

General Anaesthesia for Caesarean Section Clinical Guideline

V4.0

July 2020

1. Aim/Purpose of this Guideline

1.1. General anaesthesia for caesarean section carries considerable risk and is frequently performed out of hours by relatively junior anaesthetists. The aim of this guideline is to provide guidance for safely performing general anaesthesia for caesarean section.

1.2. This version supersedes any previous versions of this document.

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1.3. This guideline makes recommendations for women and people who are pregnant. For simplicity of language the guideline uses the term women throughout, but this should be taken to also include people who do not identify as women but who are pregnant, in labour and in the postnatal period. When discussing with a person who does not identify as a woman please ask them their preferred pronouns and then ensure this is clearly documented in their notes to inform all health care professionals (NEW 2020).

2. The Guidance

2.1. Indications

The only indication for caesarean section under general anaesthesia is maternal refusal of regional anaesthesia.

Other possible indications include:

- Failed regional
- Contraindication to regional anaesthesia e.g. coagulopathy / thrombocytopenia, local or systemic infection
- Uncorrected hypovolaemia e.g. from blood loss
- Clinical urgency, at the discretion of the anaesthetist

2.2. Preoperative Assessment

2.2.1. General

- Previous General Anaesthetic (GA)

- PMH/Co-morbidities
- Allergies
- High BMI
- Fasting status
- Remove oral piercings (NEW 2020)

2.2.2. Airway

Standard airway assessment, paying particular attention to problems more common in obstetric patients e.g. large breasts, airway oedema.

2.2.3. Specific pregnancy problems

- Pre-eclampsia
- Reflux
- Placental position

2.2.4. Explain Rapid Sequence Induction (RSI)/cricoid pressure to the patient and if time allows obtain informed consent. This should include the risk of awareness under general anaesthetic following recommendations from NAP 5 (National Audit Project 5) (NEW 2020).

2.3. Conduct of Emergency Anaesthesia

2.3.1 Preparation

- Intra-uterine resuscitation (left lateral, tocolytics (NEW 2020) may buy time by relieving fetal distress
- Maternal resuscitation (100% O₂, rapid IV fluids) (New 2020)
- Aim for rapid transfer to theatre.
- Machine and equipment should have been checked according to Association of Anaesthetists (NEW 2020) guidelines².
- Ensure difficult airway equipment including a videolaryngoscope (NEW 2020) and emergency drugs are available.
- Summon assistance – ODP +/- senior anaesthetist, especially if difficult airway or other problem is anticipated
- Partners are not allowed in theatre
- Give sodium citrate and an H₂ receptor antagonist if not already administered (NEW 2020)
- Ensure cannula and IV fluids are in situ
- ODP to attach routine monitoring
- Complete a WHO (World Health Organisation) checklist. If a category 1 section this can be a modified version (NEW 2020)
- Anaesthetist and obstetrician should discuss before induction, whether the plan would be to wake the patient or proceed in the event of a failed tracheal intubation according to the OAA DAS algorithm (Appendix 3) (NEW 2020)

