Feline otracheal intubation

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Why intubate?

- Maintain patent airway
- Protect airway
- Deliver anaesthetic gases/vapour
- Prevent anaesthetic leak
- Day 1 Skill

When to intubate

- ASA status ≥3
- Major or long procedures
  - ETI reduces risk (0.6; CEPSAF 2007)
- ↑ GOR risk
- ↑ aspiration risk
- IPPV required
### When not to intubate

- Brief, minor procedures
  - If low GOR risk
  - Facemask or SGAD alternative
  - ETI increases risk (2:3; CEPSAF 2007)
- ± airway foreign bodies

### Feline concerns

- Laryngospasm
- Small diameter airway
  - Delicate dorsal tracheal ligament
  - Partially complete tracheal rings
    - More complete than dogs
- Dental procedures
  - Tracheal damage
  - Cortical blindness

### Anatomy for orotracheal intubation

- Pharynx
- Tongue
- Epiglottis
- Vallecular
- Arytenoids
- Vocal folds
- Glottis
- Rima glottides
- Trachea
- Carina
## Equipment

- Laryngoscope
- Endotracheal tubes
  - ETT anatomy
  - Laryngeal desensitisation
  - Additional aids

## Laryngoscope

### Endotracheal tubes

- $\text{MAC}_{\text{intubation}} \neq \text{MAC}_{\text{incision}}$
- Sevo 3.55% vs 1.71%
- Autonomic stimulation
  - Painful
  - Unpleasant
- Risk of laryngospasm
- Risk of injury
- ETT selection
ETT anatomy

Machine end
- 15mm ETT connector
- Shaft
- ± Radiopaque marker
- ± Murphy eye
- ± Cuff & pilot tube
- Bevel
- Distal tip
Patient end

ETT selection: material

- Polyvinyl chloride (PVC)
  - ± Low P : high V cuff
  - ± Murphy eye
- Silicone
  - Medium P : medium V cuff
  - Murphy eye
- Red rubber
  - High P : low V cuff
  - No Murphy eye
  - Irritant

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<th>PVC</th>
<th>Si</th>
<th>RR</th>
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ETT selection: diameter

- \( R_{aw} = \frac{aL}{\pi r} \)
  - \( R \propto L \) \((\frac{1}{2} L = \frac{1}{2} R_{aw})\)
  - \( R = \frac{1}{2} r^4 \) \((\frac{1}{2} r = 16 \times R_{aw})\)

- Internal diameter \( \phi \)
  - Critical characteristic for \( R_{aw} \)
  - Tracheal \( \phi \) estimation inaccurate
  - Experience
  - Range of sizes

ETT selection: length

- Distal tip: proximal trachea
  - Below cricoid
  - Above carina
- Proximal tip: incisors
  - Minimise \( V_D \)
  - Aim for \( V_D \ll V_T \)

ETT selection: length

- If overlong
  - Distally: risk obstruction
    - Partial / complete
    - Abutting carina
    - Bronchial (one-lung) ventilation
  - Proximally: ↑ \( V_D \)
    - Rebreathing \( CO_2 \)
ETT selection: seal

- Uncuffed = hydrostatic
- Inflatable cuff
  - IPPV
  - High risk aspiration
  - GOR/lavage/blood/secreta
  - Minimise pollution
  - Takes up space
- Flanges/baffles
  - Inappropriate sizes for cats

Cuff inflation

- Cuff manometer
  - 20-30 cmH₂O
- Other techniques problematic
  - Inferior to manometer measurement
    - Minimum occlusive volume
    - Pilot tube palpation
  - Impact of N₂O

- Excessive inflation
  - Compromised mucosal perfusion
  - Dorsal ligament rupture
  - Tracheal rupture
  - ↑ harm if movement around tube
  - Dental procedures overrepresented
**Movement around cETT**

**ETT selection: et al**

- Murphy eye
- Reinforcement
- Shielding

**ETT selection**

- Minimise risk of airway damage
- \( R_{aw} = \frac{\text{ASV}}{\text{ETT}} \)
- Incisors to proximal trachea
- Generally prefer PVC
- Murphy eye

Place largest diameter ETT possible without inflicting damage
Laryngeal desensitisation

- Prophylaxis for laryngospasm
- Facilitates atraumatic intubation
- Topical deposition lidocaine
  - NMB is alternative to LA

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Laryngeal desensitisation

- One veterinary licensed product
  - Intubeaze®
  - Lidocaine 20mg/mL (2%)
    - 2 – 4 mg per spritz
  - Cleanse nozzle between uses
  - Alternate EU trade names
    - Lidcosal/ Lidcosal Vet

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Laryngeal desensitisation

- Beware human alternative products
- Xylocaine® (AstraZenica)
  - Lidocaine 10%
    - 10mg per spritz
  - Banana flavouring
    - Anaphylactoid reactions (cats)
    - Contains propylene glycol
Laryngeal desensitisation

- Topical deposition
  - Arytenoids/ vocal folds
  - 2 (– 4) mg/kg lidocaine
  - Care locoregional
  - Visualise deposition

Laryngeal desensitization: ASEs

- True hypersensitivity/ allergic reactions uncommon
  - Amide class LA
- Excessive dose → toxicity
  - CNS
  - Cardiovascular
- Won’t prevent post-intubation soreness

Neuromuscular blockade

- Alternative to topical desensitization
- Rocuronium reported
  - 0.3-0.6mg/kg
  - Did not abolish laryngeal reflexes entirely
  - MUST be able to provide IPPV
Additional aids

- Positional
- Bougie
- Dog urinary catheter
  - Luer slip
  - 3.5mm ETT connector
  - Preload ETT
- Stylet
  - NEVER within airway

Technique

- Appropriate anaesthetic depth
- Visualise & desensitise larynx
- Lubricant
- Atraumatic placement
- Confirm placement
- Secure the tube
- ± Safely inflate cuff
Confirming placement

- Laryngospasm
- Failed airway protection
- Oesophageal intubation
- Non-intubation
- Movement of/around ETT
- Fibrous pseudomembrane
- Dorsal ligament rupture
- Tracheal stricture
- Tracheal rupture
- Pneumothorax
- Pneumomediastinum
- SQ emphysema
- Tracheal mucosal necrosis
- Ischaemic mucosal injury
- Inadequate seal
- Increased work of breathing
- Cortical blindness
- Sprung mouth gags
- Malposition
- Oesophageal
- One-lung
- Mural impaction

Complications of inadequate technique

- Occlusion
- Kink
- Secreta
- Impaction
- Cuff herniation
- Inadvertent disconnection
- Connector slip
- Breathing system disconnection
- Damage/breakage/fracture

Other complications
Specific challenges

- Kittens/small cats
- Abnormal anatomy
- Concurrent locoregional
  - Total dose critical
- Common pitfalls

Q & A

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