

@ GAMC 2022

Awake Tracheal Intubation

ft. #JanuAIRWAY



Awake Tracheal Intubation & Nasendoscopy

Nasendoscopy is a USEFUL technique to assess a difficult airway pre-induction

- Use of a fibreoptic scope in both awake and asleep patients is a key skill all anaesthetists should have
- Widely regarded as the gold standard technique for securing the airway in a variety of conditions

Indications	Contraindications

• Known or anticipated difficult airway
• Known or suspected cervical cord trauma
• After failed intubation
	• Patient refusal
	• Patient uncooperative → unsafe to proceed
	  ○ E.g. learning difficulty, delirium, etc
	• Relative contraindications
	  • Severe bleeding / coagulopathy
	  • Periglottic masses → cork in bottle effect
	  • Inexperienced operator
	  • Local anaesthetic allergy – (ATI can be done with Remi alone, without LA)



Awake Tracheal Intubation & Nasendoscopy

Choice of Route

Nasal	Oral
• Potentially better tolerated by patient • More identifiable landmarks - less likely to get 'lost' • Potentially better angle of approach for intubation • Increased risk of haemorrhage • No risk of scope damage if patient bites • Railroading of ETT can be more uncomfortable • Requires smaller ETT than oral route	• Potentially more difficult for the anaesthetist • Larger cavity – more potential to get 'lost' with flexible scope • Potentially more difficult angle of approach for intubation • Reduced risk of haemorrhage • Risk of scope damage if patient bites • Stay in midline for best chance of success

Patient Preparation

- Patient cooperation is vital
- It is important to highlight that this is a safe option given known or anticipated difficulties
- Important things to highlight:
    - Topicalisation of the airway – may taste bitter and will cause them to cough at points
    - Sedation (if applicable) – to make the process more pleasant – they may not remember much
    - Passage of tube – once the ETT is in place, they won't be able to talk and will drift to sleep soon after this point



Awake Tracheal Intubation & Nasendoscopy

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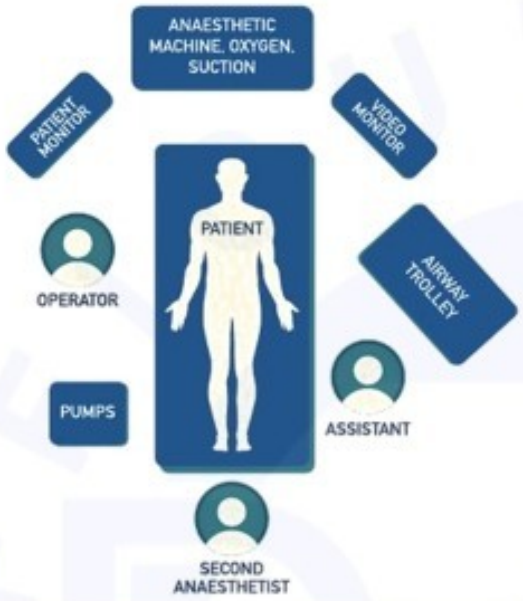
Risk Factors for Difficulty					
Facial	**Oral**	**Jaw**	**Neck**	**Pharyngeal**	**Laryngeal/ Tracheal**
• Angioedema • Trauma • Trismus	• Arched palate • Macroglossia • Micrognathia • Large tonsils • Tumours	• TMJ • Fracture • Trismus • Micrognathia	• OA/RA • Ankylosing spondylitis • Trauma • Goitre	• Abscess • Oedema • Webs • Tumours	• Deviation • Tumour • Compression • Stenosis

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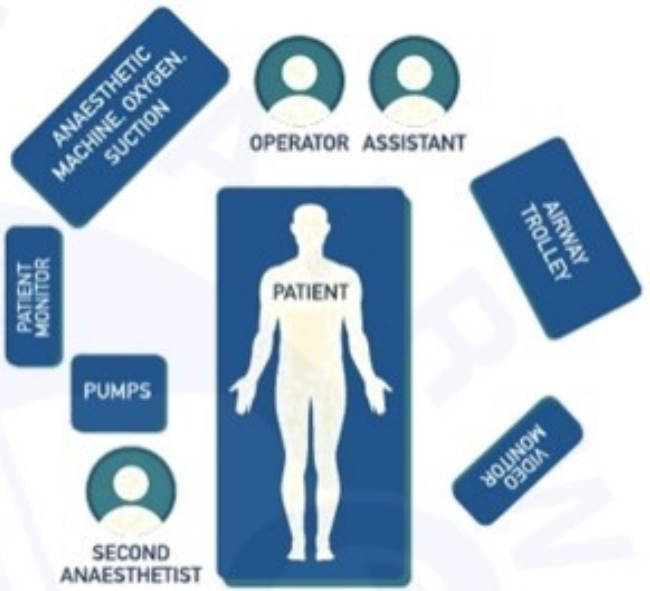
Awake Tracheal Intubation: Ergonomics

