Airway management in pregnancy

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Introduction

- Difficult and failed intubation in obstetrics is a well-known problem
- The incidence of failed tracheal intubation remains high in the obstetric population
- Human factors and poor decision making contribute to adverse airway related events

Incidence

- Incidence of failed intubation is 1:250 to 1:300

Balki et al.
Unanticipated Difficult Airway in Obstetric Patients.
Anesthesiology 2012; 117:883-97

- In SA : difficult or failed intubation: 50% of deaths following general anaesthesia

Rout, CC, Farina, Z
Anaesthesia-related maternal deaths in South Africa.
South Afr J Anaesth Analg. 2012;18(6):281-301

Why is airway management more difficult in obstetric patients?

- Specific anatomical changes
- Increased risk of aspiration
- Situational factors
- Dominant use of spinal anaesthesia
- Airway management in pregnancy remain a problem

Factors affecting airway Mx in pregnancy

	Anatomical and Physiological changes	Clinical Consequences
Airway	Weight gain	Difficulty with positioning
	Increased breast size	Difficulty with laryngoscope insertion
	Increased vascularity and oedema of the airway mucosa	Increased risk of airway bleeding and potential difficulty with tracheal intubation
Respiratory	Reduced functional residual capacity	Increased rate of oxygen desaturation
Metabolic	Increased oxygen consumption (secondary to increased metabolic demand	
Gastrointestinal	Decreased lower oesophageal sphincter tone	Increased risk of gastric regurgitation and pulmonary aspiration
	Delayed gastric emptying	

Bordoni L, Parsons K, Rucklidge M.W.M.
Obstetric Airway Management. ATOTW 393. (14 December 2018).
Available from: https://www.wfsahq.org/components/com_virtual_library/media/5be020033fc386d1943717fb8eb2977c-atow-393-00.pdf

Situational Factors

- Trend away from C/S under GA
- Fear of poor neonatal outcome
- Awareness of reported difficulties: impair confidence

Rucklidge, M, Hinton, C.
Difficult and failed intubation in obstetrics.
Continuing Education in Anaesthesia, Critical Care & Pain. 2012;12(2):86-91.

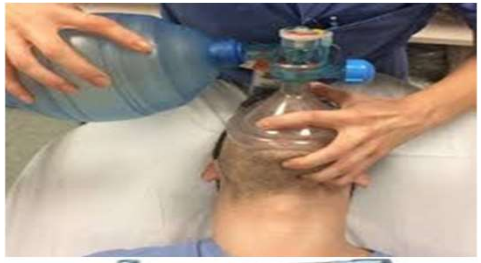
Practical approach

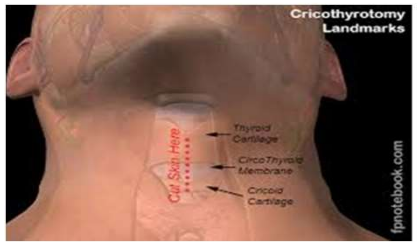
- Airway assessment
- Pharmacological aspiration prophylaxis
- Optimal patient positioning
- Preoxygenation
- Provision of a secure airway

Airway Assessment

Difficulties with:

- Bag Mask Ventilation
- Intubation
- Supraglottic device placement
- Surgical airway





Assessing Difficult BMV

- **M**ask seal
- **O**besity/Obstruction
- **A**ge
- **N**o teeth
- **S**tiff/**S**noring

Assessing Difficult Intubation

LEMON Airway assessment method

L	Look externally (Facial trauma, large incisors, beard or moustache, large tongue
E	Evaluate the 3-3-2 rule - Incisor distance: 3 FB - Hyoid-mental distance: 3 FB - Thyroid-to-mouth distance: 2 FB
M	Mallampati Score $\geq$ 3
O	Obstruction : Presence of any condition like epiglotitis, Peritonsillar abscess, trauma
N	Neck Mobility (Limited neck mobility)