2.3.2 Induction & Maintenance

- Position carefully; Patient in 15-20 degree head up position (NEW 2020), consider ramping if patient is obese (Oxford HELP pillow (NEW 2020). Remember left lateral tilt or wedge
- Pre-oxygenate with high flow oxygen via a face mask. Consider the use of high flow nasal oxygen (HFNO) (NEW 2020)
- Ensure surgeon has scrubbed, prepped and draped before starting anaesthesia
- Deliver appropriate induction agents and neuromuscular blocking agent Thiopentone at a dose of no less than 5mgs/kg (unless cardiovascular instability is evident) and suxamethonium are routinely used for Rapid Sequence Induction (RSI) in obstetrics. Remember to give >100mg (up to 150mg) of suxamethonium if the woman weighs >100kg. Propofol may be used as an induction agent and may be preferable if a difficult airway is anticipated. A second syringe of induction agent should be available in case of airway difficulties (NAP 5) Rocuronium may be used as an alternative to Suxamethonium with a pre calculated dose of Sugammadex available to be drawn up in the event of a failed intubation (NEW 2020).
- Perform RSI – see separate OAA DAS obstetric airway guidelines for guidance on conduct of intubation, and Failed Intubation Drill (Appendix 3)
- Secure the airway, inflate the cuff, confirm placement with capnography and auscultation. Inform the surgeon they may proceed once the airway is secured (NEW 2020)
- Use sevoflurane +/- 50% Nitrous oxide (N₂O) unless specifically contraindicated or a very high FiO₂ is required. N₂O is MAC sparing, decreases the risks of awareness and provides some analgesia pre delivery. N₂O, however produces the second highest carbon dioxide emissions of anaesthetic gases after Desflurane. Over-pressure may be required to achieve rapid uptake of inhalational agent. Beware that the pregnant state leads to increased sensitivity to volatiles
- Aim for combined MAC of 1-1.2, especially immediately post induction. (However be aware of tocolytic effect of high volatile concentrations)
- Give opioids immediately post-delivery which may allow a reduction in MAC. Aiming for low fresh gas flows is unnecessary. Remember that caesarean sections carry a high risk of awareness
- Further paralysis may not be required if surgeon quick and access optimal. Remember Suxamethonium has a prolonged duration of action in pregnancy due to an acquired anticholinesterase deficiency
- Remember oxytocin/carbetocinon at delivery
- Antibiotics should be given when timing allows. Ensure, if drawn up pre-induction they are kept separate (and labelled) from Thiopentone to avoid mix up of syringes

2.3.3. End of Procedure

- Check reversal with nerve stimulator. Administer reversal agent and use a double dose if patient BMI >35 (NEW 2020)
- Consider multimodal analgesia:
 - Opioid
 - Paracetamol IV/PR
 - Diclofenac PR if no C/I
 - Epidural if catheter in-situ
 - Transversus abdominis plane (TAP) block or other regional technique
- Advise the surgeon to administer local anaesthetic to the skin and the rectus sheath
- The risk of aspiration at extubation is high. Consider draining stomach contents before extubation. Extubate in left lateral position, or supine head up, when fully awake with airway reflexes recovered.
- Monitor in recovery for at least 60 min with an anaesthetist immediately available (See guideline: Post-operative care & transfer from recovery)
- Prescribe post op analgesia, fluids, thrombo- prophylaxis & anti-emetics

2.4. Special Circumstances

2.4.1. Pre-eclampsia

- Involve senior help early, consider an arterial line but do not delay if unable to insert rapidly (often difficult due to severe vasoconstriction)
- Be aware that automated blood pressure cuffs may not read accurately and manual BP may be necessary.
- Decision to deliver should only be made once the patient is stabilised and blood pressure has been treated
- Consider Magnesium, IV opioids, Esmolol or Labetalol to blunt pressor response to intubation and inform neonatologists that these drugs have been administered.
- Do not give Ergometrine or NSAIDS
- Avoid too rapid rate of fall in BP

2.4.2. Fetal compromise

- Remember in utero resuscitation
- Treat hypotension aggressively with vasopressors and fluid

3. Monitoring compliance and effectiveness

Element to be monitored	Clinical Guideline for General Anaesthesia for Caesarean Section Indications
Lead	Lead Obstetric Anaesthetist
Tool	Indication for General Anaesthesia Caesarean Section tool kit

Frequency	If GA sections flag red on the dashboard audit to be undertaken
Reporting arrangements	Maternity Risk Management and Clinical Audit Forum
Acting on recommendations and Lead(s)	Develop an action plan and assign an action plan lead
Change in practice and lessons to be shared	<ul style="list-style-type: none"> • Required changes to practice will be identified and actioned within a time frame agreed on the action plan • A lead member of the forum will be identified to take each change forward where appropriate. • The results of the audits will be distributed to all staff through the Risk Management Newsletter and Audit Forum as per the action plan

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the ['Equality, Inclusion & Human Rights Policy'](#) or the [Equality and Diversity website](#).

