WILDLIFE CHEMICAL CAPTURE AND ANAESTHESIA II

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Wisdom 1

• The best anaesthesia is the one you have experience with

Introduction

• High therapeutic index
• Potent – low volume
• Rapid onset – min. excitement
• Good muscle relaxation
• Antagonists available
• Long shelf-life

Considerations prior to capture

• Species – determines drug choice and doses. Know the species!
• Sex
• Age
• Weight
• Seasonal variations
• Excitement
Potent - low volume

- Soehring’s law
  - “Resorption per time unit is inversely proportional to the concentration and the applied injection volume”

Drug combinations

+ Dose reduction – adverse effects reduced
+ Shorter induction phase
+ Smoother awakening

- Difficult to assess individual component effects
- Dose calculation
- Adverse effects increased

<table>
<thead>
<tr>
<th>Xylazin mg / kg</th>
<th>Ethorphine mg / kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.01</td>
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<tr>
<td>0.01</td>
<td>0.025</td>
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<tr>
<td>0.025</td>
<td>0.025</td>
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<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Dose calculation

- Never memorize a drug dose
- When you are not sure do not apply
- Paper, pencil and calculator
- Careful when you have “bad feeling”
- Take your time

Sedation

Long-Acting Neuroleptics

Neuromuscular blocking drugs

- Curare - typifies this group
- Three classes
  - Depolarizing
  - Non-depolarizing or competitive
  - Ganglionic

Neuromuscular blocking drugs

- Depolarizing
  - Succinylcholine, suxamethonium
- Competitive
  - Gallamine, Tubocurarine, Atracrium
  - Antagonists: Phystostigmine, neostigmine
- Ganglionic
  - Nicotine (Cap-Chur-Sol®) - lethal!
Neuroleptanalgesia

- Combination of a neuroleptic Alpha-2 agonist tranquilizer with an analgetic and kataleptic Cyclohexane
  - Alpha-2: xylazine, detomidine, romifidine, medetomidine, dexmedetomidine
  - Cyclohexanes: phencyclidine, ketamine, tiletamine

Ketamine Hydrochloride
Xylazine (Alpha-2 inhibits norepinephrine release)
- Hellabrunner Mischung
  - Ketamin 10 mg / Kg Kgw + Xylazin 2 mg Kg Kgw.

Hellabrunner Mix

- 500 mg Rompun® TS (Xylazine) dissolved with 4 ml 10 % Ketamine
- 1 ml mix contains:
  - 125 mg Xylazin
  - 100 mg Ketamin
HBM / Xylazine Antagonisten

- Yohimbin 0,25 - 0,3 mg / Kg Kgw.
- Atipamezole (Antisedan®) 1 mg / 10 mg Xylazine
- 4-amino-pyridin
- Tolazolin

Medetomidine + Ketamine

- Medetomidine Alpha - 2 adrenoceptor Agonist
  - Similar to Xylazine
  - New Generation
  - Enhanced action

Medetomidine + Ketamine

- Medetomidine is available as:
  - Dormitor® 1 mg / ml
  - Zalopine® 10 mg / ml
  - „Experimental“ 40 mg/ml
Medetomidine Antagonist

- Atipamezole (Antisedan®): 5 mg /ml
  - 5 mg / 1 mg Medetomidine

Medetomidine + Ketamin

- Very useful for ungulates
  - Gazelles und Antelopes
  - Equids Alternative for etorphine
  - Careful in bears – spontaneous arousal
  - Dose 80 – 100 ug / Kg Kgw. + 1,5 mg / Kg / Kgw. Ketamine
Other combinations

- Tiletamine - Zolazepam - Medetomidine
- Detomidine - Butorphanol - Ethorphine + Tiletamine-Zolazepam

Other combinations_BAM

- BAM a mixture of Butorphanol, Azaperone and Medetomidine
- Completely reversible anesthesia
- excellent muscle relaxation, analgesia, relaxed respiration and no hyperthermia
- mule deer and white tail deer.

http://www.zoopharm.net/drugs/pdf/BAM-V2.pdf

Tiletamine - Zolazepam

- Also a Neuroleptanalgesia
- Used since the 1960s in the USA
- Since the 1980s in Europe - but not as popular

After Schobert 1987

<table>
<thead>
<tr>
<th>Primates</th>
<th>53 sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felidae</td>
<td>21 sp.</td>
</tr>
<tr>
<td>Canidae</td>
<td>8 sp.</td>
</tr>
<tr>
<td>Ursidae</td>
<td>10 sp.</td>
</tr>
<tr>
<td>Viverridae</td>
<td>13 sp.</td>
</tr>
<tr>
<td>Bovidae</td>
<td>10 sp.</td>
</tr>
<tr>
<td>Cervidae</td>
<td>33 sp.</td>
</tr>
<tr>
<td>Aves</td>
<td>36 sp.</td>
</tr>
<tr>
<td>Reptilia</td>
<td>9 sp.</td>
</tr>
</tbody>
</table>

Dosage / kg always is a combination of mg Tiletamine + mg Zolazepam
Tiletamine - Zolazepam

- 5 mg / Kg Kgw. Tiletamine Zolazepam means:
  - 2,5 mg Tiletamine + 2,5 mg Zolazepam / Kg Kgw.