Evaluation

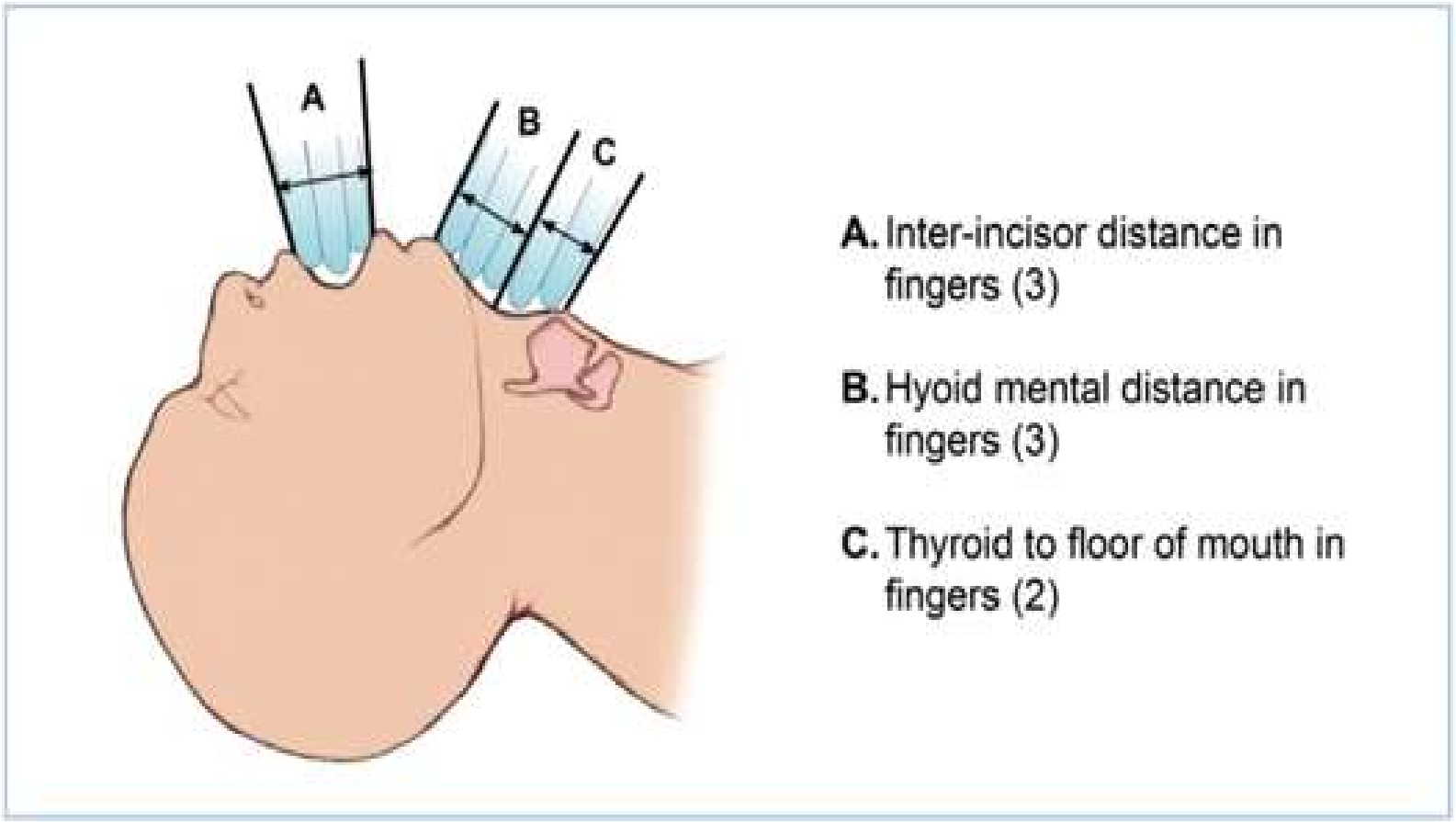
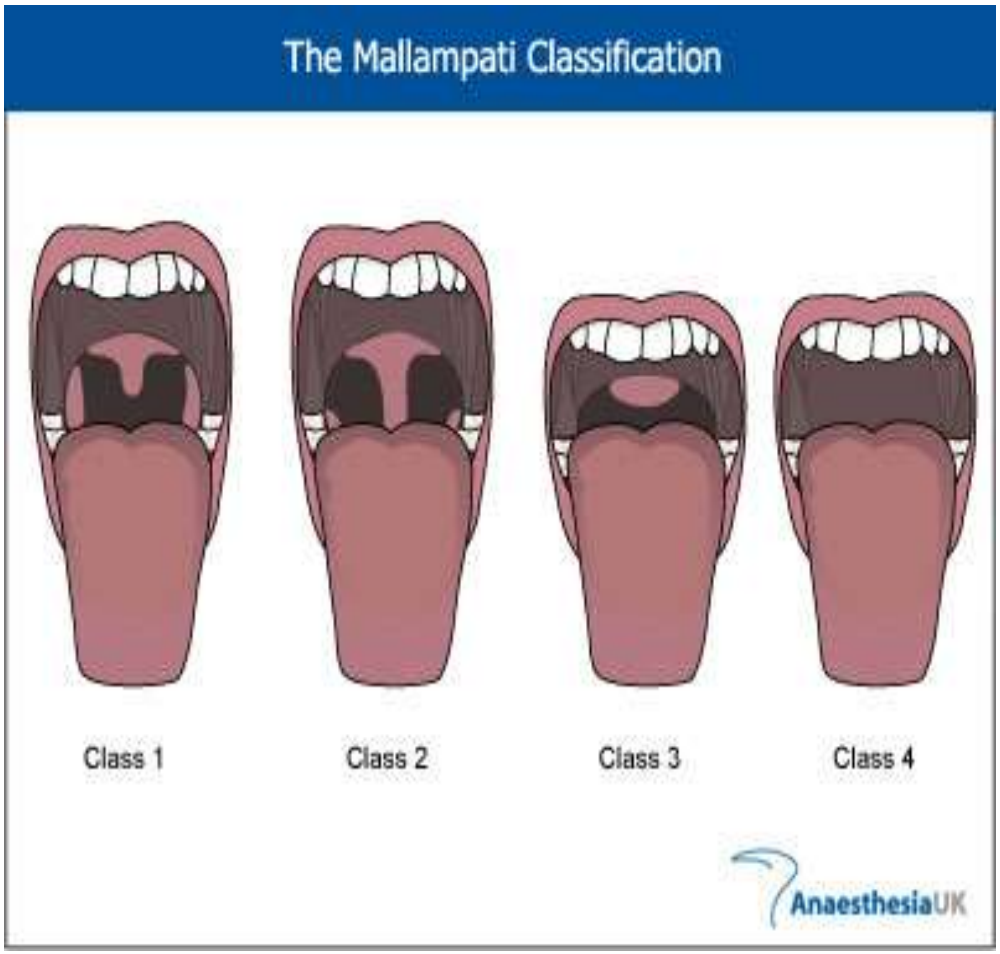


FIGURE 14.6 LEMON airway assessment method. (Murphy MF, Wall RM. The difficult and failed airway. In: *Manual of Emergency Airway Management*. Chicago, IL: Lippincott Williams and Wilkins; 2000:31–39.)

Mallampati Classification



Lemon Evaluation Criteria

EVALUATION CRITERIA	POINTS
L = Look externally	
Facial trauma	1
Large incisors	1
Beard or moustache	1
Large tongue	1
E = Evaluate the 3-3-2 rule	
Incisor distance-3 finger breadths	1
Hyoid-mental distance-3 finger breadths	1
Thyroid-to-mouth distance-2 finger breadths	1
M = Mallampati (Mallampati score > 3)	1
O = Obstruction (presence of any condition like epiglottitis, peritonsillar abscess, trauma)	1
N = Neck mobility (limited neck mobility)	1
Total	**10**

Can an airway assessment score predict difficulty intubation?

- “An airway assessment score based on criteria of the LEMON method is able to successfully stratify the risk of intubation difficulty in the emergency department.”

Reed MJ, Dunn MJG, McKeown DW.
Can an airway assessment score predict difficulty at intubation in the emergency department?
Emerg Med J. 2005;22:99-102.

Assessing Difficult LMA

- **R**estricted Mouth Opening
- **O**bstruction
- **D**isrupted/**D**istorted Airway
- **S**tiff lungs

Assessing difficulty with surgical airway

- **S**urgery
- **H**aematoma
- **O**besity
- **R**adiation
- **T**umor

Pulmonary Aspiration Risk Reduction

- H_2 receptor antagonists – Ranitidine
  - Elective 150mg ranitidine PO at 10pm the night
  - before their CS and a further 150mg at 6am on the morning of surgery

- Antacid (Sodium Citrate): 30 mL

Francis, J. Clinical Guideline for: Antacid Prophylaxis for Obstetric Anaesthesia 2018 [Accessed 25/05/2019]. Available from https://www.nnuh.nhs.uk/publication/antacid-prophylaxis-for-obstetric-anaesthesia-io19-v.