As with any practical procedre, ergonomics are important. If using a stack it must be facing the endoscopist, in one of the two set-ups shown below.

Set-up A (facing the patient)



Set-up B (standing behind the patient)



Awake Tracheal Intubation: Ergonomics

Insertion Technique

Patient Positioning

Two Options:

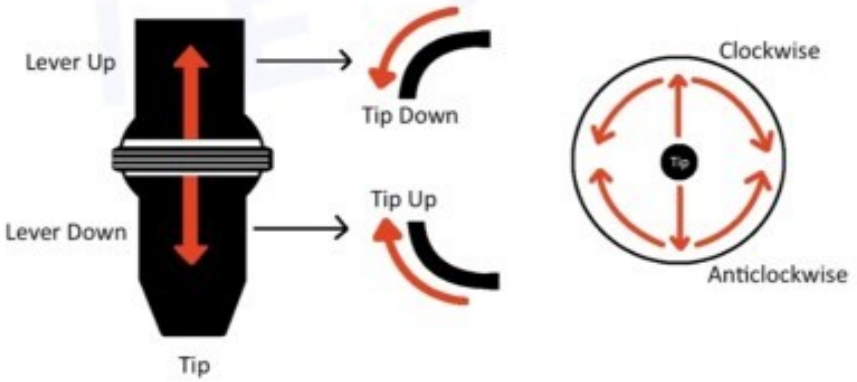
- Sat-upright
  - Helps to 'open up' the airway
  - Improves oxygenation (favourable FRC)
  - Facilitates secretion drainage
- Supine
  - May be easier to handle scope for novices
  - Anatomy may be viewed in a more familiar manner

Scope Handling

- Hold the control unit in the dominant hand with a thumb on the control lever
- Use the non-dominant hand to guide the tip / insertion cord into the nose/mouth and advance as required
- The insertion cord should be held straight and taut at all times (see right)
- This allows rotational movements to be effectively transmitted to the tip (as shown right)
- If scoping in sat-up position – it may be easier to rest the scope on your shoulder