4.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Document Title	General Anaesthetic for Caesarean Section Clinical Guideline V4.0		
This document replaces (exact title of previous version):	Clinical guideline for general anaesthesia for caesarean section indications V3.0		
Date Issued/Approved:	4th June 2020		
Date Valid From:	July 2020		
Date Valid To:	July 2023		
Directorate / Department responsible (author/owner):	Obs and Gynae Directorate Sam Banks		
Contact details:	01872 252879		
Brief summary of contents	Guidelines for general anaesthesia for caesarean sections		
Suggested Keywords:	General anaesthesia, caesarean section, GA, airway, difficult, intubation, fluid, resuscitation, RSI, Rapid Sequence Induction		
Target Audience	RCHT	CFT	KCCG
	✓		
Executive Director responsible for Policy:	Medical Director		
Approval route for consultation and ratification:	Maternity Guideline Group Care Group Board		
General Manager confirming approval processes	Debra Shields		
Name of Governance Lead confirming approval by specialty and care group management meetings	Caroline Amukusana		
Links to key external standards	CNST 2.6		
Related Documents:	<ul style="list-style-type: none"> McGlennan A, Mustafa A. General anaesthesia for Caesarean section. Contin Educ Anaesth Crit Care Pain (2009) 9 (5): 148-151 http://www.aagbi.org/sites/default/files/checking_anaesthetic_equipment_2012.pdf http://www.rcht.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/Anaesthetics/FailedIntubationForTheObstetricPatient.pdf 		

	<ul style="list-style-type: none"> • J.G. McDonnell, G. Curley, J. Carney, A. Benton, J. Costello, C.H. Maharaj, J.G. Laffey The analgesic efficacy of transversus abdominis plane block after cesarean delivery: a randomized controlled trial. <i>Anesthesia and Analgesia</i> (2008) 106: 186-191 • Rawlinson E, Mincon A. Pulmonary aspiration. <i>Anaesth Intensive Care</i> (2007) 8: 365–7 • http://www.rcht.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/MidwiferyAndObstetrics/PreEclampsiaEclampsiaGuidelineForTheManagementOfSevere general Anaesthesia in the United.pdf • NAP 5. Accidental Awareness during Kingdom and Ireland (September 2014) • OAA DAS Obstetric airway guidelines (2015)
Training Need Identified?	None
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet & Intranet <input checked="" type="checkbox"/> Intranet Only <input type="checkbox"/>
Document Library Folder/Sub Folder	Clinical / Midwifery and Obstetrics

Version Control Table

Date	Version No	Summary of Changes	Changes Made by (Name and Job Title)
5 th June 2014	V2.0	<ul style="list-style-type: none"> • "Discuss with patient" section largely removed. Not relevant in emergency • In utero resuscitation included in preparation section • Emphasis on positioning for intubation • Direct reference to failed intubation guideline • Instruction on gas mixture rewritten for clarity • Antibiotics/oxytocin instruction updated to reflect current practice • Extubation section expanded with suggestion to drain stomach contents • Pre-eclampsia section rewritten to emphasise need to stabilise patient before theatre 	Alexander Ishimaru
17th June 2017	V3.0	<ul style="list-style-type: none"> • NAP 5 recommendations included • Addition of DAS guidelines as appendix 	Sam Banks Consultant Anaesthetist