Patient Positioning

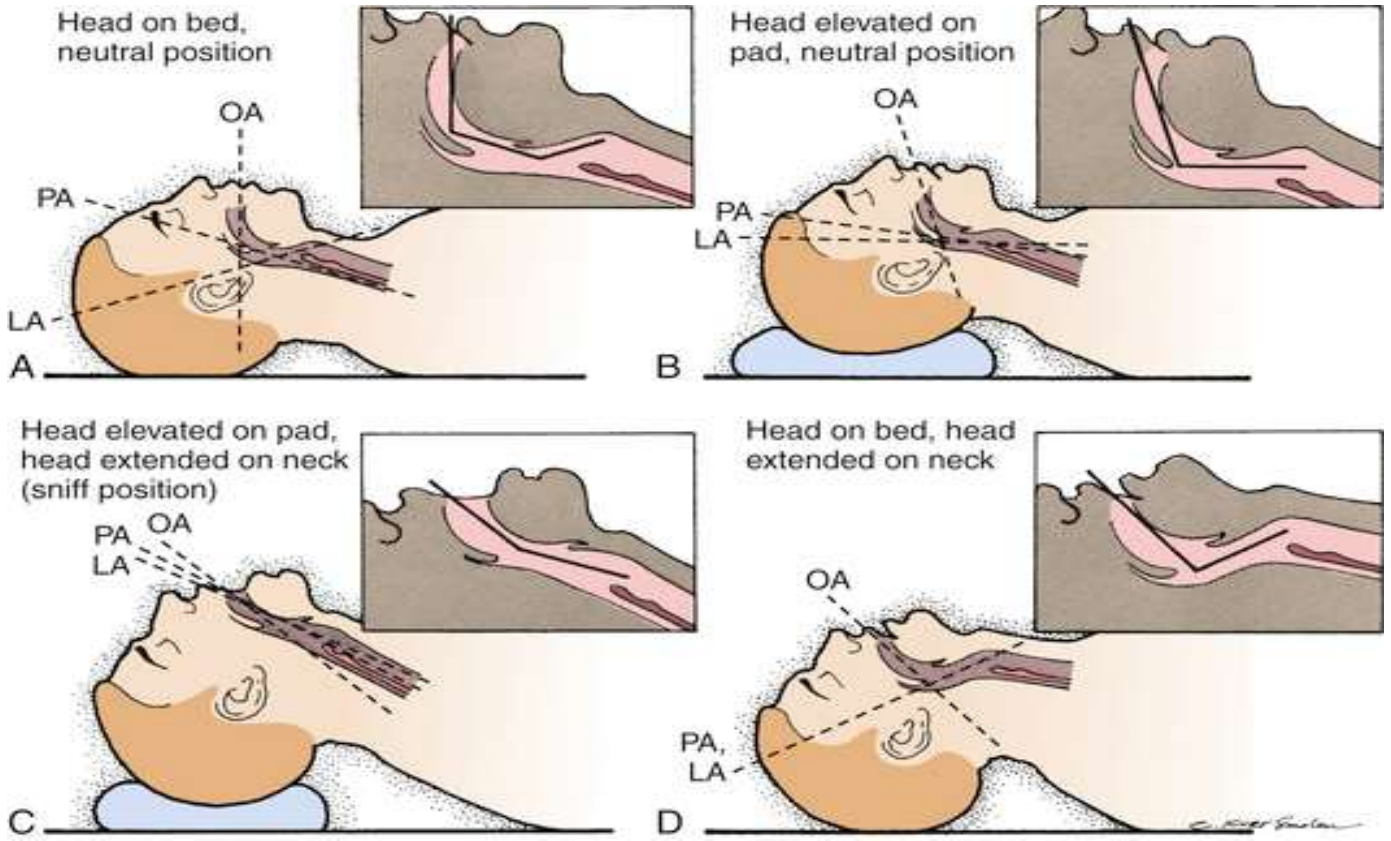