Scope Handling

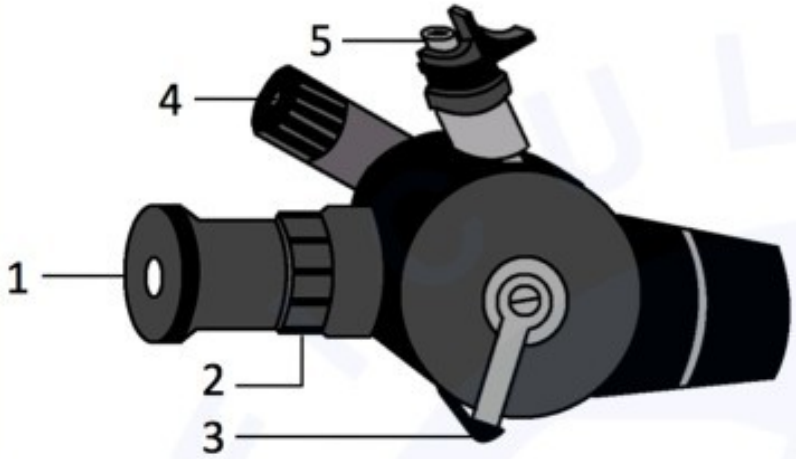




Awake Tracheal Intubation with Flexible Bronchoscope

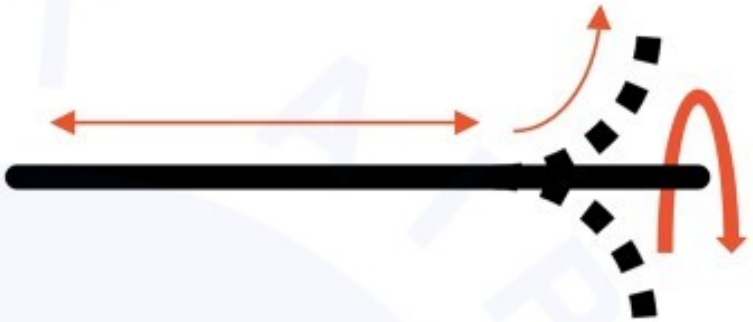
Anatomy of a Flexible Bronchoscope

Possible Control Unit Components



1. Eyepiece
2. Diopter ring for focussing (may not be present on modern scopes)
3. Control lever- alters tip direction (up/down)
4. Battery powered light source (may not be present on modern scopes)
5. Working channel Port e.g. for local anaesthetic instillation or oxygen delivery
6. Suction valve and port

Scope Tip



- **The scope tip can be moved in three basic directions:**
  - In and out
  - Up and down
  - Rotated left and right
- Control is best maintained by keeping the scope perpendicular to the insertion site (nose / mouth)

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Awake Tracheal Intubation with Flexible Bronchoscope

Anatomy of a Flexible Bronchoscope

Modern Videoscopes



Older Fibreoptic Stack



Scope Set-up

1. Ensure scope is clean or if using a reusable scope that it has been cleaned/disinfected
2. Check tip movement
3. Attach camera / screen to scope
4. Turn screen on and confirm image
5. If using older stack – optimise picture (focus, magnification, white balance, etc)
6. Consider attaching suction to suction port if needed
7. Lubricate scope prior to scoping.

Awake Tracheal Intubation: Ancillary Equipment

Nasal Oxygen

- As previously stated it is essential to continue to deliver oxygen during fibreoptic intubation.
- Options include:
  - **Nasal oxygen catheter**
    - sponge tipped tube that can deliver oxygen via contralateral nostril
  - **Nasal specs including HFNO**
    - No need to cut off the prongs for nasal intubation as they are soft and flexible





Mucosal Atomisation Devices

- Device that forcing fluid through a narrow orifice results in a fine, wide-reaching spray
- Allows for better topicalisation of the airway
- Two basic types
  - Stylet (top right) long, malleable stylet – allows for increased manoeuvrability
  - Nasal (bottom right) – foam tipped for comfort
- If these are unavailable an 18G cannula will suffice



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Awake Tracheal Intubation: Ancillary Equipment

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Oral Airways – Not a necessity, but may be helpful

Berman (now discontinued)	Ovassapian	Williams
		

• Tubular along entire length
• Side slit allows for removal after successful intubation – without need to remove 15mm ETT connector
• **Must be kept in Midline**
• Available sizes
  ○ Children – 7 - 8cm
  ○ Adults 9 – 11cm
• Fits ETTs sized ≤ 8.5
	• Proximal half acts as bite - block
	• Flat lingual surface
	• Two side walls to facilitate passage of fibreoptic scope
	• 15mm ETT connector must be removed prior to removal of Williams airway.
	• One size available
	• Fits ETTs sized ≤ 8.5
		• Proximal half acts as a bite-block
		• Distal half opens onto lingual surface
		• 15mm ETT connector must be removed prior to removal of Williams airway.
		• Available sizes
		  ○ 9cm and 10cm
		• Fits ETTs sized ≤ 8.5cm



Awake Tracheal Intubation: Drugs

Antisialogogues

	Onset	Duration	Elim. $t_{1/2}$	Dosing	Notes
Glycopyrronium	20min im 3-5min iv	30-60min 30-60min	40-80min 40-80min	0.2-0.4mg 0.1-0.2mg	Administer 30-60mins pre-procedure. May produce significant tachycardia. Hyoscine can also cause dizziness and sedation.
Atropine	20min im 2-3min iv	30-60min 30-60min	2hr 2hr	0.3-0.6mg 0.2-0.3mg	
Hyoscine Hydrobromide	30min im 5-10min iv	4hr	5hr	0.2-0.6mg	

Topical Anaesthesia

PATIENCE & ADEQUATE COVERAGE ARE THE KEYS TO SUCCESS

	Onset	Duration	Elim. $t_{1/2}$	Dosing	Notes
Co-Phenylcaine Spray	2-5min	30min	1.5-2hr	Lidocaine 125mg Phenylephrine 12.5mg	2.5ml = lidocaine (50mg/ml) & phenylephrine 5mg/ml
Lidocaine 1-10%	5min	30-60min	1.5-2hr	**Max 9mg/kg LBW**	1ml of 1% = 10mg 1spray of 10% - 10mg
COCAINE 10%	1-3min	30-60min	1hr	**Max 1.5mg/kg**	Caution in older patients and/or cardiac disease



