/HR***

NMDA ANTAGONIST

➤ *N2O BENEFITS*

➤ *ANALGESIA/ANTI-HYPERALGESIA*

➤ *REVERSES CHRONIC CENTRAL SENSITIZATION*

NMDA ANTAGONIST

- ***N2O COMPLICATION***
 - ***DIFFUSION HYPOXIA***
 - ***INCREASE IN NAUSEA IF NO PROPHYLAXIS***
 - ***PULMONARY HYPERTENSION***
 - ***B12 DEFICIENCY***
 - ***GENETIC MUTATION***

NA CHANNEL BLOCKER

➤ *LIDOCAINE BENEFITS*

- *ANALGESIA/ANTI-HYPERALGESIA***
- *ANTI-INFLAMMATORY***
- *REDUCES COUGHING ON EMERGENCE***
- *ANTI-VIRAL/BACTERIAL/FUNGAL***

NA CHANNEL BLOCKER

➤ LIDOCAINE SIDE-EFFECTS

➤ LOWERS SEIZURE THRESHOLD

➤ USE CAUTION IF CONCURRENT USES OF LOCAL ANESTHESIA

➤ MILD NEUROLOGIC SYMPTOMS IN AWAKE PATIENT

➤ TINNITUS ETC

NA CHANNEL BLOCKER

➤ LIDOCAINE

➤ INDUCTION

➤ 1-2 MG/KG

➤ MAINTAINENCE

➤ 2-3 MG/KG/HR

➤ 2% LIDOCAINE 0.1-0.15 ML/KG/HR (80 KG = 8-12 ML/HR)

➤ PACU

➤ 1-2 MG/KG/HR

BETA BLOCKER

➤ ESMOLOL BENEFITS

- REDUCED POST-OPERATIVE PAIN/OPIOID REQUIREMENTS***
- PREVENTS ORADES***

➤ ESMOLOL SIDE EFFECTS

- BRADYCARDIA***
- HYPOTENSION***

BETA BLOCKER

➤ **ESMOLOL**

➤ **INDUCTION**

➤ **0.5-1 MG/KG**

➤ **MAINTENANCE**

➤ **50-200 MCG/KG/MIN**

➤ **METOPROLOL**

➤ **LABETOLOL**

1. Consider premedication: *Clonidine (Catapressan)* 150 ug or *Gabapentine (Lyrica)* 150 – 300 mg po

Before beginning of anaesthesia prepare:

1. "The Dexdor load" - 5 cc syringe with 5 ml *Dexmedetomidine* 4 ug/ml

2. "The induction & maintenance mixture" - 50 cc syringe containing:

50 ug *Dexmedetomidine* (Dexdor) (0,5 cc of standard 100 ug/ml solution or 12,5 cc from 4ug/ml solution.)

50 mg *Ketamine* (*Ketalar*) (or 25 mg *S-Ketamine*)

500 mg *Lidocaine* (*Linisol*) (25 ml of standard 2% solution)

NaCl up to total 50 ml

2. Pre induction loading:

Start with "The Dexdor load" syringe direct after iv line is placed and patient has been connected to Standard monitoring latest 10 min before induction.

Give iv 0,25 ug/kg *Dexmedetomidine* (max 20 ug) (age dependent)

3. Induction:

Dexmedetomidine 0,1 ug/kg

Lidocaine 1 mg/kg

Ketamine 0,1 mg/kg

= 1ml/10 kg of solution from "The induction & maintenance mixture" syringe

Continue induction with *Propofol*.

If NMB is needed give *Rocuronium* and measure TOF/PTC

Consider *Dexamethasone* 10 mg; *Droperidol* 0,625 – 1,25 mg, *Magnesium* 40 mg/kg (~2,5 g)

4. Continue maintenance of anaesthesia with:

Dexmedetomidine 0,1 ug/kg/h

Lidocaine 1 mg/kg/h

Ketamine 0,1 mg/kg/h

= 1ml/10 kg/h of solution from "The induction & maintenance mixture" syringe

+ *Sevoflurane* or *propofol* infusion as usual

About 15 min before the end of the operation reduce maintenance dose to 0,5 ml/10 kg/h.

5. Provide anti nociception in PACU:

Continue infusion at 0,5 ml/kg/h until it ends or until patient discharge from PACU

Dexmedetomidine 0,05 ug/kg/h

Lidocaine 0,5 mg/kg/h

Ketamine 0,05mg/kg/h

= 0,5 ml/10 kg/h of solution from "The induction & maintenance mixture" syringe

6. Analgesia after PACU (intensive care, ward, day clinic, home)

Oral analgesics – iv analgesics – PCIA pumps

Paracetamol iv - po

NSAIDs iv - po

OFAMixture iv fixed pump rate 0,5 ml/10 kg/h if needed patient controlled bolus of 1 ml (lockout 15 min)

Morphine iv – po - sl as rescue

Every patient is different, monitor and adapt up or down.