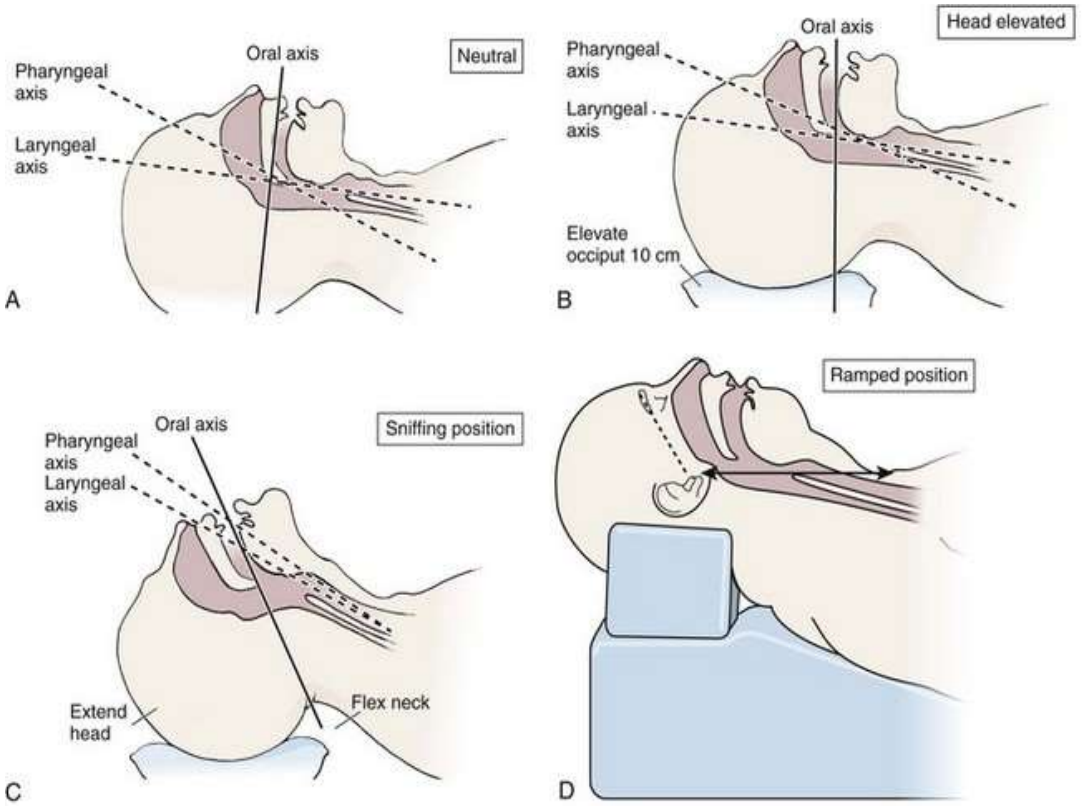
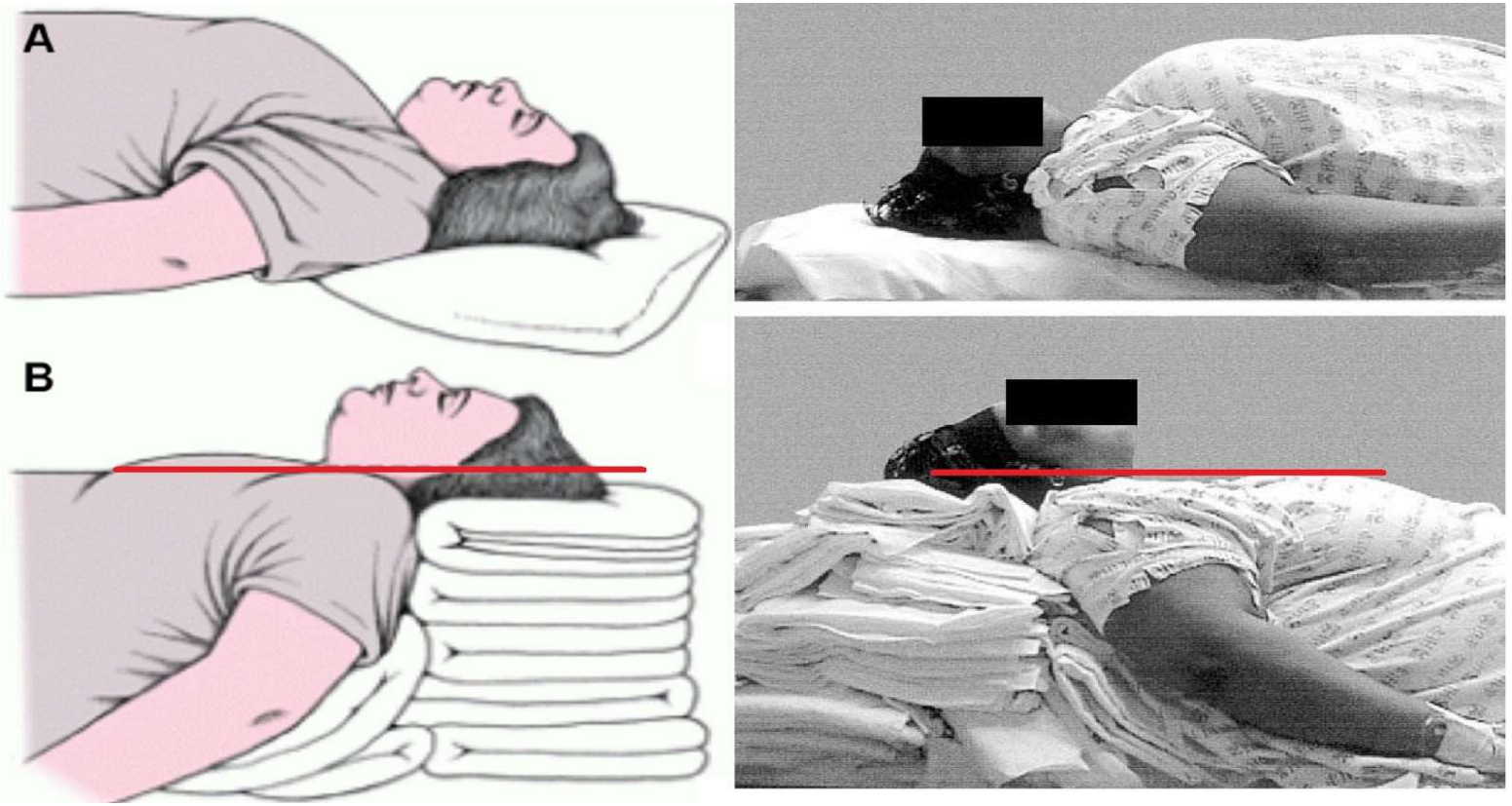