Awake Tracheal Intubation: Drugs

Sedatives					
	Onset	**Duration**	**Elim. $t_{1/2}$**	**Dosing**	**Notes**
Propofol	30secs	5-10min	1.5-3hr	TCI effect site 0.5-1 mcg/ml	Caution with doses >1.5mcg/ml. Avoid boluses Risk of oversedation & hypoventilation especially with opioids
Midazolam	3-5min	1-2hr	1.5-3hr	Bolus 0.5-1 mg	Titrate to effects. Peak effect within 5-10mins
Dexmedetomidine	1-2min	5-10min	2hr	Bolus 0.5-1 mcg/kg over 5 mins followed by infusion 0.3 -0.6 mcg/kg/hr	Caution with bolus dosing – associated with hypertension and bradycardia
Analgesia					
	Onset	**Duration**	**Elim. $t_{1/2}$**	**Dosing**	**Notes**
Remifentanil	1min	3-5min	1-20min	TCI effect site 1-3 ng/ml	Caution with respiratory depression. Avoid boluses
Fentanyl	2-5min	30-60min	6-10min	Bolus 0.5-1 mcg/kg Subsequent doses of 0.5 mcg/kg as needed	
Alfentanil	2-3min	15min	90-120min	Bolus 5 mcg/kg Subsequent doses of 1-3 mcg/kg as needed	



Awake Tracheal Intubation: Special Circumstances

	Considerations	Modification	Potential Management Options
Critically ill	Adverse over-sedation	Sedation	Avoid or minimise sedation
	• Risk of LA toxicity • Increased secretions	Topicalisation	• Cautious use of local anaesthetic • Suction airway before instrumentation
	↑ O_2 demand/↓reserves	Oxygenation	Supplemental oxygen essential
	Unstable transfer	Performance	• Avoid transfer. Maintain same monitoring. Consider high-risk GA
Obstetrics	Foetal sedation	Sedation	Sedation with dexmedetomidine or remifentanil. Warn neonatologist
	Risk of LA toxicity	Topicalisation	Cautious dosing; consider using pre-pregnancy body weight for dosing
	↑ O_2 demand/↓reserves	Oxygenation	Supplemental oxygen essential
	• Risk of nasal bleeding • FONA more difficult	Performance	• Oral approach to ATI • Identify & mark cricothyroid membrane early (ultrasound may help)
Obesity	Adverse over-sedation	Sedation	Avoid or minimise sedation
	Risk of LA toxicity	Topicalisation	Local anaesthetic dosing on lean body weight
	↑ O_2 demand/↓reserves	Oxygenation	Supplemental oxygen essential
	• Reduced FRC • FONA more difficult	Performance	• Sitting position / reverse Trendelenburg. Operator facing patient. • Identify and mark cricothyroid membrane early (ultrasound may help)



Awake Tracheal Intubation: Special Circumstances

	Considerations	Modification	Potential Management Options
Trauma	Adverse over-sedation	Sedation	Avoid or minimise sedation
	Airway soiling	Topicalisation	Cleared soiled airway before topicalisation
	↑ O_2 demand/↓reserves	Oxygenation	Supplemental oxygen essential
	• Unstable transfer • Airway soiling • ?Skull base fracture	Performance	• Avoid transfer. Same equipment/monitoring • ATI with videolaryngoscope or tracheal intubation via SAD • Avoid HFNO. Use oral approach to ATI
Trismus	Adverse over-sedation	Sedation	Avoid or minimise sedation
	Limited access	Topicalisation	Nebulised lidocaein. Spray-as-you-go. Transtracheal injection. Use of Mucosal atomiser and patient gargling.
	Increased O_2 demand	Oxygenation	Supplemental oxygen essential
	Limited mouth opening	Performance	Nasal approach to ATI with flexible bronchoscope
Stridor	Adverse over-sedation	Sedation	Avoid or minimise sedation
	Risk of laryngospasm	Topicalisation	Consider nebulised and/or lower concentrations of lidocaine
	Airway obstruction	Oxygenation	HFNO highly recommended
	Narrowed airway	Performance	• Recognise that narrowing may preclude oral or nasal intubation • Prime for eFONA • Use smaller tracheal tube • Most experienced practitioner to perform • May require combined technique



