Wheat Ridge Animal Hospital
Presents:

2016 Mountain Area Continuing Education Seminar

What to consider when anesthetizing a geriatric patient

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Outline
Risk in geriatric anesthesia

Geriatric physiology

Clinical pharmacology

Anesthetic management

Anesthetic risk assessment

Cardiac Physiology

Cardiac Disease

Cardiac support

Pulmonary Physiology

Pulmonary support

Prevent hypoxemia
  - Preoxygenate
  - High inspired O₂ & continue in recovery!
  - Hypoventilation persists
  - Shivering increases O₂ consumption

Prevent hypoventilation
  - Positive pressure ventilation
Protect airway
- Intubate
- Monitor

17 Renal Physiology

18 Renal Physiology
Potential decreased functional kidney mass, RBF, GFR
- Uremia & plasma levels
- Drug Elimination – ketamine in cats
- Potential to prolong recovery
- Ability to deal with Na & H₂O load or loss
- Concentrating ability – RAAS & ADH
- Azotemia - predisposition to metabolic acidosis
- Electrolytes

19 Ace-inhibitors: Enalapril

20 Renal support
Decreased renal function
- Diuresis pre & post-op
- Uremia – consider decreasing drug doses
Prevent hypotension
Minimize sympathetic stimulation
- VC may reduce renal blood flow
Sevoflurane – compound A
- Nephrotoxic
Synthetic colloids
- Potential negative renal effects in humans

21 Renal support
Sevoflurane – compound A
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22 Hepatic Physiology
Decreased total mass and blood flow
- Blood flow further attenuated by GA
Enzyme function
- Drug metabolism
- Increased plasma levels of drugs
Decreased metabolic function (mild)
- Glucose
- Albumin
Clotting factors

23 □ Hepatic support
Monitor & maintain oxygenation & BP
Pharmacology
  ◆ Reversible drugs
  ◆ Low doses, increased dosing interval
Cyt P-450 inhibition
  ◆ Reduce metabolism of drugs when co-administered

24 □ CNS Physiology
Decreased neuronal mass
  ◆ Reduced volume of gray and white matter
  ◆ Neuronal shrinkage
Alterations in synapses and dendrites
  ◆ Neurotransmitters
  ◆ Receptor density
Axons and myelin
  ◆ Breakdown and degeneration
  ◆ Decrease in cognitive function

25 □ CNS support
  ◆ Increased sensitivity to anesthetics
  ◆ Reduced sympathetic response to stress
  ◆ Delirium & cognitive dysfunction after anesthesia in people, likely in vet med

26 □ Serotonin & drug interactions
TCAs
  ◆ Amitriptyline, Clomipramine, Mirtazapine
SSRIs
  ◆ Fluoxetine
  ◆ Tramadol
MAOIs – Selegiline
Phenylpiperidine series
  ◆ Meperidine, fentanyl, methadone
SARI - Trazadone

27 □ Serotonin syndrome
Autonomic signs
  ◆ Tachycardia
  ◆ Tachypnea
  ◆ Fever
Diarrhea
Alterations in BP

Neurologic signs
Tremor
Myoclonus
Rigidity

Treatment: serotonergic antagonist
Cyproheptadine, Chlorpromazine
Supportive care

28 Serotonin syndrome
MAOIs
Avoid drugs that stimulate catecholamine release
Ketamine
Use direct acting sympathomimetics
Avoid ephedrine

TCAs are arrhythmogenic
Anticholinergics may increase these effects

Dose drugs cautiously, titrate to effect

29 Thermoregulation
Decreased basal metabolic rate & production of body heat
Hypothermia develops faster
Re-warming is slower
Consequences
Shivering
Increases VO₂ up to 300%
Increased in cardiopulmonary function may not match

30 Other considerations
Osteoarthritis
Gentle handling & restraint
EMLA cream if IV challenging
Padding, positioning

Be patient! Impaired:
Auditory
Visual

31 Pharmacology
Body composition
Decrease in skeletal muscle, increased body fat
Decrease total body water
Lower volume of distribution
Kidney & liver blood flow
Decreased CO
CNS changes

32 **Pharmacology**

Atropine
- Decreased HR response in geriatric people
- Increased CNS sensitivity (sedation, disorientation)

Beta adrenergic agonists
- Decreased HR response

Meperidine (opioid)
- Absorption delayed in older dogs (IM)
- Elimination delayed in older dogs

33 **Pharmacology**

Propofol
- Lower dose required for intubation
- Slower clearance
- More likely to see apnea
- Higher incidence of hypotension (people)

Likely similar PK changes w/other anesthetic drugs
- Requirements are decreased, prolonged interval
- Titrate to effect

34 **Pharmacology - MAC in people**

35 **Pharmacology**

MAC decreased with age in dog
Older dogs had lower HR, MABP, SpO2

36 **Individualized anesthesia plans**

Thorough history
Physical exam
- Co-existing morbidities
  - Arthritis
  - Endocrine (hypo/hyperthyroid, DM, HAC)
  - CKD

Blood work
Additional diagnostics or treatment prior to anesthesia?

37 **Individualized anesthesia plan**

Careful manipulation
Pre-medication
- Opioids
- Benzodiazepines
- Anticholinergics
Environment
- Warm
- Provide hiding options
- Quiet

38 **Individualized anesthesia plan**
Pre-oxygenation with mask
Induction
- Injectable induction
- Cats with renal disease try to avoid ketamine
Maintenance
- Balanced anesthesia
Monitoring

39 **Individualized anesthesia plan**
Recovery
- Bladder expression
- Supplement oxygen
- Analgesics prior to recovery
- Heat support
- Continue fluid support
- Quiet, dark, padded environment
- Monitoring – dysphoria or pain

40 **Old angry cat sedation**
Alfaxalone 1-2 mg/kg + Midazolam 0.25 mg/kg + Opioid IM
- Fast onset
- Minimal cardiovascular depression
- Large volume
- Potential for excitement in recovery
- Quiet, dark area
- Not seen when followed by inhalant anesthesia

41 **Non-pharmacological options**
Cryotherapy
Acupuncture
E-stim/TENS
LASER
PT
Massage
Heat
Ultrasound
PROM

42 **Summary**
Individualized patient assessment
Dose drugs on lean body weight, reduce doses
Pre-oxygenate
Slow titration of drugs
Careful and diligent monitoring (BP, oxygenation) with dedicated anesthetist
Continue close monitoring and support in recovery

Questions?

References


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