Image accessed from: https://aneskey.com/emergency-airway-management/

Positioning



“HELP” position



Picture accessed from: https://doctoryg.blogspot.com/2016/12/successful-intubation-position.html

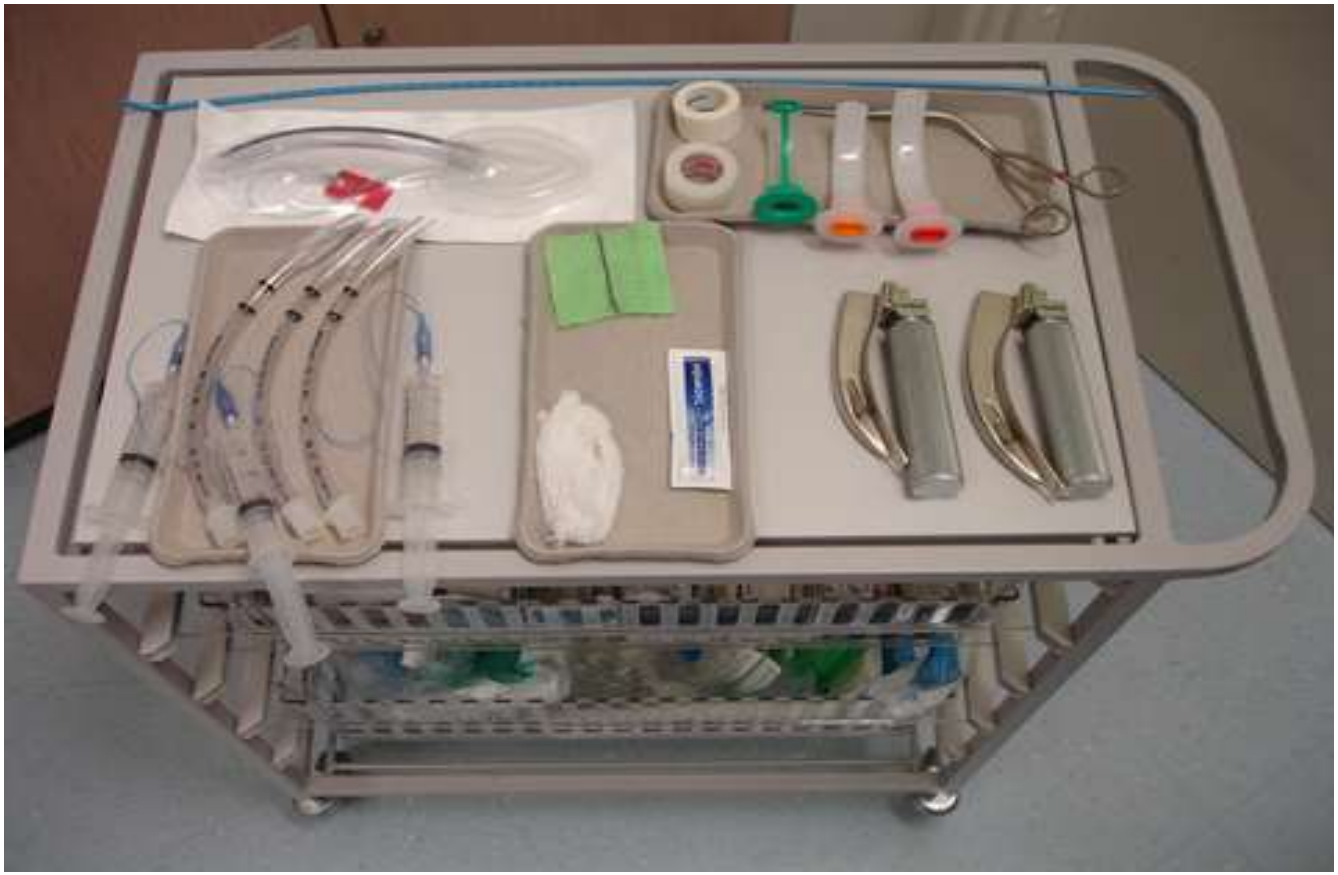
Preoxygenation

- Effective oxygenation prior to induction
- FGF of 10L with a tight fitting mask
- Emergency: 3-4 maximal capacity breaths of 100% oxygen

Preparation for airway management

- Routine airway management
- Unanticipated difficult airway management

Equipment for routine airway management



Difficult airway trolley

THE HOSPITAL
NHS Trust

Unanticipated difficult intubation strategy
– 'Call for help'

NHS

Plan A:

Initial intubation strategy

Elective intubation

max 4

Rapid sequence induction

max 3

Optimum position

Bougie

Alternative laryngoscope

C-MAC

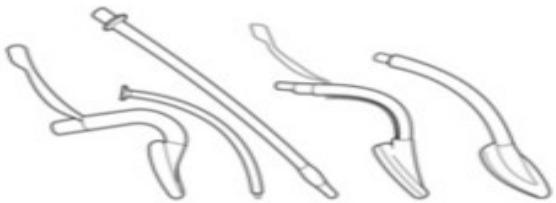
Plan B:

Secondary intubation strategy

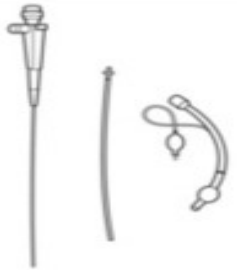
Not in rapid sequence

~~RSI~~

ILMA, pLMA or cLMA



then fibreoptic, Aintree and ETT 7.0



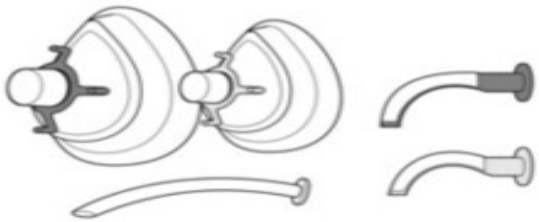
Plan C:

Oxygenation and ventilation

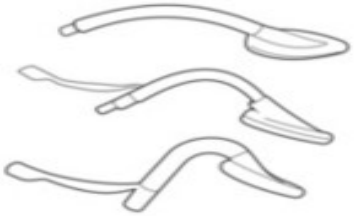
Wake patient up

Consider sugammadex

Face mask, oro- or nasopharyngeal



cLMA, pLMA or ILMA



Plan D:

Can't intubate, can't ventilate

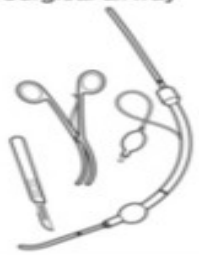
CICV

Melker

Quicktrach

Manujet and jet ventilation catheter

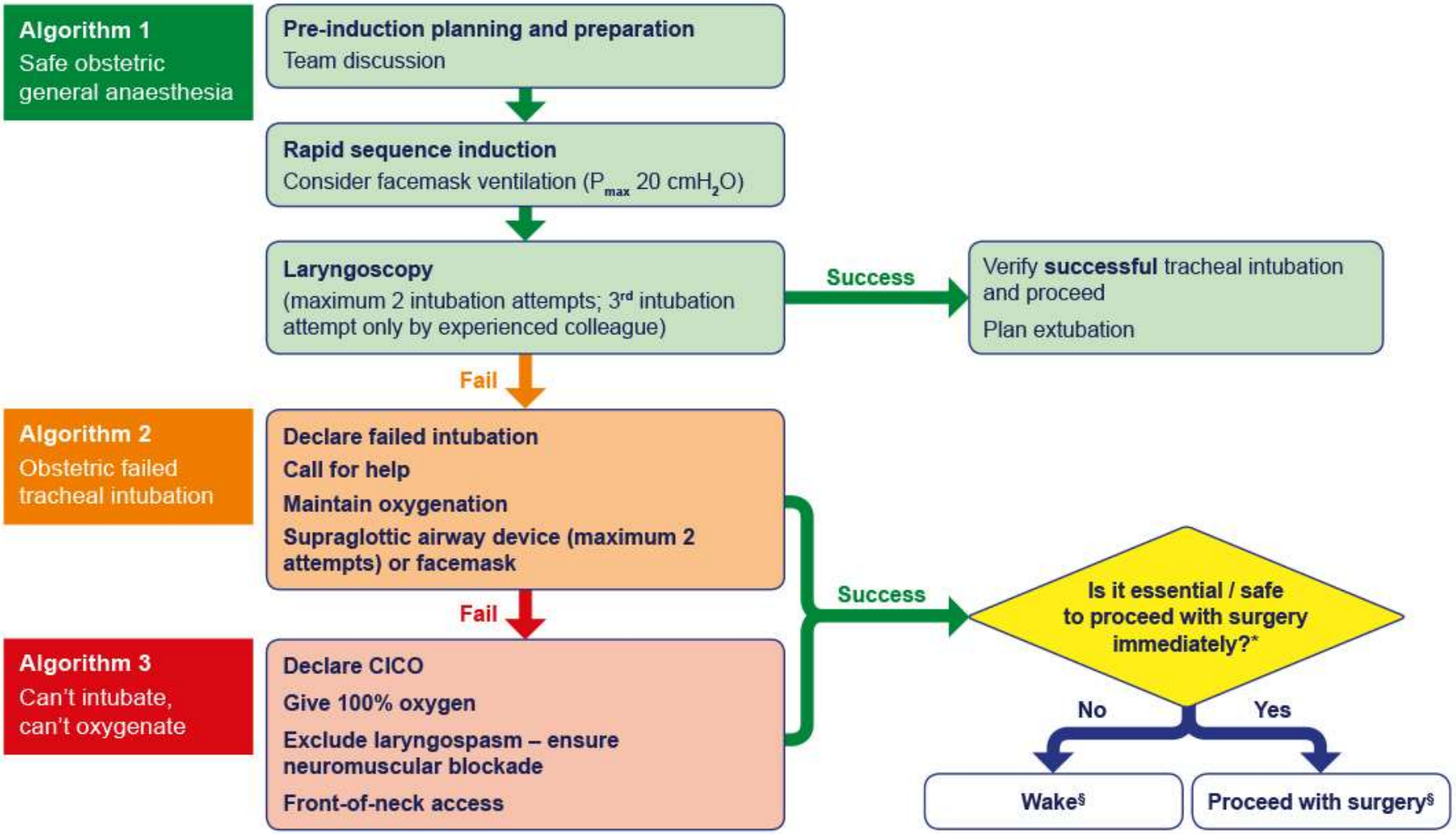
Surgical airway



Obstetric Airway Management

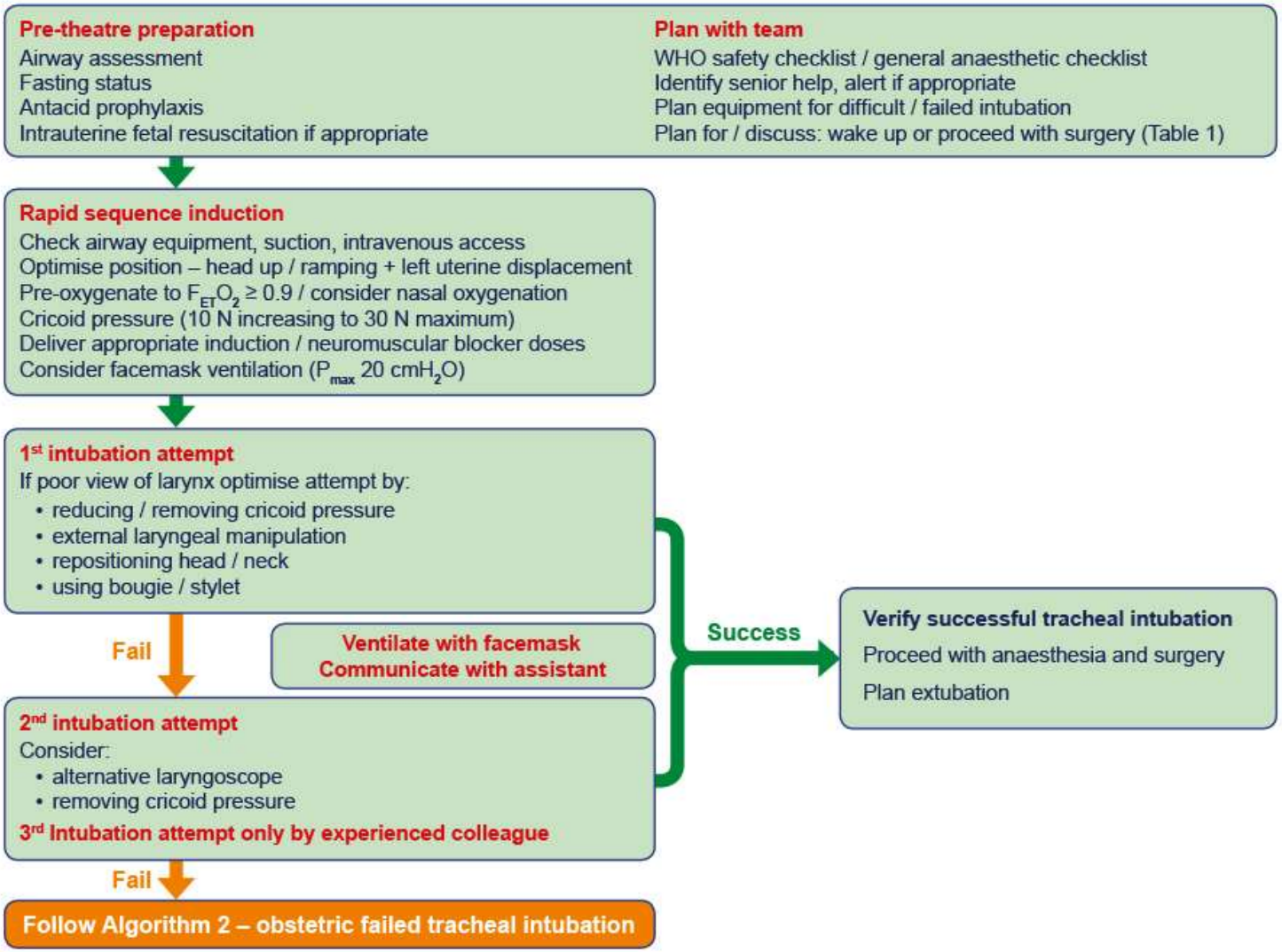
- The OAA and DAS: difficult and failed intubation guidelines