Awake Tracheal Intubation: Conduct

Preparation

Patient (consent / IV access / monitoring)	Equipment	Ergonomics	Cognitive Aid/Checklist	Strategy

DAS ATI Technique

DAS ATI technique

DAS ATI technique

OXYGENATE

- Apply HFNO early
- Titrate HFNO from 30–70 l.min^{-1}
- Continue HFNO throughout procedure

TOPICALISE

- Lidocaine 10% spray to oropharynx, tonsillar pillars, base of tongue
- 20 – 30 sprays (during inspiration, over 5 min)
- If nasal route: co-phenylcaine spray
- Test topicalisation atraumatically
- If inadequate, re-apply LA up to maximum dose:
  - Further 5 sprays of lidocaine 10% to tongue base
  - 2 ml lidocaine 2% (x 3) spray above, at and below vocal cords via epidural catheter/working channel of FB or using MAD

Lidocaine
- 1 spray (0.1 ml) of 10% = 10 mg
- 1 ml of 2% = 20 mg

Co-phenylcaine
- 2.5 ml = 125 mg lidocaine + 12.5 mg phenylephrine



PERFORM

- Select appropriate tracheal tube
- Patient sitting up
- Ensure operator can readily see patient monitor, infusion pumps and video screen
- Clear secretions
- For ATI:FB
  - Operator positioned facing patient
  - Consider bronchoscope airway if oral route
  - Bevel facing posteriorly
- For ATI:VL
  - Operator positioned behind patient
  - Consider bougie
- Before induction of anaesthesia: two-point check

SEDATE

- Sedate if required
- Remifentanil TCI (Minto) Ce 1.0–3.0 ng.ml^{-1}
- If second anaesthetist present, consider adding midazolam 0.5–1 mg

Two-Point Check:

1. Visualise tracheal lumen / passage via cords AND
2. Presence of capnography

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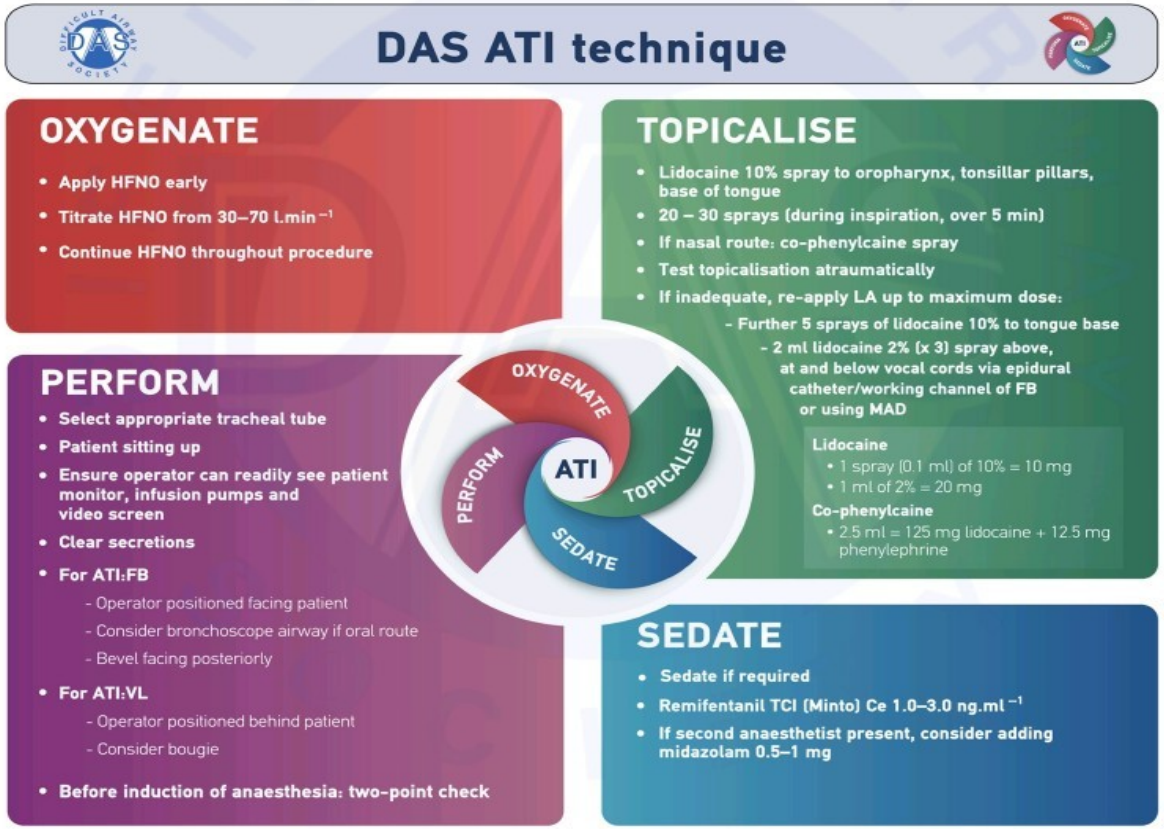
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Awake Tracheal Intubation: Troubleshooting Scoping