4 th June 2020	V4.0	<p>1.3.0. Inclusion statement.</p> <p>2.2.1. Removal of oral piercings added.</p> <p>2.2.4. NAP5 (National Audit Project 5) added.</p> <p>2.3.1. Left lateral and tocolytics for intrauterine resuscitation added, 100% oxygen and rapid IV fluids removed, 100% oxygen and rapid IV fluids for maternal resuscitation added, Association of anaesthetists added, AAGBI removed, videolaryngoscope added, Ranitidine removed, H2 receptor antagonist added, modified version of WHO checklist added for CAT1 CS, OAA DAS algorithm added.</p> <p>2.3.2. Patient position added, Oxford HELP pillow added, nasal cannular and 5 litre oxygen removed, high flow nasal oxygen added, induction agents and neuromuscular blocking agent added, Rocuronium and Sugammadax added, failed intubation guideline removed, OAA DAS obstetric guidelines added, informing surgeon one airway secured added, nitrous oxide and its environmental impact added, labelling antibiotics added, reversal agent and increased BMI changes.</p> <p>Updated Trust templates.</p>	Sam Banks Consultant Anaesthetist
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This document is only valid on the day of printing

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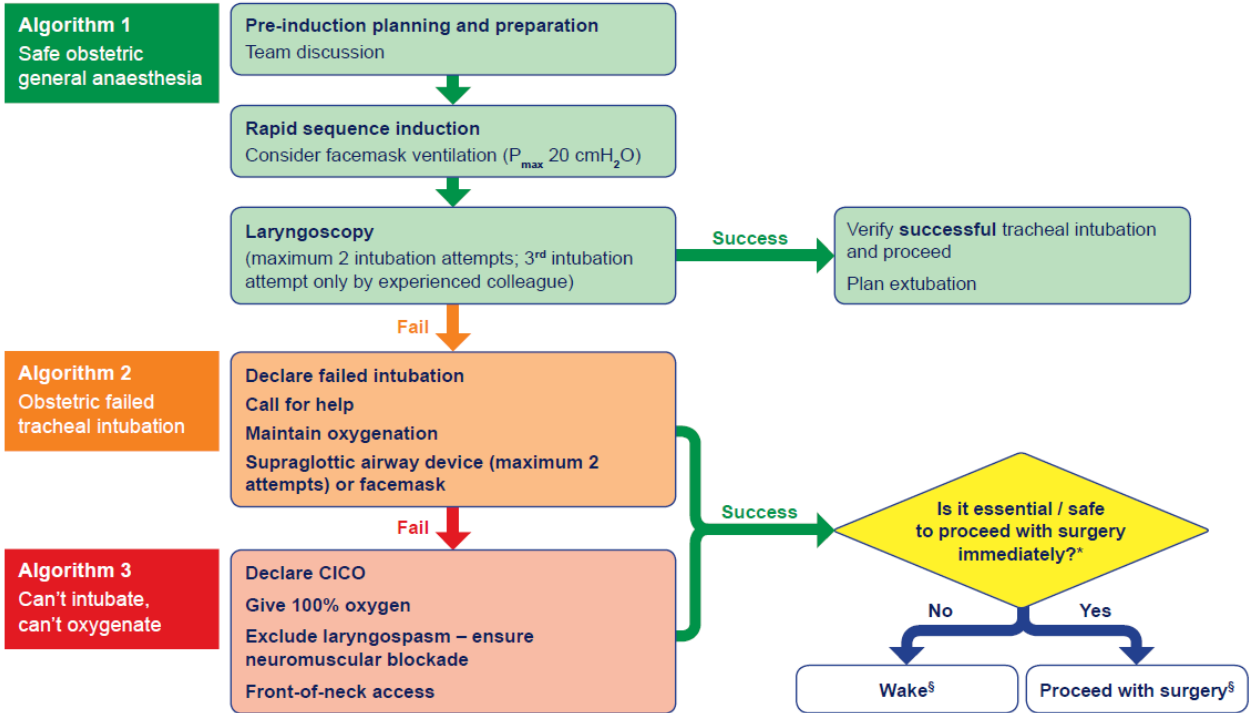
Appendix 2. Initial Equality Impact Assessment