Master algorithm – obstetric general anaesthesia and failed tracheal intubation

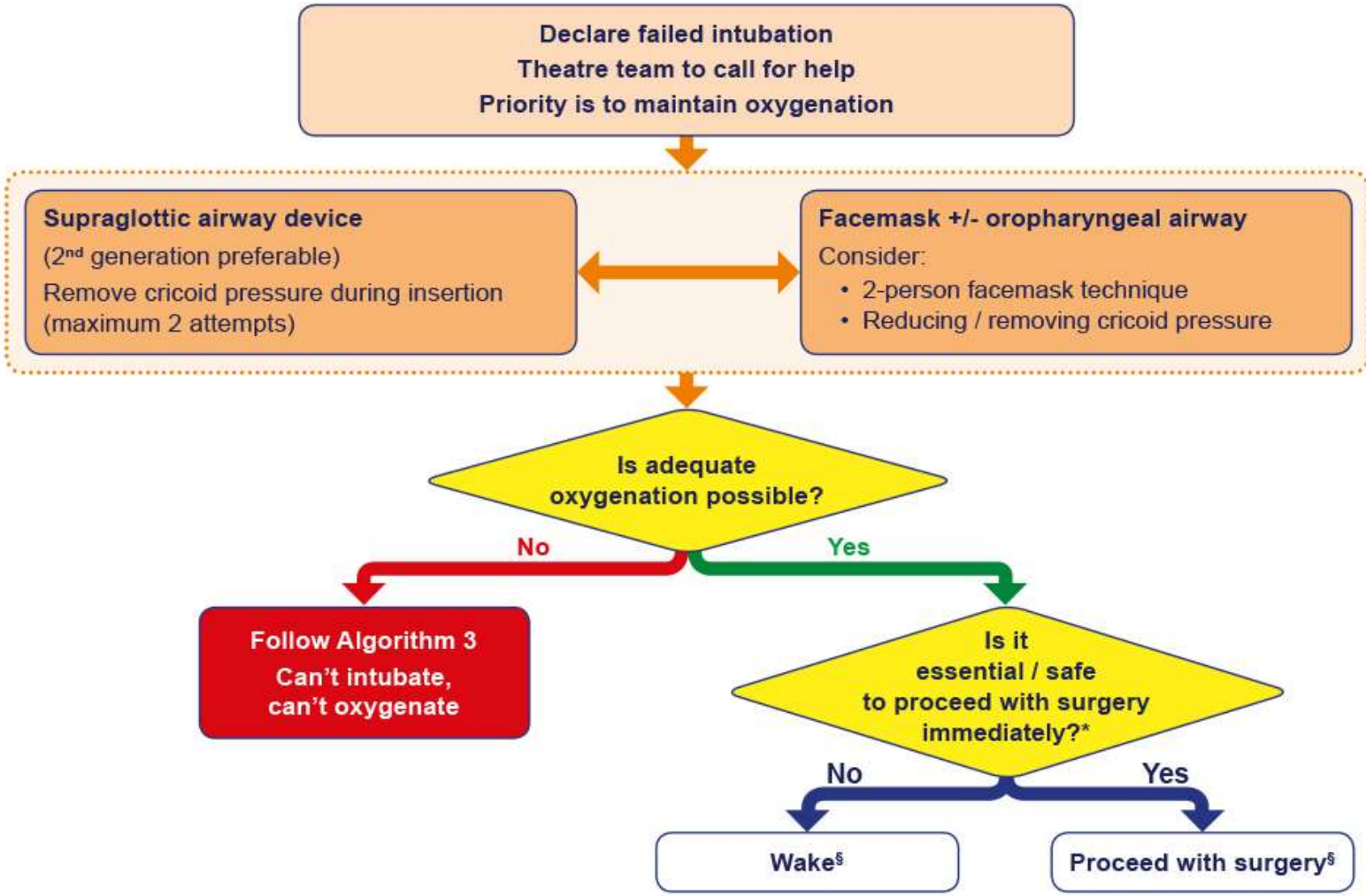


*See Table 1, §See Table 2

Algorithm 1– safe obstetric general anaesthesia

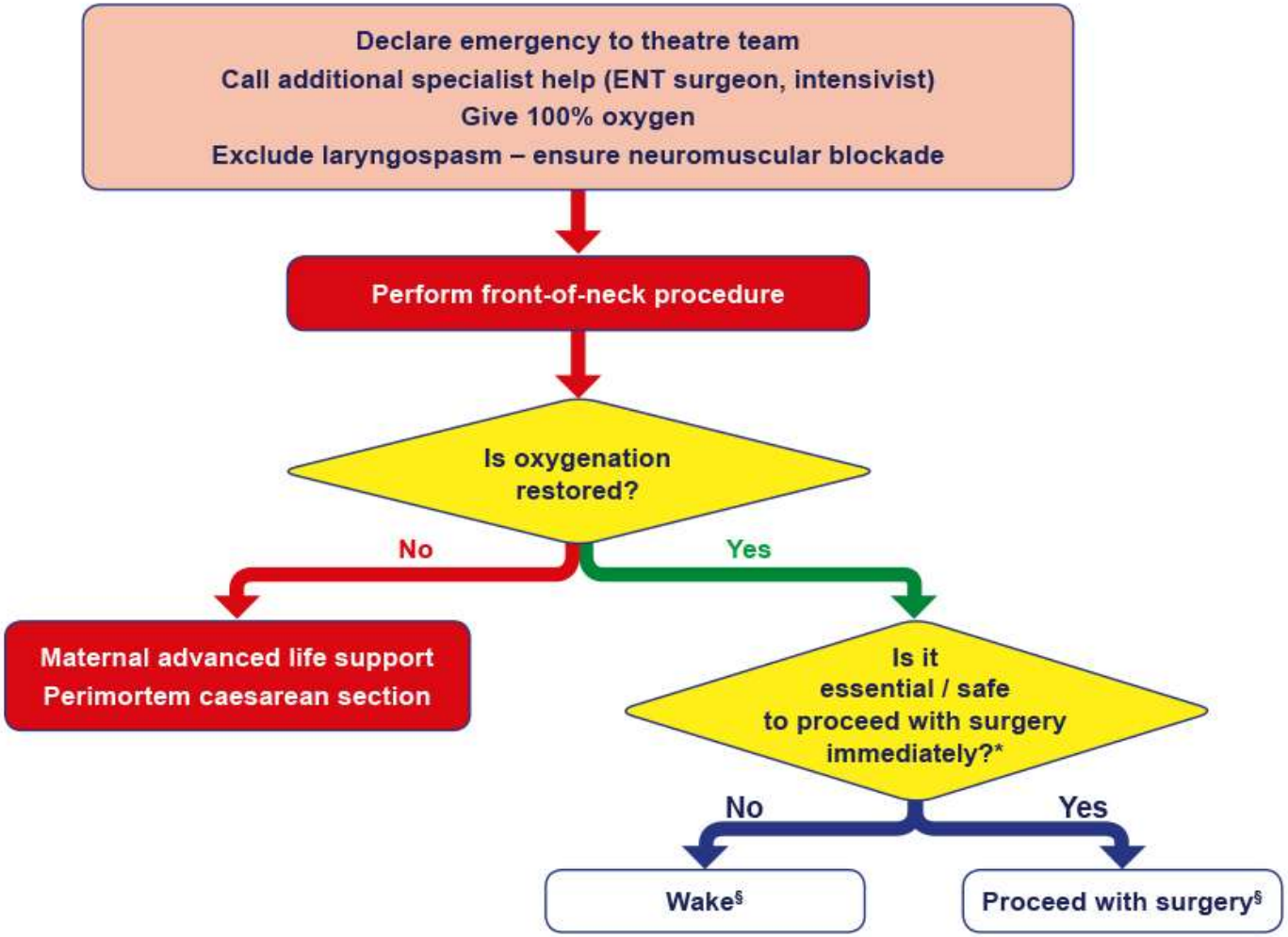


Algorithm 2 – obstetric failed tracheal intubation



*See Table 1, §See Table 2

Algorithm 3 – can't intubate, can't oxygenate



*See Table 1, §See Table 2

Table 1 – proceed with surgery?

	Factors to consider	WAKE			PROCEED
Before induction	**Maternal condition**	• No compromise	• Mild acute compromise	• Haemorrhage responsive to resuscitation	• Hypovolaemia requiring corrective surgery • Critical cardiac or respiratory compromise, cardiac arrest
	Fetal condition	• No compromise	• Compromise corrected with intrauterine resuscitation, pH < 7.2 but > 7.15	• Continuing fetal heart rate abnormality despite intrauterine resuscitation, pH < 7.15	• Sustained bradycardia • Fetal haemorrhage • Suspected uterine rupture
	Anaesthetist	• Novice	• Junior trainee	• Senior trainee	• Consultant / specialist
	Obesity	• Supermorbid	• Morbid	• Obese	• Normal
	Surgical factors	• Complex surgery or major haemorrhage anticipated	• Multiple uterine scars • Some surgical difficulties expected	• Single uterine scar	• No risk factors
	Aspiration risk	• Recent food	• No recent food • In labour • Opioids given • Antacids not given	• No recent food • In labour • Opioids not given • Antacids given	• Fasted • Not in labour • Antacids given
	Alternative anaesthesia • **regional** • **securing airway awake**	• No anticipated difficulty	• Predicted difficulty	• Relatively contraindicated	• Absolutely contraindicated or has failed • Surgery started
After failed intubation	**Airway device / ventilation**	• Difficult facemask ventilation • Front-of-neck	• Adequate facemask ventilation	• First generation supraglottic airway device	• Second generation supraglottic airway device
	Airway hazards	• Laryngeal oedema • Stridor	• Bleeding • Trauma	• Secretions	• None evident

Criteria to be used in the decision to wake or proceed following failed tracheal intubation. In any individual patient, some factors may suggest waking and others proceeding. The final decision will depend on the anaesthetist's clinical judgement.