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Poor Image

General	Fogging	Blood / Secretions
• Orientate yourself • Hold scope straight • Move slowly • Optimise focus	• Dip scope in warm water • Hold tip against mucosal surface for approx. 30 seconds (can warm tip and prevent condensation)	• Use suction – either by scope or suction catheter • Pass ETT into pharynx & use as a conduit – keeping blood on posterior pharyngeal wall away from scope • Use an SAD as a conduit – in same manner as above

Respiratory Problems

Coughing	Desaturation	Laryngo- / Broncho- spasm

• Improve local anaesthesia e.g. spray Lidocaine down scope
• Improve sedation (e.g. Remifentanil)
• IV Lidocaine may help suppress cough reflex
	• Administer Oxygen (if not already)
	• Stimulate patient
	• Overuse of suction (can remove Oxygen from airway)
	• Rule out endobronchial intubation / loss of airway
		• Usually due to inadequate local anaesthesia
		• Laryngospasm
		  ○ Remove stimulus, apply 100% Oxygen and CPAP
		• Bronchospasm
		  ○ Bronchodilators +/- Ketamine



Awake Tracheal Intubation: Troubleshooting Scoping

Cardiovascular Problems

Hypertension	Hypotension	Arrhythmias
• Improve local anaesthesia • Improve sedation	• Stimulate patient • Lighten sedation • Fluid bolus / vasopressor	• May be brady- or tachy-arrhythmias • Reduced risk with good local anaesthesia • Remove stimulus if able

Equipment problems

Cannot Pass ETT into Trachea	Scope stuck in ETT
• Hold-ups usually occur if/when ETT tip catches on epiglottis / cords • Nasal approach reduces risk • Warming tube pre-insertion • **DO NOT REPEATEDLY TRY TO FORCE ETT** • Withdraw ETT 1-3cm before trying following: • Jaw thrust - Opens pharynx by lifting tongue and clearing away epiglottis • Deep inhalation lifts uvula and opens glottis • Rotate tube during insertion • Consider smaller tube	• Often due to lack of lubrication / lubricant drying during procedure • Instill 2-3ml of 0.9%NaCl down ETT to lubricate • Golden Rules- BE AWARE & BE GENTLE • Other causes – tip of scope caught in Murphy's eye or intussusception of scope's outer coating within ETT

IF IN TROUBLE – CONSIDER INSERTING A SAD (LMA/iGEL) TO ACT AS A CONDUIT



Awake Tracheal Intubation: Complications

Complications occur due to inadequate sTOP (sedation, topicalisation, oxygenation, performance)

Optimise sTOP components BEFORE ANY attempt at ATI

Seek help at the earliest opportunity:
to maximise success and minimise potential for complications

Managing procedural complications

- Clear obstruction
- Reduce/reverse sedation
- Increase FiO_2
- Change mode of O_2 delivery

- Additional topicalisation to a maximum of 9 $mg.kg^{-1}$
- Local anaesthetic toxicity management



- Limit attempts (maximum 3+1)
- Abandon procedure
- Suction
- Alternative route/device
- Change tracheal tube type
- Call for more experienced help

- Review sedation regimen
- Consider reversal agents

LIMIT ATTEMPTS to 3 +1 – optimisation must be maximised before each attempt (the fourth final attempt should be reserved for a more experienced operator)