Section 1: Equality Impact Assessment Form						
Name of the strategy / policy / proposal / service function to be assessed General Anaesthetic for Caesarean Section Clinical Guideline V4.0						
Directorate and service area: Obs and Gynae			Is this a new or existing Policy? Existing			
Name of individual/group completing EIA Sam Banks			Contact details: 01872 25 3132			
1. Policy Aim Who is the strategy / policy / proposal / service function aimed at?		The aim of this guideline is to provide guidance for anaesthetists to safely perform a general anaesthesia for caesarean section.				
2. Policy Objectives		Ensure appropriate and safe management of general anaesthesia for caesarean section.				
3. Policy Intended Outcomes		Good outcome for the mother undergoing caesarean section under general anaesthesia.				
4. How will you measure the outcome?		Compliance monitoring tool.				
5. Who is intended to benefit from the policy?		All pregnant women.				
6a). Who did you consult with?		Workforce	Patients	Local groups	External organisations	Other
		x				
b). Please list any groups who have been consulted about this procedure.		Please record specific names of groups: Maternity Guideline Group Care Group Board				
c). What was the outcome of the consultation?		Guideline agreed				

7. The Impact				
Please complete the following table. If you are unsure/don't know if there is a negative impact you need to repeat the consultation step.				
Are there concerns that the policy could have a positive/negative impact on:				
Protected Characteristic	Yes	No	Unsure	Rationale for Assessment / Existing Evidence
Age		x		
Sex (male, female non-binary, asexual etc.)		x		
Gender reassignment		x		
Race/ethnic communities /groups		x		
Disability (learning disability, physical disability, sensory impairment, mental health problems and some long term health conditions)		x		
Religion/ other beliefs		x		
Marriage and civil partnership		x		
Pregnancy and maternity		x		
Sexual orientation (bisexual, gay, heterosexual, lesbian)		x		
<p>If all characteristics are ticked 'no', and this is not a major working or service change, you can end the assessment here as long as you have a robust rationale in place.</p> <p>I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.</p>				
Name of person confirming result of initial impact assessment:			Sam Banks	
<p>If you have ticked 'yes' to any characteristic above OR this is a major working or service change, you will need to complete section 2 of the EIA form available here:</p> <p>Section 2. Full Equality Analysis</p> <p>For guidance please refer to the Equality Impact Assessments Policy (available from the document library) or contact the Human Rights, Equality and Inclusion Lead debby.lewis@nhs.net</p>				

