### Guideline for general anaesthesia for caesarean section

<table>
<thead>
<tr>
<th>Full Title of Guideline:</th>
<th>Guideline for general anaesthesia for caesarean section</th>
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</thead>
<tbody>
<tr>
<td>Author (include email and role):</td>
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</tr>
<tr>
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<td>Anaesthesia, Clinical support</td>
</tr>
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<td>Ratified by:</td>
<td></td>
</tr>
<tr>
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</tr>
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<td>Includes patients having caesarean section</td>
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<tr>
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<tr>
<td>Summary of evidence base this guideline has been created from:</td>
<td>Nap4, NAP5 and literature search regarding anaesthesia for caesarean section</td>
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</table>

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.
Anaesthesia for caesarean section – general anaesthesia

General anaesthesia for caesarean section may be used for emergency caesarean, immediate threat to life of mother or baby, elective caesarean, regional not possible or patient request, or due to failure of regional anaesthesia, either before skin incision or during the procedure.

Pre-operative assessment
- Focused history and examination with particular attention to the airway\(^1\). Also pre-eclampsia, risk of bleeding, current volaemic status and obesity.
- If any **anticipated difficulty, summon help immediately**.
- Intrauterine fetal resuscitation if necessary\(^2\).

Preparation for GA
- skilled airway assistant (ODP/nurse)
- consider sodium citrate\(^3,4\) – 30ml 0.3 Molar
- IV access – 16 or 14G, check patent with free flowing drip
- Patient position – 15\(^0\) left lateral tilt, optimise head and neck position (‘sniffing the morning air’ or Oxford HELP, especially if raised BMI\(^5\))
- Full monitoring as per AAGBI guidelines
- Suction
- Airway plan – discuss with ODP
- WHO checklist – whilst preoxygenating
- Consider cell salvage

Preoxygenation
- Tight fitting facemask and high flow oxygen 10-15l/min
- Preoxygenate to Et O\(_2\) > 0.9\(^6\)
- Consider nasal oxygenation(5 L/min increased to 15 L/min post induction)\(^7,8\) or THRIVE\(^9\) (only if experienced in use)
- Have a low threshold for gentle bag-mask ventilation

Cricoid
- Recommended initial 10N force then increase to 30N
- Adjust or remove if airway difficulty
Induction

- **Propofol** \(^\text{10}\) (if more familiar with it as an induction agent) or **Thiopentone** 5-7mg/kg. High risk of awareness so ensure adequate dose and consider further dose if difficult intubation (may need reduced dose if cardiovascularly unstable). \(^\text{11}\)
- **Rocuronium** 1-1.2mg/kg IBW max 100mg (if using for suspected difficult airway or high BMI ensure 16mg/kg dose of sugammadex available for immediate reversal - Appendix A) \(^\text{12,13}\) or **Suxamethonium** 1.5mg/kg
- Consider opioid (essential if preeclampsia or CVS disease) e.g. 1-2mg alfentanil. Inform neonates if given

Intubation

- Make first attempt the best attempt – position, anaesthesia, relaxation, laryngoscope
- COETT 7-7.5
- Failed intubation – call for help, follow OAA/DAS guidelines \(^\text{14}\)

Maintenance

- **Oxygen** to maintain sats >95%
- **Sevoflurane/isoflurane** – consider overpressure initially as high risk of awareness, then decrease after cord clamping and opioid administration. Volatiles cause decrease in uterine tone.
- Consider **N\(_2\)O**, as allows anaesthesia with decreased use of volatile. (up to 67% N\(_2\)O)
- **Antibiotics** should be given as per NUH antibiotic guidelines (but after induction as risk drug errors and lack of time)
- **Vasopressors** – give 50-100mcg phenylephrine boluses if needed (ensure hypotension not due to bleeding)
- **Muscle relaxant** – may need further doses of rocuronium during surgery
- **Analgesia** – 1g paracetamol iv, morphine 10-15mg, consider TAP blocks or wound infiltration of local anaesthetic by surgeon, consider PR diclofenac 100mg if consented and no contraindication
- **Uterotonics** – give 5 units oxytocin by slow iv infusion after cord clamping then oxytocin infusion as per NUH guidelines
- **Fluids** – give 1000ml Hartmanns via fluid warmer, give further fluid as per clinical need, consider blood if blood loss
- **Antiemetics** – give ondansetron 4mg after cord clamping
• **Document** – whole anaesthetic including reason for GA and timings

**Extubation**

• **Reversal** – Train of four should be monitored and appropriate reversal given. Consider sugammadex for reversal of rocuronium if any airway concerns or obese.\(^{15}\) (Appendix B\(^{16}\))

• **Extubate awake and sitting (or in left lateral)** – High risk of regurgitation, airway obstruction and hypoventilation so extubate fully awake and fully reversed with good oxygen saturations and tidal volumes in head up position.\(^{17,18}\)

**Postoperative Care**

• **Analgesia** – Oramorph prn, regular paracetamol +/- regular ibuprofen QDS (as per clinical picture) as first line. Consider PCA if operation more extensive than usual or unable to take medication orally.