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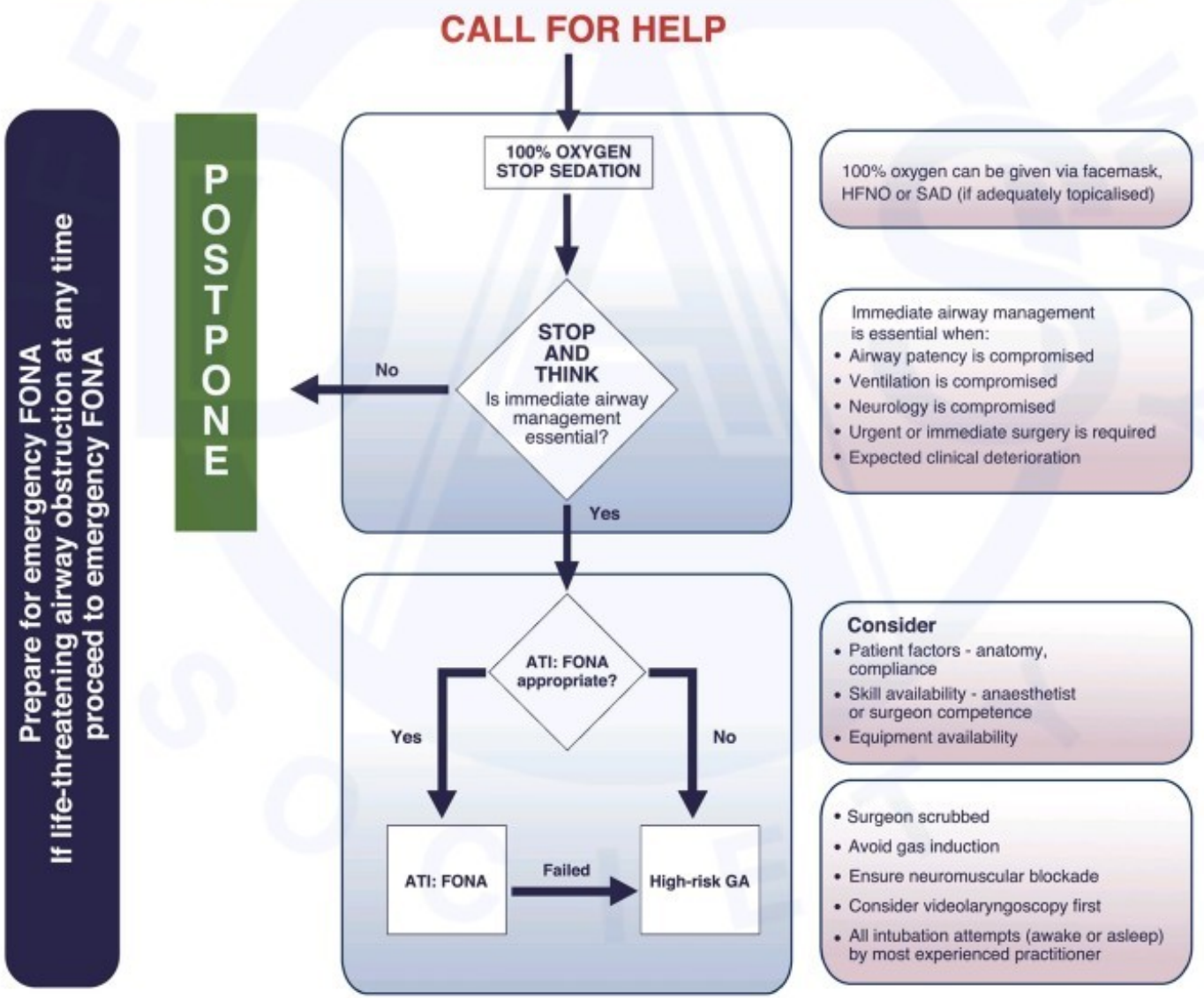
Awake Tracheal Intubation: Managing Unsuccessful ATI

DIFFICULT AIRWAY SOCIETY DAS

DAS defines 'unsuccessful ATI' as unplanned removal of flexible bronchoscope, videolaryngoscope or tracheal tube from the airway.

If unsuccessful after 3+1 attempts, follow the unsuccessful ATI algorithm (see below)

Management of unsuccessful ATI in adults



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Awake Tracheal Intubation: Managing Unsuccessful ATI

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