APPENDIX 3

Master algorithm – obstetric general anaesthesia and failed tracheal intubation

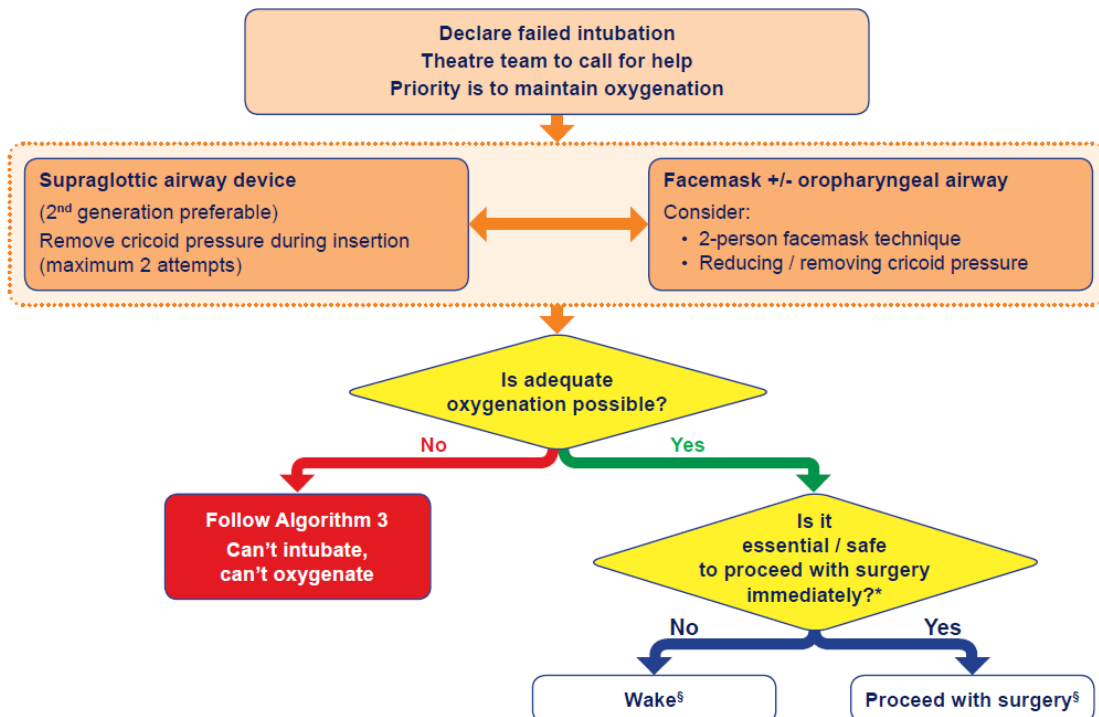


*See Table 1, §See Table 2

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Algorithm 2 – obstetric failed tracheal intubation

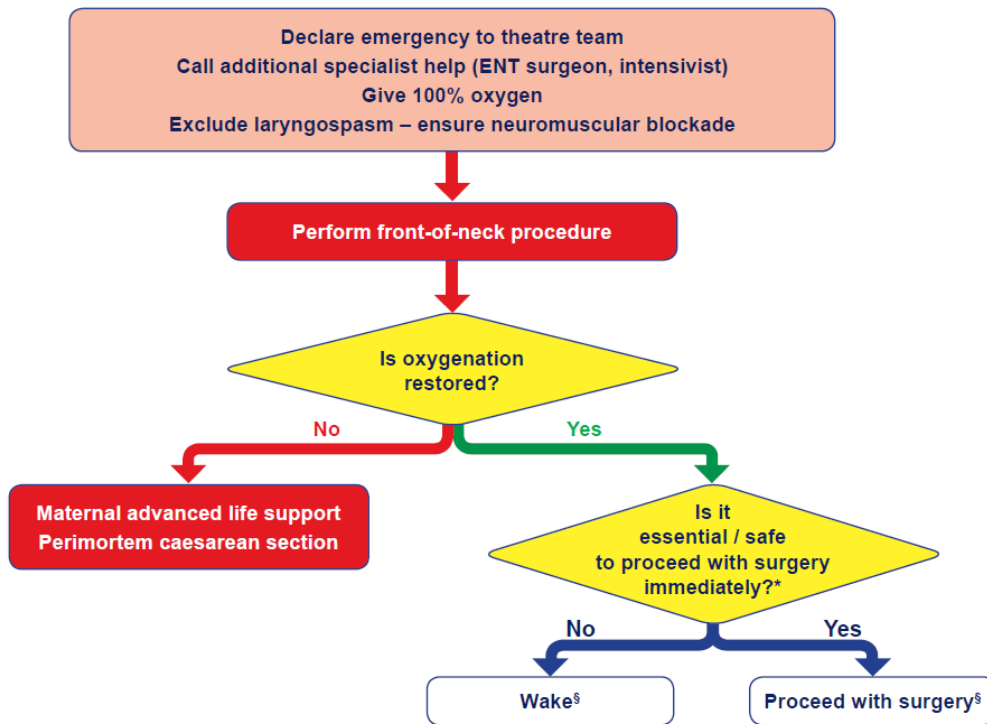


*See Table 1, §See Table 2

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



*See Table 1, §See Table 2

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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.

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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 H₂ receptor blocker i.v. if not already given
- Senior obstetrician to operate
- Inform neonatal team about failed intubation
- Consider total intravenous anaesthesia



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