IS THAT HORSE ASLEEP?
TOTAL INTRAVENOUS ANESTHESIA
IN THE HORSE
TOTAL INTRAVENOUS ANESTHESIA (TIVA)

Advantages
• Field or hospital procedures
• Minimal equipment required
• Minimal cardiorespiratory compromise

Disadvantages
• No single drug
• Short to medium duration
• Oxygen supplementation
CONSIDERATIONS

• Duration

• Procedure stimulation

• Patient status
PROTOCOL SELECTION

• Injectable Combinations
  • Xylazine, Ketamine, Diazepam
  • Xylazine, Guaifenesin, Ketamine
  • Xylazine, Tiletamine, Zolazepam
  • Detomidine, Butorphanol, Ketamine
  • Romifidine, Diazepam, Ketamine

• Infusion Combinations
  • Guaifenesin, Ketamine, Xylazine
  • Guaifenesin, Ketamine, Detomidine
  • Guaifenesin, Ketamine, Romifidine
  • Midazolam, Ketamine, Xylazine
SHORT PROCEDURES EQUIPMENT

- IV Catheter/Extension set
- Stethoscope
- +/- Intubate
SHORT PROCEDURES PROTOCOL
Xylazine – Ketamine – Diazepam

• Procedures < 30 minutes

• Premedication
  • Xylazine 1.1 mg/kg IV
  • +/- Butorphanol 0.04 mg/kg IV

• Induction – dissociative & benzodiazepine combined
  • Ketamine 2.2 mg/kg IV
  • Diazepam 0.04 mg/kg IV

Photo courtesy Dr. Caston
PRE-MEDICATION

Photos courtesy Dr. Caston
Smooth recovery with minimal ataxia – stand 1\textsuperscript{st} attempt

- \(~30 – 35\) minutes after ketamine administration

Prolong anesthesia (Xylazine – Ketamine)

- Additional 30-50\% of original dose

Redosing prolongs recovery times
MEDIUM – LONG PROCEDURES – TIVA “TRIPLE DRIP”

- Procedures 30-90 minutes
- “Triple Drip” → GKX combination
  - Guaifenesin – central muscle relaxant
  - Ketamine – dissociative
  - Xylazine – alpha 2 agonist
MEDIUM – LONG PROCEDURE EQUIPMENT

• More monitoring and support
TIVA “TRIPLE DRIP” – GKX

- Triple Drip Preparation for 500 mL fluid bag
  - Guaifenesin 5% in 500 mL fluid bag
    - Add 25 g Guaifenesin to 500 mL (50 mg/mL)
  - Ketamine 500 – 1000 mg (1-2 mg/mL)
  - Xylazine 250 mg (0.5 mg/mL)

- Infusion rate = 1.5 mL/kg/hr or to effect

- If using 10% Guaifenesin added amounts are double and the fluid rate is halved
TIVA – “TRIPLE DRIP”

• Intravenous administration required
  • Perivascular Guaifenesin → tissue necrosis or sloughing
  • >10 % Guaifenesin → hemolysis

• Variable rate – horse, illness, or procedure

• Hypoxia due to recumbency
TIVA – “TRIPLE DRIP”

- Recovery similar to injectable TIVA

- Typically ~30 minutes after end of infusion

- Increases recovery time and ataxia

- May need oxygen supplementation
TIVA MONITORING – LIGHT PLANE OF ANESTHESIA

- Open eyes, spontaneous blinking, palpebral present
- Slow nystagmus
  - Slow to rapid = light anesthesia
- Lacrimation
- Anesthetic depth gauged from surgical stimulation

Photo courtesy Dr. Caston
TIVA MONITORING- DEEP PLANE OF ANESTHESIA

• Rapid, shallow breaths $\rightarrow$ apnea

• Cheyne-Stokes breathing
  • Deep, fast breathing $\rightarrow$ transitory apnea $\rightarrow$ repeat

• Decreased pulse strength

• Absent ocular movements

Some disturbances of the respiratory rhythm

Cheyne-Stokes respiration

CONCLUSION

• Most common form of anesthesia

• Adequate anesthesia

• Smooth recovery

• Careful monitoring
REFERENCES


• Hubbell J. Options for field anesthesia in the horse. Proceedings of National AAEP Convention 1999, 45: 120-121


THANK YOU!

- Dr. Bornkamp & Dr. Riedesel
- Dr. Caston
- Equine & Anesthesia department
- Friends & Family