Tiletamine Zolazepam

- Excellent for emergencies
- Very short induction time
- Large therapeutic index
- Can be used in „just about“ all species
  - 10 mg / Kg Kgw
Vienna Mix

- 500 mg Rompun® TS with 5 ml 10% Tiletamin - Zolazepam Lsg. Auflösen
  - Per ml 100 mg Xylazin and 100 mg TZ

Benzodiazepine Antagonist

- Sarmazenil (Sarmasol®): 0,05 - 0,1 mg /Kg
- Flumazenil (Anexate®): 1 mg / 25 mg BDZ


Tiletamine - Zolazepam - Medetomidine

- Very useful in many species but especially in carnivores - bears:
  - 50 - 80 ug Medetomidine + 1-2 mg/Kg TZ
  - 500 mg T-Z with 3mg medetomidine (3 ml Dormitor®)
Opioids

- From poppy flower (*Papaver somniferum*)
- Most anaesthetics derived from Morphine und Thebaine
- Fentanyl, Ethorphine, Carfentanil

Ethorphine Potency (based on rat data)

- Morphine 1
- Fentanyl 50
- Ethorphine 750
- Carfentanil 1000

Ethorphine + ACP + (alpha-2)

- Large Animal Immobilon (C-Vet): 2,45 mg/ml Ethorphine + 10 mg/ml ACP
- M-99: 2,45 mg/ml oder 9,8 mg/ml
Ethorphine + ACP + (alpha-2)

- NB! Human toxicity

Ethorphine Human Emergency

- Keep calm - get help
- Wash contaminated area - use gloves
- Naltrexone PO
- Naltrexone od. Naloxon IV - IM
- Repeat till effective
- IV port
- Remember ABC's

Ethorphine Emergency

NEVER USE DIPHRENORHINE IN HUMANS!!

Ethorphine

- Ethorphine can be used orally
  - In honey bait for Brown / black Bears
  - Antagonise and apply TZ

  ! Dosage cannot be controlled in oral applications!
Ethorphine Antagonists

- Diprenorphine (Reviron®): 2 x the Ethorphine Dose
- Naltrexone (Trexonil®, Revia®): 20 mg / mg Ethorphine
- Naloxon (Narcanti®): 0.04 mg / kg IM/IV/SQ

Ethorphine Antagonists

- Naltrexone can be given intranasally
- Emergency – Cardio-pulmonary depression or arrest
- Primates

Ethorphine Antagonists

- NB! Enterohepatic cycle with possible Renarcotisation after 8 – 12 hrs.
- Use naltrexone – long half-life

Ethorphine – Wisdom

- Ethorphine solo can not be recommended
- Catalepsia – significant muscle rigidity and cramping

Ethorphine – Wisdom 2

- The therapeutic index is narrow in some species
  - Elephant
  - Rhino – especially white rhino
  - Hippo dive reflex
Buthorphanol

- Opioid agonist-antagonist
- Kappa-receptor Agonist
- Mu-receptor Antagonist

- Use this in combo in all equids, rhinos, tapir

Detomidine - Buthorphanol - Ethorphine + Tiletamine-Zolazepam

- Always use the partial antagonist with ethorphine
  - Reduces respiratory depression
  - Very smooth
  - Less pacing

Detomidine - Buthorphanol - Ethorphine + Tiletamine-Zolazepam

Gas Anaesthesia

- Gas can provide a useful addition to injectable protocols
  - Halothane
  - Isoflurane
  - Sevoflurane
Gas equipment for larger animals can be cumbersome! - and cylinders heavy! - or even unavailable.

Standard Penton OMV Tri-Service draw-over vaporiser
ANAESTHETIC MONITORING & FLUID THERAPY

GUIDELINE ANAESTHETIC DOSE RATES (mg/kg) FOR CARNIVORES

<table>
<thead>
<tr>
<th>Agent</th>
<th>Small spp (kg)</th>
<th>Medium spp (10–100kg)</th>
<th>Large spp (&gt;100kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medetomidine + ketamine</td>
<td>100–150 mg + 3–15 mg</td>
<td>50–80 mg + 2–4 mg</td>
<td>30–50 mg + 0–3 mg</td>
</tr>
<tr>
<td>Ketamine + xylazine</td>
<td>10–20 mg + 1–2 mg</td>
<td>8–10 mg + 0.5–1 mg</td>
<td>5–8 mg + 0.5–2 mg</td>
</tr>
<tr>
<td>Tiletamine + Zolazepam (TZ)</td>
<td>5–15 mg</td>
<td>3–10 mg</td>
<td>2–5 mg</td>
</tr>
<tr>
<td>Medetomidine + TZ</td>
<td>30–50 mg + 2.5–4 mg</td>
<td>30–40 mg + 0.5–3 mg</td>
<td>15–60 mg + 0.5–3 mg</td>
</tr>
</tbody>
</table>

- Small spp: < 10 kg
- Medium spp: 10–100 kg
- Large spp: >100 kg