



## Feline oro-tracheal intubation

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## Why intubate?

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



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## When to intubate

- ASA status  $\geq 3$
- Major or long procedures
  - ETI reduces risk (0.6; CEPSAF 2007)
- $\uparrow$  GOR risk
- $\uparrow$  aspiration risk
- IPPV required



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### 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



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### Feline concerns

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



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### Anatomy for orotracheal intubation

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



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## Equipment

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

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## Laryngoscope

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## Endotracheal tubes

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

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## ETT anatomy

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




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## 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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## ETT selection: material

Kinking	RR	>	Si	≈	PVC
Ease of inspection	PVC	≥	Si	>>	RR
Preformed curve	PVC	≈	RR	≠	Si
Softens with heat	Si	>	PVC	≠	RR
Flammability	PVC	>	Si	>	RR
Autoclavable	RR	≈	Si	≠	PVC
Degradation with cleansing	RR	≈	Si	>	PVC
Perishable	RR	>	Si	≈	PVC
Expense	Si	>	RR	>	PVC




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ETT selection: diameter

- $R_{aw} = \frac{8L\eta}{\pi r^4}$ 
  - $R \propto L$  ( $1/2 L = 1/2 \times R_{aw}$ )
  - $R \propto \frac{1}{r^4}$  ( $1/2 r = 16 \times R_{aw}$ )
- Internal diameter  $\phi$ 
  - Critical characteristic for  $R_{aw}$
  - Tracheal  $\phi$  estimation inaccurate
    - Experience
    - Range of sizes




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ETT selection: length

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




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ETT selection: length

- If overlong
  - Distally: risk obstruction
    - Partial / complete
    - Abutting carina
    - Bronchial (one-lung) ventilation
  - Proximally:  $\uparrow V_D$ 
    - Rebreathing  $CO_2$




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### ETT selection: seal

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



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### Cuff inflation

- Cuff manometer
  - 20-30 cmH<sub>2</sub>O
- Other techniques problematic
  - Inferior to manometer measurement
    - Minimum occlusive volume
    - Pilot tube palpation
- Impact of N<sub>2</sub>O



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### Cuff inflation

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



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### Movement around cETT



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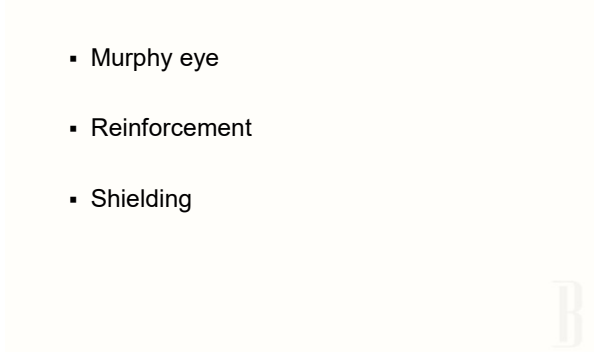
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### ETT selection: et al

- Murphy eye
- Reinforcement
- Shielding



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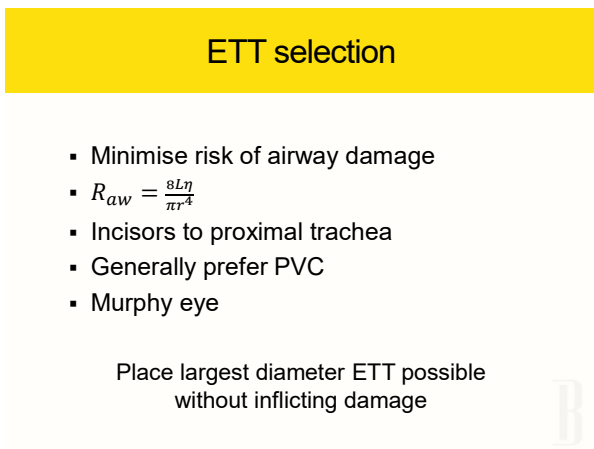
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### ETT selection

- Minimise risk of airway damage
- $R_{aw} = \frac{8L\eta}{\pi r^4}$
- Incisors to proximal trachea
- Generally prefer PVC
- Murphy eye

Place largest diameter ETT possible  
without inflicting damage



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### 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



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### Laryngeal desensitisation

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



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### Laryngeal desensitization: ASEs

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



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### 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



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**Additional aids**

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



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**Additional aids**

Blank area for notes



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**Technique**

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



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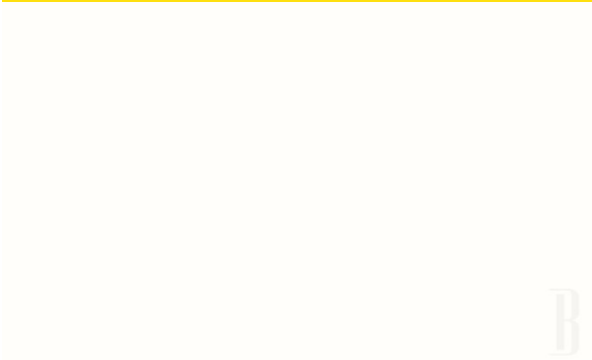
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### Confirming placement



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### Complications of inadequate technique

- Laryngospasm
- Failed airway protection
  - Oesophageal intubation
  - Non- intubation
- Movement of/around ETT
  - Fibrinous 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

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### Other complications

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

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### Specific challenges

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



### Q & A

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