All doses can be adjusted if needed. (age effect more important than weight!)

Consider 0,5 – 1 ml/10kg bolus of the mixture just before surgery if tachycardia.

For obese patients base doses on IBW (LBW) instead of TBW

For short procedure use no maintenance infusion.

Have *Metoprolol*, *Nicardipine*, *ephedrine*, *phenylephrine* or comparable available.

Example for patient of 70 kg IBW:

Label "The induction & maintenance mixture" 50 cc syringe:

Dexdor. 50 mcg = 12.5 ml of dexmedetomidine mixture

Ketalar. 50 mg = 1 ml of Ketamine

Lidocaine 500 mg = 25 ml lidocaine 2%

NaCl 0,9% up to 50 ml = 11.5 ml

7 ml for induction,

7ml/h maintenance,

3,5 ml/kg/h PACU from of solution from "The induction & maintenance mixture" syringe

Content of one 50 cc syringe should be enough for about 6 hours

Label "The Dexdor load" 5 cc syringe:

Dexdor 20 ug to be given 15 min before start

If heart rate rises give extra bolus and increase infusion

If heart rate decreases very low reduce infusion

Be aware that every patient is different and might require less or more.

Good luck and keep it simple!

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‘www.publicationslist.org/jan.mulier

Cocktail Maintenance Infusion

- **Lidocaine 2mg/kg/hr, Ketamine 5mcg/kg/min, Magnesium 10mg/kg/hr, Precedex 0.4mcg/kg/hr**
- NS 100mL bag remove 20mL
 - Inject Lido 2% 20mL, Ketamine 60mg, Magnesium 2gm, and Precedex 80mcg into bag
 - Infuse at 0.5mL/kg/hr
 - Run infusion up until starting incision closure
- Syringe
 - Lidocaine 2% 10mL, Ketamine 30mg, Precedex 40mcg, Magnesium 1gm, then add IV fluid to make 50mL volume

*based on Ideal or Adjusted Body Weight

MY FAVORITE TECHNIQUE

➤ DECISIONS

➤ LENGTH OF CASE

➤ STANDARD VS SHORT TECHNIQUE

➤ SYRINGES/BOLUS

➤ INFUSION

➤ 1 BAG

➤ MULTIPLE PUMPS

MY FAVORITE "STANDARD" TECHNIQUE

➤ PRE-OP

➤ DEXMEDETOMIDINE 0.5 MCG/KG/10 MINUTES

➤ INDUCTION

➤ KETAMINE 0.5 MG/KG

➤ LIDOCAINE 2 MG/KG

MY FAVORITE "STANDARD" TECHNIQUE

- ***MAINTENANCE STARTING DOSES***
 - ***DEXMEDETOMIDINE 0.2 MCG/KG/HR***
 - ***KETAMINE 0.1 MG/KG/HR***
 - ***LIDOCAINE 2 MG/KG/HR***
 - ***MAGNESIUM 50 MG/KG/1 HOUR***

MY FAVORITE "STANDARD" TECHNIQUE

➤ ONE BAG TECHNIQUE

- ADD 2 MCG/ML DEXMEDETOMIDINE AND 1 MG/ML KETAMINE TO 2% LIDOCAINE**
- 0.1-0.15 ML/KG/HR**
 - 80 KG PATIENT : 8-12 ML/HR**
- DEXMEDETOMIDINE 0.2-0.3 MCG/KG/HR**
- KETAMINE 0.1-0.15 MG/KG/HR**
- LIDOCAINE 2-3 MG/KG/HR**

MY FAVORITE "SHORT" TECHNIQUE

➤ **INDUCTION**

- **ESMOLOL 0.5-1 MG/KG**
- **MAGNESIUM 5-10 MG/KG**
- ***MAYBE* DEXMEDETOMIDINE 0.1-0.3 MCG/KG**
- ***MAYBE* KETAMINE 0.1-0.3 MG/KG**

➤ **MAINTENANCE**

- **MAGNESIUM 40 MG/KG**
- **N2O**
- **ESMOLOL PRN**



4.

EXPECTATIONS

NEED TO RESET OUR EXPECTATIONS

***INITIAL WAKE UP SLOWER,
BUT MORE CLEAR-HEADED IN
PACU***

***INCREASED RESPIRATORY
RATE UNTIL
EXTUBATION... DO NOT NEED
TO TREAT WITH AN OPIOID!***

***LESS PAIN, MORE
RESPONSIVE TO OPIOIDS***

SOFA

The Society for Opioid Free Anesthesia

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