• **Antiemetics** – prescribe prn

• **Enoxaparin** – prescribe 4 hours after end of operation, or removal of epidural, at nearest drug round

• **ERAS** – is patient suitable for enhanced recovery? (see ERAS checklist)

• **Where?** – The patient must meet the recovery criteria for transfer of patient out of recovery to the postnatal wards.\(^{19}\) If there are any concerns about the clinical condition of the patient then they should be transferred to labour ward or considered for CCU.

• **Review** – all patients should be reviewed when fully awake. If there are any concerns about possible intraoperative awareness then the consultant in charge should be informed, the patient should be debriefed and follow up arranged as per the NAP5: Anaesthesia Awareness Pathway\(^{20}\).
APPENDIX A

Obstetric Sugammadex Dosing Guide

Emergency reversal following RSI

<table>
<thead>
<tr>
<th>Weight</th>
<th>Dose to be given</th>
<th>Number of large 5ml vials</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;60kg</td>
<td>1000mg</td>
<td>2</td>
</tr>
<tr>
<td>60-90kg</td>
<td>1500mg</td>
<td>3</td>
</tr>
<tr>
<td>90-125kg</td>
<td>2000mg</td>
<td>4</td>
</tr>
<tr>
<td>&gt;125kg</td>
<td>2500mg</td>
<td>5</td>
</tr>
</tbody>
</table>

Sugammadex can also be given for routine reversal of rocuronium-induced neuromuscular blockade.

<table>
<thead>
<tr>
<th>Depth of neuromuscular blockade</th>
<th>Dose</th>
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<tbody>
<tr>
<td>Shallow – Train of four count of ≥2</td>
<td>2mg/kg</td>
</tr>
<tr>
<td>Deep – No response to train of four but post-tetanic count of 1-2</td>
<td>4mg/kg</td>
</tr>
</tbody>
</table>
**APPENDIX B**

<table>
<thead>
<tr>
<th>Qualitative PNS</th>
<th>Quantitative PNS</th>
<th>Neostigmine</th>
<th>Sugammadex iv</th>
<th>mg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTC 0-15</td>
<td>PTC 0-15</td>
<td>WAIT (until TOF count 4)</td>
<td>WAIT or Sug 2-4 mg/kg</td>
<td></td>
</tr>
<tr>
<td>TOF Count 1 or 2</td>
<td>TOF Count 1 or 2</td>
<td>WAIT</td>
<td>WAIT or Sug 2mg/kg (max 1 200mg vial)</td>
<td></td>
</tr>
<tr>
<td>TOF Count 3 or 4</td>
<td>TOF Count 3 or 4</td>
<td>NEO 50mcg/kg*</td>
<td>USE NEO 50mcg/kg* (or Sug 2mg/kg)</td>
<td></td>
</tr>
<tr>
<td>TOF Count 4 with fade</td>
<td>TOF ratio &lt;40%</td>
<td>NEO 50mcg/kg*</td>
<td>USE NEO 50mcg/kg* (or Sug 2mg/kg)</td>
<td></td>
</tr>
<tr>
<td>TOF Count 4 No fade</td>
<td>TOF ratio 40-90%</td>
<td>NEO 30mcg/kg**</td>
<td>USE NEO 30mcg/kg **(or Sug 2mg/kg)</td>
<td></td>
</tr>
<tr>
<td>TOF ratio &gt;90%</td>
<td>NO REVERSAL</td>
<td>NO REVERSAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Time from Neostigmine administration to extubation – allow 20 minutes
** Time from Neostigmine administration to extubation – allow 10-15 minutes

Sugammadex is 150 times more expensive than neostigmine so use as per NUH Sugammadex guideline
References


7 Wimalasena Y, Burns B, Reid C, Ware S, Habig K. Apneic oxygenation was associated with decreased desaturation rates during rapid sequence intubation by an Australian helicopter emergency medicine service. Ann Emerg Med 2015; 65: 371–6.


10 Lucas DN, Yentis SM. Unsettled weather and the end for thiopental? Obstetric general anaesthesia after the NAP5 and MBRRACE-UK reports. Anaesthesia 2015; 70: 375–9

11 NAP5 5th National Audit Project of The Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland, Chapter 16 AAGA in obstetric anaesthesia


20 NAP5: Anaesthesia Awareness Pathway http://www.nap5.org.uk/NAP5-Awareness-Pathway