Table 2 – management after failed tracheal intubation

Wake

- Maintain oxygenation
- Maintain cricoid pressure if not impeding ventilation
- Either maintain head-up position or turn left lateral recumbent
- If rocuronium used, reverse with sugammadex
- Assess neuromuscular blockade and manage awareness if paralysis is prolonged
- Anticipate laryngospasm / can't intubate, can't oxygenate

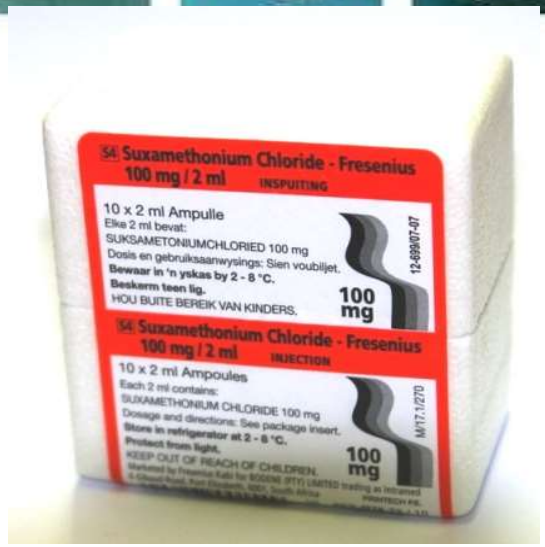
After waking

- Review urgency of surgery with obstetric team
- Intrauterine fetal resuscitation as appropriate
- For repeat anaesthesia, manage with two anaesthetists
- Anaesthetic options:
  - Regional anaesthesia preferably inserted in lateral position
  - Secure airway awake before repeat general anaesthesia

Proceed with surgery

- Maintain anaesthesia
- Maintain ventilation - consider merits of:
  - controlled or spontaneous ventilation
  - paralysis with rocuronium if sugammadex available
- Anticipate laryngospasm / can't intubate, can't oxygenate
- Minimise aspiration risk:
  - maintain cricoid pressure until delivery (if not impeding ventilation)
  - after delivery maintain vigilance and reapply cricoid pressure if signs of regurgitation
  - empty stomach with gastric drain tube if using second-generation supraglottic airway device
  - minimise fundal pressure
  - administer H_2 receptor blocker i.v. if not already given
- Senior obstetrician to operate
- Inform neonatal team about failed intubation
- Consider total intravenous anaesthesia

Induction of anaesthesia



Conclusion

- Airway management in obstetric is often uneventful
- But is associated with a higher rate of difficult and failed intubation
- Oxygenation via alternative airway devices and techniques is important

References

1. Balki M, Cooke ME, Dunington S, Salman A, Goldszmidt E. Unanticipated Difficult Airway in Obstetric Patients. Anesthesiology. 2012;117(4):883-97.
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7. Mushambi et al. Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics. Anesthesia 2015; 70: 1286-1306.